-DRAFT COPY-

SAHA INSTITUTE OF NUCLEAR PHYSICS

ANNUAL REPORT

2016 – 2017

SINP

Sector – 1, Block - AF, Bidhannagar,
Kolkata – 700 064

Contents

Activities of the Institute
(April 2016 – March 2017)

Saha Institute of Nuclear Physics (SINP) is engaged in basic scientific research on four broad subject areas, namely, (a) Astroparticle physics and Cosmology, Theory (b) Applied Nuclear Physics, High Energy Nuclear & Particle Physics, Nuclear Physics and Plasma Physics, (c) Condensed Matter Physics, Surface Physics and Material Science (d) Biophysics and structural Genomics, Crystallography & Molecular Biology, Computational sciences and Chemical sciences.

The following table represents information on the number of Faculties, Research Fellows, Research Associates/Post Doctoral Fellows and number of Ph.D's awarded.

Division	Faculties	Research Fellows	R.A. / Post-Doc	Ramanujan Fellow	Ph. D. Awarded
Astroparticle Physics & Cosmology	6	6	1		6
Theory	13	13	5		5
Applied Nuclear Physics	7	7	1		2
High Energy Nuclear & Particle Physics	8	13	2	1	5
Nuclear Physics	6	15	1	1	2
Plasma Physics	2	8	1		4
Condensed Matter Physics	12	21	9		6
Surface Physics & Material Science	12	14	2		8
Biophysics & Structural Genomics	7	15	3		8
Crystallography & Molecular Biology	6	13	5		3
Chemical Science	8	10	3		6
Computational Science	2	2	1		1
Total	89**	137	34	2	56

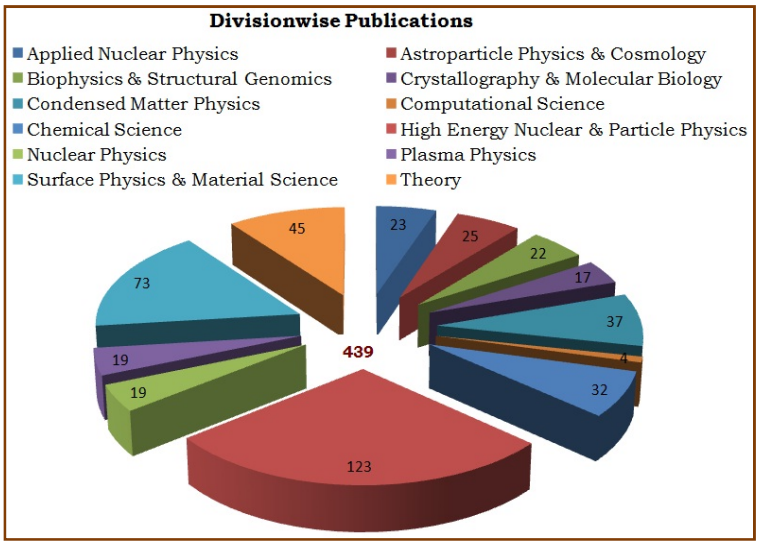
View at a glance of each Divisions in Tabular Form

**** Total 90 Faculties including Director**

Thirty one (31) Post M.Sc. students have been inducted into research and teaching program during the year 2016-17. Eleven (11) undergraduate associates and twenty four (24) summer students have been trained in the Institute. The students come from different parts of the country.

Important Achievements

Research Publications and PhD Awarded

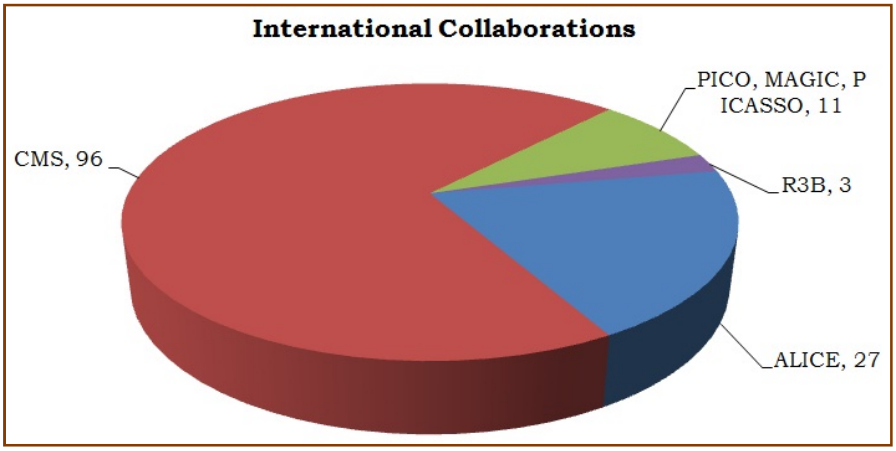


In this period about 56 theses have been awarded the Ph.D. degrees. Altogether 439 research publications have been credited during the period with 62 scientific articles published in high impact (I.F.≥ 6) journals like Nature, Science, ACS Catalysis, Nucleic Acids Research, Proceedings of The National Academy of Sciences of The United States of America, Chemistry of Materials, Physical Review Letters, ACS Applied Materials & Interfaces, Chemsuschem, Cancer Letters, Acta Biomaterialia, Chemical Engineering Journal and Journal of High Energy Physics, etc.

- **International Collaborations**

Besides, the institute is continuing several International Collaborations such as:

- ALICE and CMS experiments at CERN, PICASSO experiment at SNOLab.
- Experiments at Deutsches Elektronen-Synchrotron (DESY), Hamburg through the Indo-German Collaboration in synchrotron research.
- Successful operation of the Indian Beam Line at Photon Factory (KEK) at Tsukuba, Japan has been recognized as a flagship cooperative activity by the honorable Prime Minister of India. Publications through international collaborations are represented in the following graphical presentation.



Pie chart of the Number of publications through International Collaboration

- ## Outreach Programme

The institute has organised several **outreach programmes** through the CARE unit (Centre for Advanced Research & Education) both inside and outside SINP and received overwhelming response from the participants.

A moment during Science Day Celebration at SINP, March 10, 2017

Award Giving Ceremony of Science Day Celebration Program: Award given by Prof Ajit Kumar Mohanty, Director, SINP and Prof Amitava Roy, Director, VECC

- ## Honours & Distinctions

Prof. Gautam Bhattacharyya

- **Prof. Gautam Bhattacharyya** has been awarded the prestigious **J.C. Bose National fellowship** (DST-SERB) in 2017.

Dr. Biswarup Satpati

- **Dr. Biswarup Satpati** has been awarded MRSI medal 2017, Material Research Society of India.

67th Annual Foundation Day Celebration
January 11, 2017

Tree plantation by Chieft Guest Dr. Mammen Chandey, Director, Tata Medical Centre, Kolkata in the presence of our Director, Registrar and staff of SINP.

67th Foundation Day Lecture delivered by Dr. Mammen Chandy, Director, TMC, Kolkata

Celebration of 70th Indipendence Day at SINP
August 15, 2017

Flag hoisting and saluting on Independence Day 2017

Special Events

61st DAE-BRNS Symposium on Nuclear Physics

December 4 – 9, 2016

Participants of 61st DAE-BRNS Symposium on Nuclear Physics 2016 at Saha Institute of Nuclear Physics, Kolkata. Over 458 scientists and students from from all over the country participated in this annual symposium organized by DAE, Govt. of India. The main symposium is preceded by a one-day Orientation Programme for the student participants with Nuclear Astrophysics as the theme of the programme.

Saha Theory Workshop 2017 of the Theory Division

January 16 – 20, 2017

Theory Division of Saha Institute of Nuclear Physics host its third "Saha Theory Workshop: Aspects of Early Universe Cosmology". Experts who are actively working in this field had participated and young members who are pursuing research in this area. The workshop focuses on several theoretical aspects of early universe cosmology, how present and forthcoming data can guide us to unravel the mystery of early Universe.

Care Seminar Lecture given by Mark McCanghrean on February 14, 2017

Post M.Sc. Associates

Under Graduate Associate 2016 – 2017

Summer Students 2016 – 2017

Research Highlights

1. Applied Nuclear Physics

Research carried out at the Applied Nuclear Physics Division during 2016-17 involves probing the atomic, nuclear and nanocrystalline systems using nuclear probes and techniques. Intermetallic alloys of technological importance and low-dimensional systems, such as nano-crystalline materials are also being studied to explore their properties. Our members are working on dark matter search experiment, cosmic muon based tomography and developing instruments, experimental techniques and simulation of various aspects for these applications involving interdisciplinary areas of Physics. Development, characterization and optimization of radiation detectors for next generation high energy physics experiments, model based simulation and cognitive science research to understand the details of visual perception are also being carried out in our laboratories.

Our members, in collaboration with Astroparticle Physics and Cosmology (APC) Division, are working on the development of an underground laboratory in India for dark matter search experiment using scintillation based detectors. The experiment evolved as active collaboration between SINP, BARC, NISER and UCIL (and also INO). First phase of the experiment is to establish the laboratory, measure the radiation background and devise methods of reducing the effects of radiation background. Parallel development of scintillation detectors, their characterization for operation at cryogenic temperatures and optimizing the pulse shape discrimination to distinguish between electron and nuclear recoil events is in progress. Significant work has been done on simulation of the radiation background at the laboratory site by considering penetrating cosmic rays and residual rock radioactivity. Simulation of the detector response to background neutrons and gamma rays is also in progress.

Experiments on Electromagnetically Induced Transparency (EIT) and Electromagnetically Induced Absorption (EIA) in room temperature Rb atoms were carried out at Laser Spectroscopy and Quantum Optics laboratory at SINP. We have performed spectroscopic studies on neutral Rubidium atoms using pump-probe spectroscopic techniques, and results are interpreted by assuming V- and Λ-type multi-level systems for ^{85}Rb and ^{87}Rb atoms in D2 and D1 transitions. The results can be used to render the medium opaque and transparent in a controlled way for optical switching applications. Laguerre-Gaussian (LG) beams (optical Vortex beam) were set up using external cavity diode lasers. Narrowing of the line shapes of hyperfine transitions were observed for higher orders of the LG beam in comparison to the Gaussian beam.

Using time-differential perturbed angular correlation (TDPAC) technique, studies of point defects, structural and magnetic phase transitions in metallic and inter-metallic systems, thin films and nano-crystalline materials are carried out. A four-detector TDPAC spectrometer with ultrafast BaF_2 or $LaBr_3$(Ce) detectors has been developed for the above purpose. Numerous technological applications of Ni-based Zr and Hf intermetallic alloys have prompted comprehensive studies in $ZrNi_3$ and $HfNi_3$ alloys by perturbed angular correlation (PAC) spectroscopy which were not studied earlier. The different phases produced in the samples have been identified by PAC and X-ray diffraction (XRD) measurements. Stoichiometry of the compounds was asserted by HRTEM analysis. Density functional theory (DFT) based calculations of electric field gradient (EFG) and asymmetry parameter (η) at ^{181}Ta probe nucleus

allowed us to assign the observed EFG fractions at the lattice sites in the compounds.

Positron annihilation spectroscopy (PAS) was used for the studies of properties and processes related to defects in nanomaterials including metals, alloys, ferrites and semiconductors. An interesting aspect of these studies has been to look for the effect of doping and surface modification by defects and other substitutional elements in a nanocrystalline system. Investigation on several polymeric samples are also carried out for characterization of free volume defects in them and estimating their concentration.

Our members have successfully implemented the nearly exact Boundary Element Method (neBEM) to solve for potential and flux field in a non-dissipative system governed by Laplace's equation. In an important break-through, we have been able to carry out analytic integration of Green's function (and derivative) for singularities uniformly distributed over typical rectangular and triangular elements through the use of symbolic mathematics. The solver has been applied to study the physical as well as weighting field configurations of a diverse group of detectors that includes a few wire chambers, TPC, RPC and several new generation micro-pattern gaseous detectors (MPGD) such as Micro-Wire, Micro MEGAS, THGEM etc. We are working onthe application-oriented field of cosmic ray muon tomography. Both experimental and numerical simulation tools are being used to explore various possibilities.

One of our members is working on computational neuroscience which is an interdisciplinary area involving computational science, cognitive science and various aspects of visual perception. Computational mechanism of filling in at the blind spot of the retina and its associated properties can be understood by taking into account the statistics of natural scene and the computational architecture (Hierarchical Predictive Coding) of the cortex, and demonstrated that several experimentally observed properties of filling-in at the blind-spot could be accommodated under the same computational framework. The findings, in this work, offer new insights into the role of natural scene statistics in our perception and suggest, what is possibly, the first systematic bridge linking anisotropy in three levels: natural environment, visual cortex, and perceptual filling-in at the blind spot.

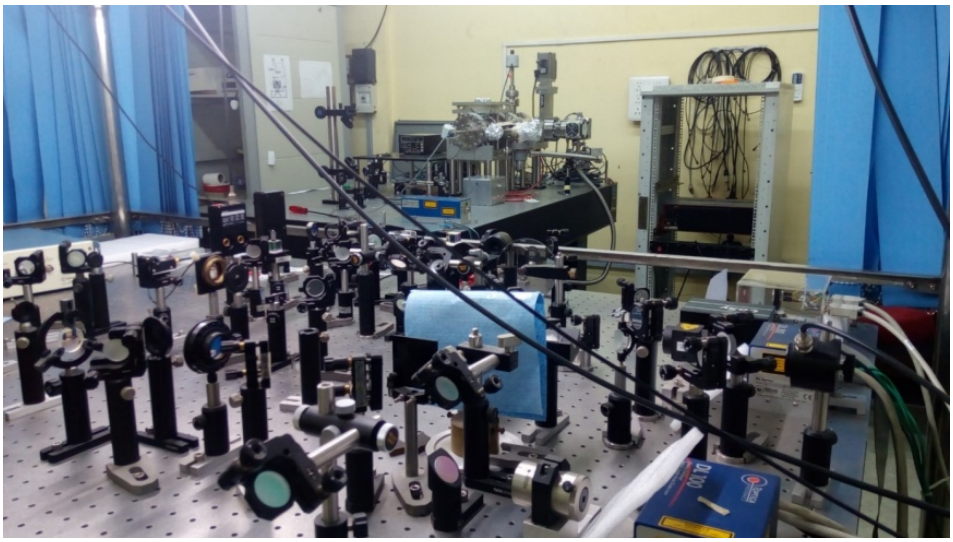


Fig. Laser Spectroscopy Laboratory in SINP studies electromagnetically induced phenomenon in neutral Rubidium atoms using external cavity diode lasers (ECDLs) operating at 780 nm.

1.1. Ph D Awarded

1. Hitesh V. Rahangdale [Satyajit Saha], Electron impact ionization study of high Z elements, Homi Bhabha National Institute, January 2017.
2. Meghna K. K. [Satyajit Saha], Performance of RPC detectors and study of muons with the Iroh calorimeter detector at INO, Homi Bhabha National Institute, January 2017.

1.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Nayana Majumdar

1. Status of INO, International Workshop of Next Generation Nucleon Decay and Neutrino Detectors (NNN16), Beijing, China, November 3-5, 2016.

Supratik Mukhopadhyay

1. Ionization detectors in nuclear and astroparticle physics, 8th Vidyasagar-Satyendranath Bose National Workshop 2017 on Nuclear and Astrophysics: Two opposite ends of Dimension (NATD 2017), Vidyasagar University, Midnapore, WB, India, January 17-19, 2017.
2. Detector Physics Simulation of Gaseous Ionization Detectors, Advanced Detectors for Nuclear, High Energy and Astroparticle Physics (ADNHEAP2017), Bose Institute, Kolkata, February 15-17, 2017.

P.M.G. Nambissan

1. Characterization of free volume defects in macromolecular systems through positron annihilation spectroscopy, International Conference on Macromolecules: Synthesis, Morphology, Processing, Structure, Properties and Applications (ICM-2016), Mahatma Gandhi University, Kottayam, Kerala, May 13-15, 2016.
2. Positron annihilation spectroscopic studies of multiferroic nanocrystalline bismuth ferrite doped with lanthanide ions, National Conference on Nanoscience, Nanotechnology and Advanced Materials (NCNNAM–2016), Birla Institute of Technology, Mesra, Ranchi, Jharkhand, September 26-27, 2016.
3. (i) Increasing the intensity of the consciousness of life through science and (ii) Nano is the word but Giga is the impact, INSPIRE Internship Science Camp, Sree Narayana College, Kannur, Kerala, December 25-30, 2016.
4. Positrons as nuclear spectroscopic probes for the studies of materials of astrophysical relevance, 8th Vidyasagar-Satyendranath Bose National Workshop 2017 on Nuclear and Astrophysics: Two opposite ends of Dimensions (NATD-2017), Vidyasagar University, Midnapur, West Bengal, January 17-19, 2017.
5. A metal oxide glass nanocomposite using its cationic vacancies as messengers of structural information in positron annihilation studies, 4th International Conference on Nanostructured Materials and Nanocomposites (ICNM-2017), Mahatma Gandhi University, Kottayam, Kerala, 10-12 February 10-12, 2017.

6. Positron annihilation studies of a metal oxide nanocomposite system, One day Workshop on Recent Advances in Nuclear Technique Based Materials Science Research, UGC-DAE Consortium for Scientific Research, Kolkata Centre, Kolkata, February 27, 2017.
7. Defect spectroscopic studies of nanomaterials, National Seminar on Nanoscience and Nanotechnology (NSNN-2017), Haldia Institute of Technology, Haldia, West Bengal, March 17-18, 2017.
8. Defect characterization through electron-positron annihilation spectroscopy of rare-earth-ions-substituted $BiFeO_3$ multiferroic nanocrystallites, International Meeting on Highly Correlated Systems (IMHCS-2017), Mahatma Gandhi University, Kottayam, Kerala, March 24-26, 2017.

Sankar De

1. Intra-molecular scattering within dissociative diiodoacetylene authored by Sankar De, P. Bhatt,C. P. Safvan, J. Matsumoto and H. Shiromaru, International Conference on Frontiers in Theoretical and Applied Physics (FTAPS 2017), American University of Sharjah, United Arab Emirates, February, 2017.
2. Probing ultrafast molecular dynamics with few-cycle infrared laser pulses and CEP control, Frontiers in Attosecond Science and Technology (FAST), Indian Institute of Science Education and Research (IISER), Mohali and Max Planck Society, Germany, March 2017.

2. Astroparticle Physics and Cosmology

The Astroparticle Physics & Cosmology (APC) Division carries out advanced research in the interface areas spanning High Energy Astrophysics, Cosmology, and Particle & Nuclear physics. During the year under review, members of the Division have carried out research on a variety of topics in Astroparticle Physics observational, experimental and theoretical. Some highlights are given below:

Dark matter direct search with PICASSO/PICO and various aspects of superheated liquid detector

Radiation linear energy transfer and drop size dependence of low frequency acoustic signal from tiny superheated droplets have been investigated experimentally at the SINP lab. The simulation of the response of superheated droplet detector to alpha particles has also been explored by incorporating the contamination both at the droplets and at the supporting matrix. Detection of bubble nucleation event has been carried out in superheated drop detector by using the pressure sensor. The design of the Camera Mount system for the next generation PICO-40L bubble chamber experiment has been done at SINP. The camera mount will be fitted with the viewing port of the chamber of the detector to view the bubble nucleation. Final sensitivity result from PICASSO dark matter search experiment has been published with the 32 detectors among which the two detectors were fabricated by the SINP group. We have also participated in the on-line shifts from SINP for the detector operation during actual physics run at SNOLab and in the data analysis program.

High Energy Gamma Ray Astronomy

The scientists of APC Division are involved in designing and building the calibration system for calibrating the camera of a prototype Large Size Telescope (LST) of Cerenkov Telescope Array (CTA) in close collaboration with Max Planck Institute for Physik, Munich and Tata Institute of Fundamental Research (TIFR), Mumbai. The calibration system has been assembled with help of engineers and technicians at SINP and TIFR and a graduate student from SINP. All tests to ascertain its performance have been completed. It is expected to be shipped to the observatory at La Palma, Canary Islands, Spain in autumn 2017 where the prototype LST is being constructed. Further field tests are envisaged in 2017.

The High Altitude Water Cerenkov (HAWC) detector array has recently released a catalog of very high energy gamma-ray sources above an energy threshold of ~ 10 TeV which have no clear counterparts in lower energies (either at > 10 GeV or > 300 GeV). The MAGIC telescopes and archival data from Fermi-LAT satellite detector were used to search for high energy and very high energy gamma ray emission from a selected list of promising candidate sources. No significant emission of gamma rays from any of the candidate sources was detected and hence differential flux upper limits were calculated for these sources. The combination of HAWC and MAGIC results together allow us to put strong constraints on the extensions of the sources.

A very detailed study of the long term light curve of the Flat Spectrum radio Quasar (FSRQ) PKS1510-089 in high energy gamma rays was done using the data taken by Large Area Telescope on board Fermi Gamma Ray Space Telescope (Fermi-LAT). Several flares of this highly variable source were identified and their temporal and spectral properties were studied in detail and compared with previous works on flares of PKS 1510-089. Five major flares and few sub-flares / sub-structures have

been identified in our study. The fastest variability time is found to be 0.95 +_10 hr where the minimum size of the emission region is estimated to be 4.82 x 10^{15} cm. In most of the flares the spectral energy distributions are best fitted with Log-parabola distribution compared to simple Power law or Power law with exponential cut-offs. This has strong physics implications regarding the nature of the high energy gamma-ray emission region

Neutron Stars

The magneto-elastic oscillations of magnetars were studied taking the effect of strong magnetic fields on the crustal composition, into account. Global magneto-elastic (GME) modes as well as modes confined to the crust (CME) only were investigated. Findings of model calculations were compared with frequencies of observed quasi-periodic oscillations in SGR 1806-20 and SGR1900+14. This comparison indicates that GME modes are essential to explain all the frequencies whereas CME modes can explain only the higher frequencies.

Furthermore, the influence of magnetic fields on the frame dragging effect of rotating neutron stars was investigated. It was found that the magnetic field has a non-negligible impact on the frame dragging.

Theoretical Research on Dark Matter

A new class of Dark Matter namely Feebly Interacting Dark Matter is explored in details. In this model, the Dark Matter is never in thermal equilibrium with the rest of the Universe's plasma and produced by the very feeble interaction of other particles. In contrast to more popular WIMP (Weakly Interacting Massive Particle) scenario, the FIMP Dark Matter approaches towards equilibrium whereas for the case of WIMP, the Dark Matter particles move away from equilibrium leading to decoupling. We propose a FIMP-WIMP model for dark matter and explore its phenomenology. It is revealed that while the Galactic centre (GC) gamma excess can be explained by considering annihilation of WIMP type Dark Matter at GC, the observation based self interaction bound of Dark Matter can be well explained by the FIMP component. Besides, we explore Axions as another possible candidate of Dark Matter.

Neutrino Physics and Astrophysics

(a) Neutrino Physics: Mass matrix phenomenology, Baryogenesis through Leptogenesis

Baryogenesis via leptogenesis is investigated in a specific model of light neutrino masses and mixing angles. The latter was proposed on the basis of an assumed complex-extended scaling property of the neutrino Majorana mass matrix M_ν, derived with a type-1 seesaw from a Dirac mass matrix m_D and a heavy singlet neutrino Majorana mass matrix M_R. One of its important features, highlighted here, is that there is a common source of the origin of a nonzero θ_{13} and the CP violating lepton asymmetry through the imaginary part of m_D. The model predicted CP violation to be maximal for the Dirac type and vanishing for the Majorana type. We assume strongly hierarchical mass eigenvalues for M_R. The leptonic CP asymmetry parameter $\epsilon^{\alpha}{}_1{}^L$ with lepton flavor α, originating from the decays of the lightest of the heavy neutrinos N_1(of mass M_1) at a temperature $T \sim M_1$, is what matters here with $\epsilon^{\alpha}{}_{2,3}$, originating from the decays of $N_{2,3}$, being washed out. The light leptonic and heavy neutrino

number densities (normalized to the entropy density) are evolved via Boltzmann equations down to electroweak temperatures to yield a baryon asymmetry through sphaleronic transitions. The effect of flavored vs. unflavored leptogenesis in the three mass regimes (1) $M_1 < 10^9$ GeV, (2) 10^9 GeV $< M_1 < 10^{12}$ GeV and (3) $M_1 > 10^{12}$ GeV are numerically worked out for both a normal and an inverted mass ordering of the light neutrinos. Corresponding results on the baryon asymmetry of the universe are obtained, displayed and discussed.

(b) Supernova Neutrinos

Supernova neutrinos can excite nuclei above their neutron emission thresholds. Simultaneous detection of the neutrons in a Fe (dominantly sensitive to neutral current) and a Pb (dominantly sensitive to charged current) can allow us to probe the flavor composition of the supernova neutrinos.

2.1. Ph D Awarded

1. Apurba Kheto [Debades Bandyopadhyay], Isospin dependent entrainment in rotating superfluid neutron stars, HBNI, Mumbai, April 2016.
2. Mainak Chakraborty [Ambar Ghosal], A Study on Neutrino Masses, Mixing and Baryogenesis through Leptognesis in Some Electroweak models, University of Calcutta, Kolkata, June 2016.
3. Kamakshya Prasad Modak [Debasish Majumdar], Investigating Some Aspects of Dark Matter Indirect Detection Using Different Dark Matter Particle Physics Models, HBNI, Mumbai, August 2016.
4. Anirban Biswas [Debasish Majumdar], Exploring Some Models for Particle Dark Matter, University of Calcutta, September 2016.
5. Debabrata Adak [Debasish Majumdar], Studying Dark Energy from Theoretical and Observational Aspects of Late-time Cosmic Acceleration, University of Calcutta, November 2016.
6. Amit Dutta Banik, [Debasish Majumdar], Study of Different Dark Matter Models with Extended Higgs Sector, HBNI, Mumbai, November 2016.
7. Prasanta Char, [Debades Bandyopadhyay], Some studies on Core Collapse Supernovae and Neutron Stars, HBNI, Mumbai, January 2017.

2.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Debades Bandyopadhyay

1. Probing Exotic Fluid in Neutron Star Interior, One day seminar on the properties of nuclear fluid, VECC, Kolkata, December 29, 2016.
2. Neutron Stars: Masses and moments of inertia, Key Science Projcet (KSP) session, SKA 2016: Science for the SKA generation, Goa, November 7-11, 2016.
3. Neutron Stars: unique laboratories for fundamental physics at supranuclear densities, First Asia SKA Initiative on NS (ASIONS), Goa, November 4-5, 2016.

4. Masses, Radii and Moments of Inertia of Neutron Stars: Probing Neutron Star Interior, Introductory Workshop on Astrophysics and Cosmology, Aliah University, Kolkata, September 27-28, 2016.

Debasish Majumdar

1. Fermionic Dark Matter in a Dark Sector, PHENO1@IISERM, IISER, Mohali, 6-9 April, 2016.
2. Invisible Sector: Neutrinos and Dark matter, Indo-US workshop, University of Hyderabad, Hyderabad, November 16-18, 2016.
3. Dark Matter, XXII DAE-BRNS High Energy Physics Symposium, University of Delhi, Delhi, December 12-16, 2016.
4. Aspects of Dark Matter, National Workshop on Recent Advances in Astrophysics and Cosmology, Department of Physics, University of North Bengal, Siliguri, March 17-18, 2017.

Mala Das

1. Direct detection of Dark Matter, 8th Vidyasagar Satyendranath Bose National Workshop 2017 on Nuclear and Astrophysics: Two opposite ends of Dimensions (NATD-2017), Vidyasagar University, Midnapore, January 18, 2017.

Pijushpani Bhattacharjee

1. Status of DINO, INO collaboration meeting, TIFR, Mumbai, October 25, 2016.
2. On the Trail of WIMPs: Detecting the Weakly Interacting Massive Particle Candidates of Dark Matter, National Conference on Frontiers of Physics, Burdwan University, Burdwan, West Bengal, March 30-31, 2017.

Pratik Majumdar

1. Origin of Cosmic Rays: A 100 Year Old Story, Recent trends in Condensed Matter and High Energy Physics (RCHP), IACS, Kolkata, January 30-February 1, 2017.
2. Exploring the Universe with High Energy Photons and Particles, DST-INSPIRE Camp, IISER, Pune, July 2016.
3. Guest Stars of the Universe, INSPIRE school students at JBNSTS, Kolkata, December 2016.

2.3. Teaching elsewhere

Debades Bandyopadhyay

1. A short course on the physics of neutron stars, NCRA-TIFR, Pune, March 23-29, 2017.

Debasish Majumdar

1. M.Sc. Course on Standard Model Interactions, St. Xavier's College, Kolkata, January - April, 2017.
2. Nuclear Astrophysics (3 Lectures), CNT Lectures, VECC, Kolkata, March 2017.

Pijushpani Bhattacharjee

1. Advances in High Energy Astrophysics & Astroparticle Physics, SINP Post-MSc. advanced course, January – March 2017.
2. Detecting the Weakly Interacting Massive Particle Candidates of Dark Matter, VECC, Kolkata, January 24, 2017.

3. Biophysics and Structural Genomics

Biophysics and Structural Genomics Division is focussed in interdisciplinary area of basic and clinical research involving Proteomics, Biomolecular spectroscopy, Chemical Biology and Synthetic & Structural Biology. The widely prevalent diseases of eastern India, HbE-thalassemia and leukemia are being studied as model for hematological disorders while Alzheimer's, Huntington's, and the Prion diseases are being investigated for gaining insights into neurodegenerative diseases. Differential proteomics studies have been performed using clinical samples of cerebrospinal fluid, blood and plasma. Classes of redox regulators and chaperone proteins have been found to be up-regulated in hemoglobinopathy and an interactome for haemoglobin has been identified in erythrocytes. Investigations in cellular signaling and its role in cell fate determination vis a vis regulation of metabolism were studied using comparative mitochondrial proteome. Our findings clearly underline that cellular signalling and differentiation, lead to the alteration of mitochondrial proteome which in turn affects the functioning of key metabolic pathways. Similar studies have also implicated deregulation in self renewal pathways in the process of metastasis in gastric and breast cancer. Biophysical studies on elasticity of nuclear membrane proteins Lamins have implicated their role not only in cardiovascular diseases but in cell differentiation as well. Currently, investigation on the role of lamins and intermediate filaments in DNA damage response, karyokinesis and carcinogenesis are underway. Epigenomics studies on function and dynamics of transcription factors have been initiated to interpret the epigenetic language in eukaryotic cells. We aim to understand the critical interactions between histone posttranslational modifications and the 'readers' which regulate important cellular pathways and their dysfunctions leading to disease such as breast cancer.

Neurodegenerative disorders like Alzheimer's, Huntington's and Prion Diseases are being pursued to study the roles of various micro RNAs in the disease process. The major focus of research in Alzheimer's has been the study of the downstream pathogenesis mediated through AICD and its adaptor network. AICD possesses conserved motifs that are known to interact with cytosolic adaptor proteins and these interactions in turn affect different signaling pathways. With Prion disease as a model system, we are trying to understand the significance of the ESCRT machinery and the endo-lysosomal pathway in Prion protein-mediated neurodegeneration. Our aim is to provide a molecular explanation for how the loss of function mutation of Mahogunin results in Prion disease like phenotype of spongiform neurodegeneration. In this regard, Ubiquitin-mediated regulation of the E3 ligase GP78 by MGRN1 in trans have been shown to affect mitochondrial homeostasis and positioning of spindle apparatus in development and disease.

Recently, we have initiated studies on a molecular systems level understanding of the combined effects of microgravity and space ionizing radiation (high energy particles) on human cells along with a metabolomics-guided system level elucidation of the effect of radiation exposure on living systems.

3.1. Ph D Awarded

1. Srijan Haldar [Subrata Banerjee], Biology of Megakaryocytes, University of Calcutta, May 2016.

2. Devika Srivastava [Oishee Chakrabarti], Mahogurin (MGRNI) mediated ubiquitination of α-tubulin and its regulation of cell division, University of Calcutta, July 2016.
3. Pritha Bhattacharjee [Kaushik Sengupta], Mechanistic elucidation of the Role of Lamin A in Dilated Cardiomyopathy, University of Calcutta, November 2016.
4. Avinanda Banerjee [Kaushik Sengupta], Effects of Lamin A mutations in Nuclear Morphology, Function and mechanics – a Plausible link with Dilated Cardiomyopathy, University of Calcutta, November 2016.

3.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Chandrima Das

1. Novel mechanisms of suppression of breast cancer metastasis by chromatin Readers/Effectors, 6th Meeting of the Asian Forum for Chromatin and Chromosome Biology, CCMB, Hyderabad, March, 2017.
2. Epigenetic Reader ZMYND8 is a novel regulator of tumorigenicity, 11th Asian Epigenomics Meeting, JNCASR, Bangalore, September, 2016.
3. Prolyl isomerization as a novel mode to regulate chromatin function, 6th Ramalingaswami Conclave, IISER, Pune, 2017.
4. HBx hijacks nuclear body protein Speckled 110 and promotes Hepatitis B Virus pathogenesis, 19th Transcription Assembly Meeting, Bose Institute in association with SINP and IICB, Kolkata, 2016.
5. Decoding the Epigenetic Landscape by the Histone Readers: Implications in Human Diseases, Special Colloquium, NCCS, Pune, 2017.

3.3. Teaching elsewhere

Chandrima Das

1. M.Sc. (3 Lectures) at Department of Biochemistry, Ballygunge Science College, November 2016.

Pulak Ray

1. M.Tech. Course on Biomedical Instrumentation (12 Lectures), Electron Microscopy and Atomic Force Microscopy, University of Calcutta, March-June 2016.

3.4. Publications in Books/Monographs/Edited Volumes

Chandrima Das

1. Noncoding RNAs as chromatin scaffold of histone modification complexes in cancer' in Cancer and Non-coding RNAs, Translational Epigenetics Series, Volume eds: Jayprokas Chakrabarti and Sanga Mitra; Series ed: TrygveTollefsbol, (Elsevier). 2017 (In Press).

4. Chemical Sciences

Research in the Chemical Sciences Division is wide-ranging and interdisciplinary, and addresses fundamental aspects of science. Overarching goals of the research projects include understanding of the excited state dynamics of complex phenomena using ultra fast spectroscopy and single molecule imaging, finding new functions for old drugs: Non Steroidal Anti-inflammatory Drugs (NSAIDs), different areas in Nuclear Chemistry, Radiochemistry and Green Chemistry, developing nanotechnology and novel advanced materials for a myriad of applications, unraveling problems associated with devising new, alternative sources of energy, neutron spectrometry and interaction, nano particle dosimetry and radiation safety.

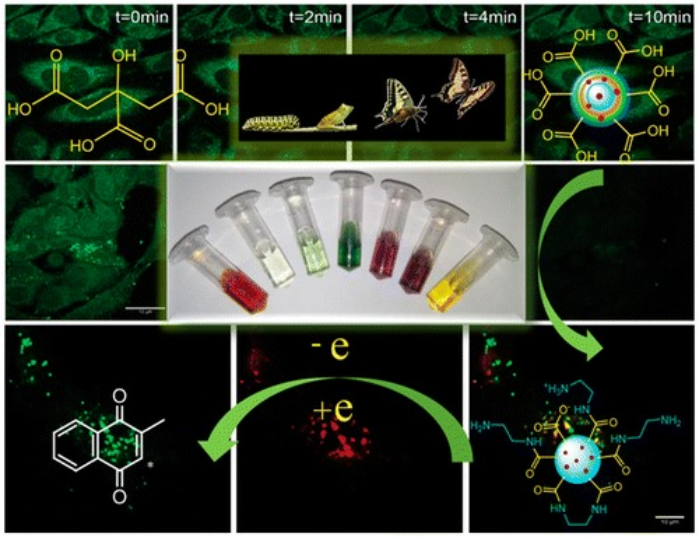


Fig. Schematic representation of the model metamorphosis of a butterfly; Synthetic root of Rr:CDs (red dots represent Ru).; White light images of seven intermediates of Ru(0.005):CDs in water, as obtained at different time intervals during pyrolysis of CA at 250 °C.

Time-resolved spectroscopy within femtosecond to nanosecond time regime is being used extensively to study excited state dynamics on electronic and spatial control over the formation of transient ion pairs during photo induced electron transfer and proton transfer with small organic molecules like proflavine–amine, lumichrome-amines, etc. Similarly the results from laser flash photolysis experiments corroborated with magnetic field highlight the inter-radical separation distance between acridine derivatives and serum albumin proteins undergoing photo induced electron transfer during binding. Moreover, steady-state and time-resolved spectroscopic studies supported by theoretical docking analyses on structure dependent hydrophobic and hydrophilic interactions of Schiff base complexes, comprising of different metal ions and ligands, with serum albumins as well as hen egg white lysozyme proteins emphasize the potentiality of less explored nickel complexes in drug–protein interactions. In recent years emphasis has been given on extension of the work using crystallography and STD NMR spectroscopy, synthesizing copper(II) and Nickel(II) Schiff base complexes which can act as efficient small perturbing agents for biomacromolecules by distinguishing the relation of the structures and functions of these complexes towards different model biomacromolecules and cell lines like HeLa and WI-38 and assessment of antibacterial efficacy of therapeutically important small molecules conjugated with gold nanoparticles. Very recently we have succeeded in synthesizing 'photo luminescent' carbon dots. As per our concern, this is a pioneering work, where the plausible molecular structure and the intrinsic mechanisms governing photoluminescence of carbon dots are explained by trapping seven visibly distinct coloured intermediates evolved during pyrolytic metamorphosis of citric acid (CA) with dopent Ru(III) as an indicator. The metamorphosis of Ru: carbon dots is monitored by characterizing each trapped intermediate using HR-TEM, DLS, XPS, XRD, ^{1}H-NMR, FT-IR, and steady-state and time-resolved UV-visible and fluorescence spectroscopy as well as magnetic field effect. The photo induced

electron transfer ability of such carbon dots helps to develop their utility as quinone-sensor in live cells.

Copper complexes of Oxicam NSAIDs have been synthesized to study their biological applications. They form a new class of membrane anchors that require neither molecular recognition nor strength of interaction between interacting molecular partners, but still can effectively increase membrane fusogenic efficacy over the bare drugs. This new class of membrane anchors is therefore a step ahead of traditional anchors that are based on two interacting molecular partners. DNA-binding with high base sequence specificity and apoptosis inducing properties have also been found for these complexes. Also, the copper complexes of traditional NSAIDs have been found to cause structural alterations upon interaction with chromatin/histone that makes them exert their effect at the epigenomic and genomic level.

Au-Polyaniline based conducting nano-composite has been utilized for bio-sensing of glucose, DNA and protein, using different electrochemical techniques and also for detecting the positional effect of single base mismatch in oligonucleotides. PEDOT-MnO_2 and graphene based materials have been used to fabricate super capacitors of high specific capacitance. A non-enzymatic electrochemical biosensor has been fabricated for cholesterol detection, having a distinct advantage over other conventional enzymatic processes. Chemically converted Graphene modified with β-CD, being hydrophilic, electro active and high surface area material, provides a platform for the electrochemical detection of cholesterol using Methylene Blue as redox indicator. Graphite nanoplatelet (GNP)/conducting polymer (poly(3,4-ethylenedioxythiophene)–poly(styrenesulfonate)) (PEDOT:PSS) composites were synthesized for their application as highly efficient electromagnetic interference (EMI) shielding material (SE) in the X-band frequency region.

A single molecule and ensemble spectroscopic study of dynamics of double stranded DNA and other DNA structural motifs were carried out. Effect of interaction of DNA with different nano particles as well as grapheme oxide was carried out using the above methods. The following results were obtained. i). *Conformational changes and complete unzipping of dsDNA by surface modified Gold Nanoparticles*. In this work the interaction of dsDNA with surface modified gold nano particles was studied. A collaborative effect of the nanoparticles resulted in structural changes e.g. compaction and strand separation depending on the size and hence the charge on the AuNPs. ii). *Bubble dynamics and DNA flexibility in presence of base pair mismatch*. Dynamics of the thermally induced DNA bubble formation shows spontaneously zipping- unzipping rate which follows multistate relaxation kinetics. The nature of bubble has been investigated using small DNA containing 23 nucleotides and having preferred nucleotide sequence nearly identical to that of the transcription initiation sequence. The selective introduction of base pair mismatch for creation of melting bubble affects the local base stacking, along with the base pairing. iii). *Chaotic Dynamics During the Restricted Branch Migration of IHF Bound Holliday Junctions due to Applied Force: A smFRET study.* The enhanced rigidity and reduced flexibility, that a Holiday junction experiences upon binding to a DNA binding/Bending Protein, IHF have been monitored. Using single molecule FRET technique, detection of the isomerization dynamics in presence of applied force becomes possible. *iv). Single molecule FRET Studies of Hybridization mechanism during the noncovalent adsorption and desorption of DNA on Graphene Oxide.* This provides the insight about the interaction of DNA with low dimensional material like 'Graphene Oxide' (GO) to give a detail hybridization mechanism during the adsorption and desorption of DNA on its surface.

Recently, different architectures of nanomaterials which include tunable gold nano-flowers, silver nano-wires, selenium nano-spheres, intercalated nano-prism, branched gold nano-crystals, and porous silver nano-materials have been developed. The main /results areas probed:

a) Standardization of nanotemplated growth technique for overgrowth anisotropic SERS active nanomaterials synthesis.

b) Controlled nanowire synthesis with aspect ratio ~1000 can replace carbon nanotube for their flexibility and giant conductivity.

c) Miniaturized electroanalytical instrument for cost effective blood profiling.

d) Synthesized bimetallic noble metal nanoparticle shows effective and selective killing of tuberculosis bacteria.

e) New generation mesoporous silica nanoparticle (MSN) for pH induced non-toxic drug delivery.

f) Newly synthesized hedgehog gold nanoparticle with high molecular weight non toxic polymer screening for long retention in blood vessel with ~5000K nanoscale thermalization.

g) Establishment of new field "Magnetic Field Enhanced Spin Dynamics".

The nuclear and radiochemistry group is engaged in various activities. For the first time non-destructive method have been designed to determine K content of ancient glass beads which eventually tells about the origin of glass bead. Contribution have made in Radio-Green Chemistry experiments. Ionic liquids and other green reagents have been used to separate no-carrier-added clinically important radionuclides like ^{61}Cu, ^{62}Zn, ^{97}Ru, ^{95,96}Tc, ^{111}In and ^{109}Cd. An effective separation of ^{163}Ho was designed from ^{163}Er which has implications in neutrino mass measurement. Another important program of nuclear and radiochemistry group is measurement of naturally occurring radioactive material in Sundarban and Punjab state in collaboration with University of Calcutta and Punjab University.

The decomposition of isolated carbonic acid (H_2CO_3) molecule into CO_2 and H_2O ($H_2CO_3 \rightarrow CO_2 + H_2O$) is prevented by a large activation barrier (>35 kcal/mol). Nevertheless, it is surprising that the detection of the H_2CO_3 molecule has not been possible yet in the Earth's atmosphere and hunt for the free H_2CO_3 molecule has become challenging not only in the Earth's atmosphere but also on Mars. In view of this fact, we first study the instability of H_2CO_3 molecule in presence of water (H_2O), formic acid (FA), acetic acid (AA) sulphuric acid (SA) and hydroperoxide radical (HOO), detected in the Earth's atmosphere. It is seen from this study the vapor phase of H_2CO_3 molecule is unstable in presence of H_2O, FA and AA. Moreover, we also study the energetic and kinetics of the OH radical-initiated H_2CO_3 degradation reaction ($H_2CO_3 + OH \rightarrow HCO_3 + H_2O$) to interpret the loss of the H_2CO_3 molecule in the Earth's atmosphere, as the OH radical is known as the atmospheric detergent. Importantly, it is seen from these two studies that, although the atmospheric concentration of the OH radical is substantially lower than the concentrations of the H_2O, FA, AA in the Earth's atmosphere, but nevertheless, the OH radical-initiated H_2CO_3 degradation reaction has significant impact, especially, towards the loss of H_2CO_3 molecule in the Earth's atmosphere. In contrary, although the catalytic efficiencies of SA, FA and AA upon the H_2CO_3 decomposition reaction are similar to each other and the concentrations of both the SA and OH radical in the Earth's atmosphere are more-or-less equal to each other, but nevertheless, the SA-assisted

H_2CO_3 decomposition reaction cannot compete with the OH radical-initiated H_2CO_3 degradation reaction.

4.1. Ph D Awarded

1. Kallol Bera [Soumen Basak], Design and application of sensors for bioimaging and protein aggregation, University of Calcutta, April 2016.
2. Anupa Majumdar [Munna Sarkar], Effect of different physico-chemical properties of the drugs and the membranes on Non Steroidal Anti-Inflammatory Drugs induced membrane fusion. Jadavpur University, June 2016.
3. Banabithi Koley Seth [Samita Basu], Spectroscopic studies on structure dependent selective bindings of copper (II) and nickel (II) Schiff base complexes with macromolecules of biological relevane, Jadavpur University, September 2016.
4. Neha Rai [Sanghamitra Raha and Munna Sarkar], Identification of cellular signalling network which induces cancer cell death in response to certain drugs and natural products, University of Calcutta, November 2016.
5. Nidhi Agnihotri [Amitabha De], Graphane/conducting polymer based nanocomposites: application in energy storage and sensors, University of Calcutta, March 2017.

4.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Dulal Senapati

1. Nanosciene: The Idiosyncratic Thinking, Tiny Machine and the Missing Link in Jagadis Bose National Science Talent Search, Government of West Bengal, Kolkata, September, 2016.
2. Beauty of Anisotropic Plasmonic Nanomaterials: Fundamentals and Multidirectional Applications, Discussion Meeting on Synchrotron Techniques in Material Research, Sponsored by Nanomission, DST; Dooars, West Bengal, February, 2017.
3. Beauty of Anisotropic Plasmonic Nanomaterials: Fundamentals and Multidirectional Applications, in the Special Winter School in Chemical Science and Technology at UGC-HRDC section, Sponsored by UGC-HRD; Academic Staff College, Calcutta University, February, 2017.
4. Nanosciene and Nanotechnology: Fundamentals and Applications, Jagadis Bose National Science Talent Search, Government of West Bengal, Kolkata, March, 2017.

Samita Basu

1. Photochemistry at Interface, DST INSPIRE Science Camp in collaboration with Department of Science and Technology, INSPIRE INTERNSHIP component of INSPIRE Program, JBNSTS, Kolkata, March 27, 2017.
2. Laser flash photolysis and magnetic field effect on photoinduced electron transfer reactions, National Seminar on Recent Trends in Chemistry

Research, Department of Chemistry, Siksha-Bhavana (Institute of Science), Visva-Bharati, Santiniketan, West Bengal, March 26, 2017.

3. Periodic Table: A Periodic Classification of Elements, Science Workshop, JBNSTS, supported by Department of Higher Education, Government of West Bengal, Kolkata, February 21, 2017.
4. Photoinduced reactions in organized assemblies, Academic Staff College, Calcutta University, February 10, 2017.
5. Basics of Spectrophotometry and Spectrofluorimetry, Ph.D. Course Work, Department of Biochemistry, Ballygunge Science College, Kolkata, February 09, 2017.
6. Electron Transfer and Magnetic Field Effect, National Symposium on Advances in Chemical Sciences (NSACS-2017), Department of Chemistry Assam University, Shilchar, Assam, January 12, 2017.
7. Photochemical Reactions in Heterogeneous Media, National Seminar on Recent Advances in Chemical Science and Application, Vidyasagar College, Kolkata, January 6, 2017.
8. Photochemistry at Interface, DST INSPIRE Science Camps, JBNSTS, Kolkata, December 23, 2016.
9. Application of Light in Chemistry: Molecular Photonics, DST INSPIRE Science Camps, JBNSTS, October 25, 2016.
10. Spectroscopy as an elegant tool for investigating interactions of small molecules with biological macromolecules, National seminar on Recent Trends in Chemical Research, Department of Chemistry at Sarojini Naidu College for Women, Kolkata, September 29, 2016.
11. Spectroscopic exploration of drug–protein interactions, Colloquium, Department of Life Sciences, Presidency University, Kolkata, September 21, 2016.
12. LASER: Basic Principles and Applications, DST-JBNSTS INSPIRE Science Camp, JBNSTS, Kolkata, August 12, 2016.
13. Chemistry through interface probed by fluorescence, Workshop, JBNSTS, Kolkata, June 8-11, 2016.
14. LASER and its applications in light-induced reactions, DST-JBNSTS INSPIRE Science Camp, JBNSTS, Kolkata, May 18, 2016.
15. Photoinduced electron transfer corroborated by magnetic field effect, Colloquium, Department of Chemistry, Presidency University, Kolkata, April 12, 2016.

Susanta Lahiri

1. Third School on Trace Analysis, Mizoram University, Radiotracer Technique, 28 March 2017.
2. Amity Institute of Nuclear Science & Technology, Radium to Radium: A hundred years cycle, New Delhi, March 09, 2017.
3. Bhabha Atomic Research Centre, Radiochemistry Division, CERN-MEDICIS: an unique facility dedicated to human welfare, February 27, 2017.
4. Radium to radium: 100 years cycle, Eruption of Radionuclides in Imaging

and Therapy, Nuclear Medicine Physicist Association of India February 25-26, 2017, Kolkata.

5. Green Chemistry to mitigate environmental hazards, University of Calcutta, UGC Interdisciplinary Refresher Course on Environmental Hazard and Disaster Management, February 20, 2017.
6. Green synthesis of nano-particles by in situ radiation, National Conference on Nanoscience, Nanotechnology and Advanced Materials (NCNNAM- 2016), Birla Institute of Technology Mesra, September 26-27, 2016.
7. Converter Target Chemistry : A new challenge to the Radioanalytical Chemistry – and its relevance with MEDICIS programme, Workshop on Radiochem Aspects of MEDICIS, CERN, Switzerland, September 23, 2016.
8. Radium to Radium- Hundred Years Cycle, DST-INSPIRE Science Camp 2016, NIT Sikkim, June 30, 2016.
9. The Periodic Table, DST-INSPIRE Science Camp 2016, NIT Sikkim, June 30, 2016.
10. Separation of lead and bismuth from proton irradiated lead-bismuth eutectic by differential precipitation, 99th Canadian Chemistry Conference and Exhibition, Halifax, Canada, June 05-09, 2016.
11. Revisiting NORM measurement, 99th Canadian Chemistry Conference and Exhibition, Halifax, Canada, June 05-09, 2016.
12. Ride on Time Machine, User interaction workshop on Accelerator Mass Spectrometry dating, IUAC, New Delhi, April 21-23, 2016.
13. Converter Target Chemistry – A New Challenge to the Radioanalytical Chemistry, First International Conference on Radioanalytical and Nuclear Chemistry (RANC-2016), Budapest, Hungary, April 10–15, 2016.

4.3. Teaching elsewhere

Samita Basu

1. Spectroscopy, M.Sc Course in Inorganic Chemistry Special, Calcutta University, March-April, 2017.
2. Photochemistry, M.Sc Course in General and Physical Chemistry special, Bidhannagar College, West Bengal State University, West Bengal, September-October, 2016 & March-April, 2017 respectively.

Maitreyee Nandy

1. Radiation Safety, Pre-Ph.D course work, Department of Biophysics & Molecular Biology, University of Calcutta, December 30, 2016.
2. Radiation Physics, Post M. Sc. Course in Biophysical Sciences, Saha Institute of Nuclear Physics, Kolkata, Session 2016-2017.
3. Advanced Particle Detectors, Post M. Sc. Course in Experimental Physics, Saha Institute of Nuclear Physics, Kolkata, Session 2016-2017.
4. Radioactivity -- M. Sc., Biophysics & Molecular Biology & Bioinformatics, University of Calcutta, 3rd semester, 2016-2017.

5. Radioisotopes and Nuclear Medicine, M. Tech. course in Biomedical Instrumentation, Department of Applied Optics and Photonics, University of Calcutta, 3rd semester, 2016-2017

5. Computational Science

Infrastructure Development and Maintenance by the Division:

The project involves migration of all the services (HTTP, SMTP, IMAPS, SSH, FTP, LDAP, DNS, Webmail etc.) and data to the new hardware and further enhancement to that. The solution also included the scope of DC and DR (Disaster Recovery) architecture, so that in case of a declared Disaster Scenario of the regular Data Center the DR setup can give critical service continuity to the users. As SINP does not have a campus at a geographically separate location, a location within our campus with electrical isolation was chosen to house the DR infrastructure. Storage (SAN) at both location and data replication between the two sites was planned. Like before we planned to use Redhat HA Cluster Suite to handle High Availability between two nodes. The nodes can be in Active/Active or Active/Passive mode. There were provisions in the scope to also have a virtual system in place (using RHEV suite) and run some applications in that. The virtual infrastructure may grow in future to support Desktop and Server Virtualization Services to cater the need of other departments.

However, mainly due to the vast nature of the project, many customizations and other factors it took quite a while to have the migrated system in production. Eventually we have moved to a more of a Virtual environment with RHEV, with RedHat Enterprize Virtualization Manager to control the guest machines. Now there are more than 10 such hosts in the virtual environment running services like, WWW, Webmail, Mailstore, Mail Gateways, Name Servers, Gatekeeper (inward SSH access to SINP LAN), LDAP, IMAP/POP, Proxy, UFS etc. Virtualization benefits in better utilization of hardware resources, reduce Data Centre (DC) footprint, provides environment for testing, custom provisioning of hardware, reduce hardware vendor lock-in, extend the life of older applications. Recently we have moved to an open source solution for virtualization called oVirt.

The infrastructure continues to serve as a heart for email, web and other Internet services from 2013. However the DR infrastructure were fully utilized in 2016 with DR (Disaster Recover) System deployment followed by a DC-DR Drill. The DC-DR drill is actually a two part drill. The first part being migration of services from DC (#237) to DR(#3401) infrastructure. This involves switching off the primary site completely and run all the production services from DR site. A role reversal happens for all the connected LUNs of the SAN (Storage Area Network) pairs, the SAN of DR starts working as primary storage and stores all the production data. After few days of observation and running the production system on DR infrastructure a reverse drill i.e. DR-DC Drill was conducted and storage and services were brought back to the DC infrastructure.

After the successful completion of the weeklong (21st to 26th July, 2016) DC-DR Drill, Dr. Sekhar Basu, Chairman AEC, along with a team of distinguished members and our Director inaugurated/visited the newly implemented DR Site. A poster session was also organised at the venue. We plan to place the DR infrastructure in future at Belgachia Campus of SINP.

Research Activities of the Division

We have developed a software to generate accurate model of a base pair using the six relative orientation parameters, Buckle, Open, Propeller, Stagger, Shear and Stretch, as suggested by IUPAC-IUB. This software can generate three-dimensional

coordinates of double helical fragment also with such unusual base pairs. We have carried out extensive quantum chemical studies using Density Functional Theory with Dispersion correction on stacking interaction between successive base pairs in those double helical fragments. The structures predicted to have strongest stacking energy are seen to be quite similar to experimental structures for Watson-Crick base pair containing stretches. Thus we hope we can extend this method of stacking energy analysis to double helices containing non Watson-Crick base pairs as well.

We have done extensive molecular dynamics simulation studies to understand different features of DNA and RNA, such as melting behavior of polymeric DNA, molecular recognition of DNA sequences by protein through conformational selection mechanism, relative stabilities of telomeric DNA of different topology types and dynamics of loop residues in miRNA like fragments. We have done density functional theory based quantum chemical calculations to study stacking between Watson-Crick and non Watson-Crick base pairs and effect of positive charge on stability of unusual base pairing.

5.1. Ph.D. awarded

1. Angana Ray [Dhananjay Bhattacharyya], Computational Studies on Biologically Important Macromolecules, University of Calcutta, 2016.

5.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools:

Dhananjay Bhattacharyya

1. Understanding Structural Features of miRNA from Analogous Structural Fragments in RNA Database: Molecular Dynamics Simulation Studies, 8th RNA Group Meeting, CCMB, Hyderabad, 8-10 January 2016.
2. Electronic properties of edges of nano materials, National Workshop on Computational Nanotechnology: Modeling and Applications with Matlab (CNMAM 2016), College of Engineering & Management, Kolaghat, August 21-22, 2016.

5.3. Miscellany

Designed, written and delivered lecture for eight course materials for E-PG Pathsala, an MHRD project under National Mission on Education through ICT (NMEICT) on Quantum Biophysics. Students can listen and view the video and read the e-text on Internet.

6. Condensed Matter Physics

Condensed Matter Physics Division 3D Dirac/Weyl semimetals: We have grown high quality single crystals of 3D topological materials such as Cd3As2, ZrT e5 and ZrSiS using different techniques and studied their transport and magnetic properties [Phys. Rev. B 94, 165139 (2016);Sci. Rept. 7, 40327 (2017)]. The Fermi surface geometry of these systems are analyzed using Shubnikovde Haas and De Haasvan Alphen oscillations. We observe remarkably large charge carrier mobility and magnetoresistance in these materials; potential for fast electronic device and magnetic field sensor applications. By measuring resistivity under electric field parallel to magnetic field configuration, we observe negative magnetoresistance in ZrTe5 and ZrSiS due to Adler-Bell-Jackiw anomaly as predicted by the relativistic theory of charged chiral fermions induced by external gauge fields with non-trivial topology. According to ISI web of science, our work on ZrSiS [PNAS 114, 2468 (2017)] has received enough citations to place it in the top 0.1% of papers in the academic field of Physics.

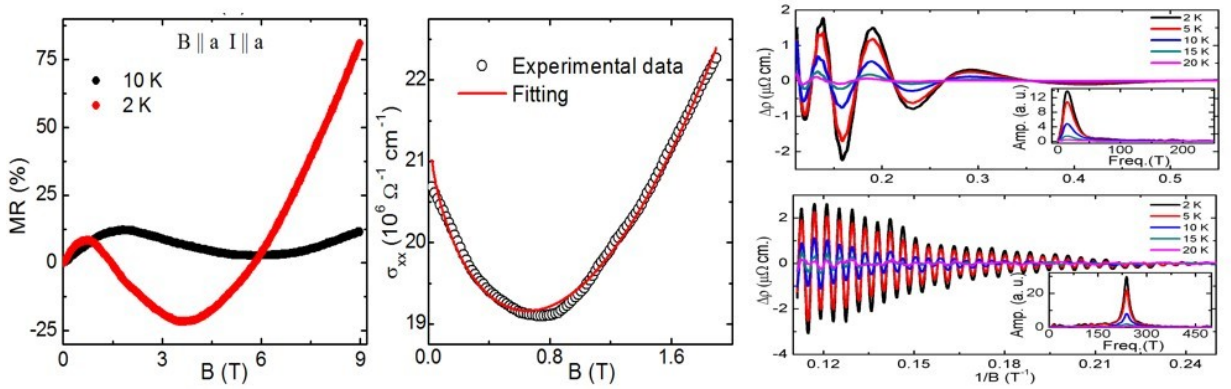


Fig. Longitudinal magnetoresistance (Adler-Bell-Jackiw chiral anomaly) with both current and magnetic field alongcrystallographic axis a ofZrSiS Dirac system (left panel) and the theoretical fit (middle panel).Shubnikov–de Haas effect in ZrSiS single crystal and its fast Fourier transform for two different frequencies (right panel)

Intermetallic compounds: Novel ternary intermetallic compounds of R2NiSi3 (R = Gd, Er) type have been recently synthesised. The magnetic ground state of the compounds found to exhibit frustrated glassy magnetic components coexisting with spatially limited long-range antiferromagnetic state, as revealed by dc & ac magnetization, heat capacity, and neutron diffraction studies. The compounds exhibit large magnetocaloric effect with, -ΔSM ~18.4 J/kg-K and RCP~525 J/kg in Gd2NiSi3 and -ΔSM ~22.6 J/kg-K and RCP~540 J/kg in Er2NiSi3 for 70 kOe magnetic field change. A correlation between large RCP and magnetic frustration is discussed for developing new magnetic refrigerant materials [Phys. Rev. B 94, 104414 (2016)]. Another interesting finding is the observation of zero thermal expansion behaviour in Ho2Fe16Cr, over a wide range of temperature (13330 K). Magnetovolume effect has been argued to be responsible for that kind of anomalous thermal expansion [RSC Adv., 6, 94809 (2016)].

In intermetallic compounds RECo2Si2 (RE = rare earth), when cobalt are partially substituted by another transition metal, namely vanadium, due to complex magnetic interactions, multiple magnetic transitions are observed [JMMM 401 998 (2016)].

Rare-earth and transition metal oxides: We have shown disorder as well as particle size induced giant enhancement of the magnetoresistive properties in several manganite materials [RSC Adv., 7, 16575, (2017), J. Appl. Phys. 121, 103904 (2017), JMMM 403, 36 (2016)]. We also synthesized fascinating nano-tubes of Gadolinium oxide (Gd2O3) using controlled template assisted electrochemical deposition technique. Tube of diameter 200nm, wall thickness 20nm, are constituted of nano-clusters of diameter 7.5nm. It shows anisotropic, large magnetocaloric effect at cryogenic temperature JMMM 417, 182 (2016), Physica E 80, 149 (2016).

Battery performance and basic physics: Established correlation between battery performance and basic physics of battery material (such as LiCoyMn2−yO4). The critical doping y ~ 0.16 results in breakdown of cooperative-distortion network, enhancing lithiation and delithiation of battery, thereby minimizing electrochemical capacity fading.[Appl. Phys. Lett. 110, 143901 (2017)].

Supersolidity in natural and artificial systems: Exploring supersolidity in naturally occurring and artificially designed systems is an area of immense interest. The cooperation of the super- fluid and charge-density-wave (CDW) orders is studied in a two-dimensional BoseHolstein (BH) model where hard-core-bosons (HCBs) are coupled locally to optical phonons. In the parameter regimes of strong HCB-phonon coupling and nonadiabaticity, a novel mechanism for latticesupersolidity is found. At densities not far from half filling and in the parameter regime where the double-hopping terms are non-negligible (negligible) compared to the nearest-neighbor hopping, checkerboard-supersolidity (phase separation) is realized [Annals of Physics 375, 322 (2016)].

Localization effect in Graphene: I have been working recently on interplay of disorder and interactions to explore many-body localisation which is an exotic phase of matter as it challenges basic foundations of quantum statistical physics. We demonstrated recently that localisation does survive in presence of interactions even in system which has single particle mobility edges. We also studied localization in context of graphene and showed that even in this 2D system there are single particle mobility edges. I am also interested in transport in strongly correlated systems. Recently, we have shown in a system of hard core bosons that the normal phase of the superfluid, which undergoes a Kosterlitz-Thouless transition in 2D is ballistic having finite Drude weight [Phys. Rev. B 94, 134508 (2016);Phys. Rev. B 93, 235426 (2016)].

Diffusion of hard-core particles: Studied diffusion of hard-core particles on a one-dimensional periodic lattice subjected to a constraint that the separation between any two consecutive particles does not increase beyond a fixed value n + 1; an initial separation larger than n + 1 can however decrease. These models undergo an absorbing state phase transition when the conserved particle density of the system falls below a critical threshold $\rho c = 1/(n + 1)$ [Phys. Rev. E 94, 062141 (2016)].

Exclusion processes in closed systems: It has been shown that closed asymmetric exclusion systems with weak particle nonconservation can lead to nontrivial steady states that are generically nonuniform. Further by using a similar lattice-gas type agent-based model for opinion dynamics, we have shown that diffusion of the agents plays a significant role in formation of consensus. General scaling behaviour and macroscopic profiles are obtained. These studies are expected to be relevant in a number of areas including intra-cellular transport in biology and traffic management in a city, and physical approaches to social dynamics [Phys. Rev. E 95, 012113 (2017); Reports in Advances of Physical Sciences 1 (01), 1740008 (2017)].

6.1. Ph D Awarded

1. Moumita Nandi [Prabhat Mandal], Study of structural, magnetic and thermal properties of some low-dimensional spin chain compounds, University of Calcutta, 2016.
2. S Kundu [Prabhat Mandal], Investigation of the physical prooerties of DNA and other nano-bio systems, Univeersity of Calcutta, March 2017.
3. Susmita Dhara [Bilwadal Bandyopadhyay], Preparation, characterization and study of magnetic properties of Co_xCu_(1-x) (x ~ 0.01-0.7) granular alloys, Homi Bhabha National Institute, March 2017.
4. Rajeswari Roychowdhury [Bilwadal Bandyopadhyay], Effect of substitution at the transition metal site on the magnetic properties of rare earth ternary silicides, Homi Bhabha National Institute, March 17, 2017.

6.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Barnana Pal

1. Incidence of ultrasonic wave through Newtonian and non-Newtonian fluids, Md Sarowar Hossain, Animesh Basak, Barnana Pal and P K Mukhopadhyay, XXIst National Symposium on Ultrasonics, 08-10 November, 2016, S N Bose National Centre for Basic Sciences and Ultrasonics Society of India.

Chandan Mazumdar

1. Griffiths phase in a frustrated antiferromagnetic intermetallic compound $GdFe_{0.17}Sn_2$ in *International Conference on Magnetic Materials and Applications* (ICMAGMA - 2017), Hyderabad, 1-3 February 2017 / jointly organized by the Defence Metallurgical Research Laboratory (DMRL), Hyderabad and the Magnetics Society of India (MSI).

P.K. Mohanty

1. Sandpile models and Percolation, one day Seminar on D Dhar's retirement, TIFR, Mumbai, November 17, 2016.
2. Universality in self-organized criticality, Discussion meeting on 60 years of percolation phenomena, SNBNCBS, Kolkata, January 24, 2017.
3. Biological networks –disease and complexcity in the Low dimensional Quantum Systems, HRI, Allahabad, February 15-16, 2017.

Prabhat Mandal

1. Magneto-transport properties of 3D Dirac semimetal Cd_3As_2, National Workshop on Condensed Matter Physics, IIT Kharagpur, February 03 - 05, 2017.
2. Structural, magnetic, thermal, electrical properties Nb-doped $EuTiO_3$ single crystal, Indo-French Workshop on Pressure Effects on Strongly Correlated Materials, Bharathidasan University, Tiruchirappalli, January 9-12, 2017.

3. ZrSiS: A new robust Dirac semimetal with unusual transport properties, Recent Trends in Condensed Matter Physics: Experiment and Theory, IACS, Kolkata, March 3-4, 2017.
4. Breakdown of Wiedemann and Franz Law in Dirac semimetal Cd_3As_2, 9th India-Singapore Joint Symposium, National University of Singapore, February 24-26, 2016.
5. Magnetotransport properties of some Dirac Semimetals, University of Potsdam, Berlin, Germany, November, 2016.

7. Crystallography and Molecular Biology

Main focus of Crystallography and Molecular Biology Division is study of the structure and conformation of proteins involved in various cellular regulatory processes. Studies relating the structure and dynamics of biological macromolecules to function are essential part of modern biophysics in order to unravel the mechanism of action of proteins at the molecular level. Our research is strongly focused on understanding the mechanistic insights of various classes of proteins such as membrane skeletal proteins; cell-cycle regulatory proteins; signaling and heat shock proteins; cysteine proteases and inhibitors; proteins involved in unique sugar metabolism; and integral membrane proteins. Using well-established expertise of recombinant DNA technology, X-ray crystallography and structure-guided protein engineering, we attempt to understand the mechanism of proteolytic activity of cysteine proteases, alter the function of cysteine proteases (like imparting hemoglobinase activity), design and generate specific protein inhibitors from serpin family against falcipain2 from *Plasmodium falciparum*, a drug target for the malaria parasite. Structural and functional aspects of *Vibrio cholera* proteins involved in many processes such as c-di-GMP mediated biofilm formation, transcription termination and activation (Rho-specific), small heat shock proteins (HSP31, HSP15, DnaK etc.) mediated protein folding and protein phosphorylation / dephosphorylation involved in metabolic activity and signal transduction will be studied in great detail.

Several unique sugar metabolizing proteins have been identified in *Leishmania donavani*, a protozoan parasite that causes Leishmaniases, which are potential drug targets. Structural characterizations have been initiated with the proteins UDP-Glc 4 ′-epimerase, UDP-galactopyranose mutase and Galactose Mutarotase. Works are in progress to elucidate the functional interaction of DNA repair protein (Ku) with the cell cycle modifier polo-like kinase 1 (Plk1). Further, structural and thermodynamic insights related to the interaction of cyclophilin, a peptidyl-prolyl cis-trans isomerase, with a transmembrane protein CD147 would be examined since this interaction has been implicated in inflammation, cancer and cardiac disorders. We would use the newly installed Next Generation Sequencer (NGS) to elucidate any differential relationship of involvement of Ku with the origin-uses in a spatio-temporal manner. Another line of research would focus on the altered drug resistance in *Leishmania* strains against available drugs. NGS would effectively be used to identify proteins/pathways involved in drug resistance.

Erythroid spectrin is a major constituent of Red Blood Cells (RBC) and plays a vital role in maintaining the cytoskeletal structure and flexibility of the erythrocyte. Cloning, expression and purifications of spectrin domains such as the ankyrin binding domain, self-associating domain, SH3 domains etc have been initiated to explore their protein-protein interactions, chaperone activity and membrane binding potential. We are starting a new research area on characterizing the structural dynamics of membrane proteins. Importantly, ~30% of human genome codes for membrane proteins and ~60% of available drugs target membrane proteins. Structural dynamics of potassium and magnesium ion channels have been just initiated to decipher lipid-dependent voltage gating mechanisms.

7.1. Ph D Awarded

1. Rakhi Paul [Udayaditya Sen), Stucture-Function Relationship of Sugar Kinases from Vibrio cholerae O395, Homi Bhaba National Institute, May 2016.
2. Neha Rai [Sanghamitra Raha & Munna Sarkar], Identification of cellular signalling network which induces cancer cell death in response to certain drugs and natural products, University of Calcutta, November 2016.
3. Soumita Mukherjee [Partha Saha], Role of post-translational modifications on cell cycle progression of eukaryotes, University of Calcutta, November 2016.
4. Debashree Das [Abhijit Chakrabarti], Membrane and spectrin interactions of heme and hemoproteins, March 2017.

7.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Abhijit Chakrabarti

1. Erythrocyte & Platelet Proteomics in Haematological Diseases, Indo-US Bilateral Worshop cum Symposium on Frontiers in Functional Proteomics and Translational Research in Food & Health, National Institute of Plant Genome Research, New Delhi, December 12-13, 2016.
2. Platelet Proteomics in Blood Disorders, International Conference on Functional & Interaction Proteomics : Application in Food & Health, 3rd meeting of Asia Oceania Agricultural Proteomics Organization and 8th Annual Meeting of Proteomic Society, India, PSI, AOAPO and National Institute of Plant Genome Research, New Delhi, December 14-17, 2016.
3. Redox Regulators in Hemoglobin Diseases, 15th Annual Meeting of Society for Free Radical Research – India (SFRR) along with a one-day workshop on Radiation and Redox Processes in Health and a conference entitled Basic and Applied Aspects of Health Management Using Radiation, Antioxidants and Nutraceuticals, Mumbai, January 9-12, 2017.
4. Membrane Asymmetry, Protein Aggregation, Spectrin and Disease, Discussion Meeting on Material Research & Synchrotron Techniques, Nanomission of DST, Dooars Forest, Chalsa Sinclair Resort, North Bengal, February 1 – 5, 2017.
5. Status of Membrane Asymmetry in Disease: Role of Spectrin, 11th International Symposium on Biochemical Roles of Eukaryotic Cell Surface Macromolecules (11th ISCSM), IISER-Mohali, Chandigarh, February 24–28, 2017.
6. Redox Regulators in Hemoglobin Diseases, National Symposium on Plant Biotechnology: Current Perspectives on Medicinal and Crop Plants & 38th Annual Meeting of Plant Tissue Culture Association (India), CSIR-IICB, Kolkata, March 3 – 5, 2017.
7. Membrane asymmetry: role of skeletal proteins, BioScience Group, Molecular Biology Division, Bhabha Atomic Research Centre, Mumbai, July 5,2016.

8. Clinical proteomics in haematological diseases, Birla Institute of Technology and Science (BITS), Hyderabad, August 29, 2016.

7.3. Teaching elsewhere

Abhijit Chakrabarti

1. On Proteomics, Refresher Course in Challenges and options in Life Science Research in the developing world today for College and University Teachers, Human Resource Development Centre/Academic Staff College, Department of Zoology, University of Calcutta, Kolkata, January 9, 2017.
2. Protein, Proteins, Proteomics (2 Lectures), Science Academy Workshop on Modern Chemistry & Biology in Birati College, Kolkata, March 4 & 6, 2017.

7.4. Publications in Books/Monographs/Edited Volumes

Rahul Banerjee

1. Indian Philosophy & Meditation: Perspectives in Consciousness Routledge, Oxon & New York (2017). Rahul Banerjee & Amita Chatterjee. ISBN 978-1-138-30897-8.

8. High Energy Nuclear and Particle Physics

ALICE Collaboration activities

The Saha groups of ALICE are one of the cofounder laboratories of the Muon Spectrometer and collaborating since 1997. In past years, the Saha members have achieved major milestones such as detector hardware fabrication, designing of MANAS (ASIC readout chip), active participation in ALICE data collection, analysis of large volume data, publication of ALICE results in major national and international conferences and journals. The groups is focused to share the knowledge gained in the frontier of science experiment such as ALICE with the school, college, university students through various seminars and public. A short summary of the major hardware and analysis activities are summarized below.

Saha hardware performance and maintenance

The indigenously built large area cathode pad chamber by Saha group comprises with 2.2 lakh readout channels which have been fully fabricated commissioned and installed by the Saha members of ALICE. Since Muon Spectrometer is a tracking detector, the stable data collection with Indian made detector is critical for the physics prospects of the Spectrometer. Each year LHC exceeds its previous record in terms of luminosity and stable beam delivery. This imposes the detector operation challenging due to the high particle flux. The successful operation of the Indian made Muon detector marked a record due to the stable performance in high luminosity (10^{29} $cm^{-2}s^{-1}$) during the pPb and Pbp data collection in 2016.

Nevertheless, it is to be mentioned that the successful operation requires critical and delicate maintenance work of the detector which are carried out by the special team of technical, engineer and scientific members of the group.

MANAS

The first stage of detector signal is processed by the ASIC chip named MANAS designed in Saha. Since the readout scheme of Muon Spectrometer and Photon Multiplicity Detector of ALICE are similar, the Saha team has delivered 88 thousands to two detector collaborations. An excellent performance of MANAS chip has been observed in LHC operation during Run I and II in high radiation background environment. The recent successful pPb data collection is an added confirmation of the stable operation of the chip in high luminosity environment.

Detector operation

The detector operation in complex setup like ALICE is a challenging task since ALICE hosts 18 different detection technologies. The Saha group of ALICE is also recognized for its leadership role during critical data collection periods such as pPb and high luminosity pp runs. The group took challenging responsibility of System Run Coordinator for Muon Spectrometer and ALICE Run Coordinator for ALICE setup in 2016 and 2017, respectively

Data analysis

The high luminosity pPb runs allow to collect a large statistics for the study of the bound and open heavy flavour mesons of charm and beauty quarks. The suppression (or no suppression) quark-antiquark pair in pPb collisions provides and important information for saturation/shadowing parameter used to understand the

quark gluon plasma created during the first epoch of Big-Bang. The number of J/psi, psi(2S), Upsilon(1S) and Upsilon(2S) as measured by the Muon Spectrometer and analyzed by Saha team is shown in the plot below [Fig (1) and (2)]. The anomalous psi(2S) suppression have been reported for the backward rapidity by the Saha group for p-Pb collisions at 8.16 TeV. The analysis note have been submitted for psi(2S) analysis after the completion of the analysis where Saha Institute took leading role.

The Saha team is involved in the analysis of Pb-Pb data of 2015 for the measurement of nuclear modification factor of Upsilon(1S) and (2S) at 5 TeV collsions. The paper draft is prepared in present academic year and ready for collaboration review for publication.

The double differential measurement of J/psi production in Pb-Pb 2015 provide a new insight to the study of recombination effect. The Saha group has initiated this analysis and currently in advanced stage.

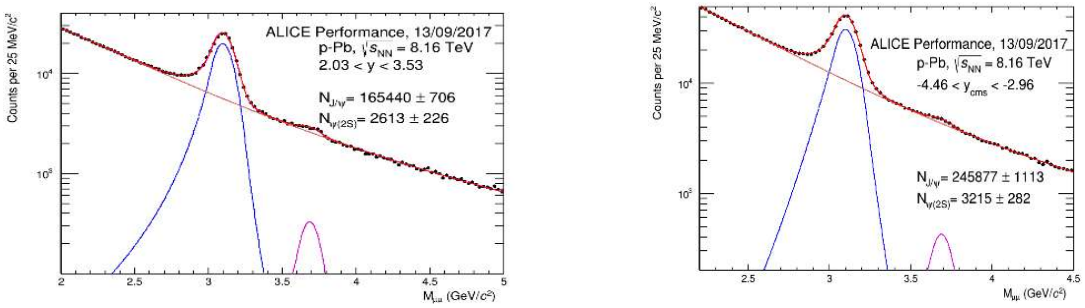


Fig. The J/psi and psi(2S) production in p-Pb collisions at forward (left) and backward (right) rapidities.

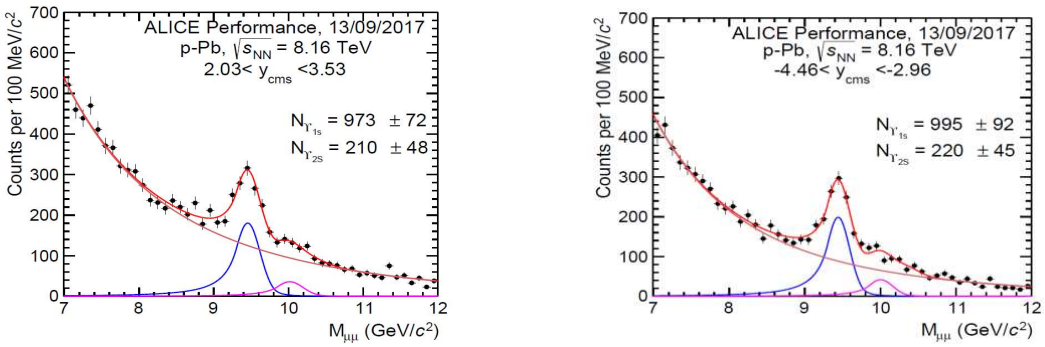


Fig. The Upsilon(1S) and (2S) production in p-Pb collisions at forward (left) and backward (right) rapidities.

The photo production of J/psi in ultra-peripheral Pb-Pb collisions allows to study the electromagnetic production cross-section of charmonium state at relativistic energies. In recent times this has drawn attention of the high energy physics community since it provides access to the electromagnetic production effect without contribution of the hadronic interaction. This measurement is carried out by the Saha group in collaboration with a Ph.D student from Aligarh Muslim University (AMU).

In proton-proton collisions where medium formation is not expected has started to show some peculiar properties which were initially observed only in Pb-Pb collisions such long range correlation. The Saha group is involved in the study of J/psi

production in pp collisions at 2.76 TeV and 5. TeV in collaboration with AMU student, which demonstrated that the production of charmonium increases linearly with charge particle multiplicity. This is understood to be originated due to multi-parton interactions in the high energy pp collisions.

The Saha group is also involved to analyze the pp 13 TeV data for the study of heavy flavor decay mouns from various sources.

ALICE Upgrade: Muon Forward Tracker (MFT)

The next ALICE upgrade includes the fabrication of silicon pixel detector in the forward rapidity known as Muon Forward Tracker. This will enhance the signal resolution due to the accurate identification of the collision vertex in the z-direction of the beam. A critical component of the detector in high luminosity environment is the reduction of the heat with proper cooling method. The SINP team is involved with the planning and fabrication of the cooling mechanism for MFT.

ALICE Upgrade: Readout Upgrade for Muon Spectrometer

The LHC luminosity will be increased further after LS2 and current readout of Muon Spectrometer cannot record at such high rate. Therefore, a new design have been proposed for the second station of Muon Spectrometer by the Saha group. The new readout PCB conceptual design has been reviewed and approved by the ALICE collaboration. This will be a multilayer PCB for continuous readout and finalization of detail design is in progress.

QGP Phenomenology

This activity is being pursued for the last 17 years with present emphasis on the properties of hadrons in non-zero magnetic field at finite temperature. The highlights of these studies in recent times are:

a) Spectral properties of rho and pi mesons in magnetic field at non-zero temperature.

b) Study of rho-omega mixing in vacuum in magnetic field.

c) QCD collective oscillations in hot magnetized plasma.

The other studies include the production ratio of Y(3S) to Y(1S) and Y(2S) to Y(1S) via pp collisions at the LHC energies is an important preliminary to the research on QGP. Such effects has been studied for forward rapidities along with J/psi(1S), Psi(2S)(charmonia) and compared with experimental results of ALICE and LHCb to understand both the hot and cold nuclear matter produced at LHC energies.

CMS Collaboration activities

The CMS group of SINP started in 2011 with 5 faculty members and 4 students. Some of the members have been involved in CMS for a much longer period contributing significantly to the design and construction of the CMS expeiment. Since the beginning of data taking, the group has had major responsibilities in tracker operations, Hadron calorimeter (HCAL) calibration and overall Data Quality Monitoring (DQM). In physics analysis, the group's major involvement has been in new particle searches including the Higgs boson. At the time of the Higgs discovery, the group was involved in search for Higgs in the high mass region. The group's work in physics and detector development has resulted in 16 physics papers, about 15 public physics results and 10 detctor related notes. So far, 9 students have

graduated from the group. At present, the group with 6 faculty members and 10 students has major involvements in several important channels of Higgs Physics, physics of jets and in searches for dark matter and extra dimensions. The group has ongoing responsibilities for the Run II data taking, in detector performance and calibration studies of the hadron calorimeter, tracker validation, bad channel calibration, and tracking performance studies. The group has commitments for several important upgrades of the CMS detector for the High Luminosity LHC opetations. SINP members have held positions of responsibilities, in detector development, operations and Physics analyses, within the collaboration.

Physics Studies and Computing

Analyses

The SINP-CMS group has been involved in serveral important LHC physics analyses, namely: (1) SM Higgs boson studies in the $\gamma\gamma$ decay mode, e.g differential cross-section measurement, and in the 4-lepton decay mode (4e, 4μ, 2e2μ). (2) SM Higgs boson searches in the associated production mode with a W, where the Higgs boson decays into a pair of τ leptons and the W decays to an electron or a muon; (3) di-Higgs production at the LHC energies; (4) search for dark matter and extra-dimensions; (5) inclusive jet production at different energies and event shape studies; (6) Feasibility study to trigger on $B_S \rightarrow \varphi\varphi \rightarrow$ 4 kaons events at Level 1 using the proposed CMS PhaseII tracker.

The SINP team played a central role in two important publications of CMS in 2016 from dark matter searches and excited lepton searches from 2012 data. Students from SINP were leading analyzers and served as analysis contact persons within the collaboration. The bound on dark matter nucleon scattering cross-section obatined from our monophoton analysis appears in the global plot of dark matter-nucleon scattering cross-section upper bound. The SINP members have also contributed towards rediscovery and first mass measurements of the Higgs boson using the Run II data.

Computing

The SINP-CMS cluster became fully operational in 2013, with the successful hosting of the Asian CMS Data Analysis (CMSDAS) school. The cluster served significantly for the PhaseII Tracker related simulation studies. In 2016 SINP has become a part of the LHCone network supported under the National Knowledge Network (NKN). A new divisional computing center has also been developed during the last year.

Run II Detector Performance related activities

The group has long-term responsibilities on current tracker and HCAL operations and calibration. The group is responsible for the validation of the present tracker detector; tracker bad channel calibration and tracking performance studies. The group have contributing substantially to the calibration of the hadron calorimeter making use of different approaches to do relative and absolute calibration of the calorimeter. In addition, strategies to trigger on isolated particles are pursued.

Hadron Calorimeter Upgrade

The backend electronics of HCAL has been upgraded during the long shutdown period 1 (LS1) of LHC. The group made substantial contribution in two broad areas: 1) microTCA based readout cards for HF and 2) Optical Splitters for barrel and end-cap HB/HE detectors.

A total of 54 μHTR cards were fabricated within LS1. All the required cards have been built in the industries in Bangalore and tested at SINP before being shipped to CERN. These cards required some power mezzanine cards and they have been tested at SINP. All the cards were successfully installed and commissioned for RunII data taking in 2015 and have been working successfully ever since.

Optical splitters for LS1 upgrade were crucial for the working of trigger with CMS HCAL back-end electronics. Students and post-doc have played a major role in designing and testing for 3 years, to meet our partial commitment towards LS1 upgrade. Eventually, 206 such units have been shipped to CERN and installed and integrated with the detector.

Phase II Upgrade

A number of sub-detectors of the CMS detector will be upgraded fully before the HL-LHC phase starts. The timeline for upgrade is 2020-23 and R&D activities are in full swing.

The CMS tracker detector will be replaced entirely in order to operate at the High Luminosity LHC. The proposed tracker design allows us to reconstruct tracks with sufficient resolution at Level 1 phase of the trigger system. The tracks reconstructed at Level 1 trigger is crucial to reduce and keep event rate at an acceptable limit. We have contributed towards the Associative Memory (AM) based L1 track trigger simulation studies. We have also made major contribution to the study of performance of the proposed L1 track trigger by looking at the improvement in electron rate. This study is already a part of the PhaseII tracker Technical Proposal (TP). We have also studied whether rare processes like $B_S \rightarrow \varphi\varphi \rightarrow 4$ kaons can be triggered using the PhaseII tracker and the results have been included in the Tracker Technical Design report (TDR). The group members have contributed significantly to the PhaseII tracker module-test software development and Data Quality Monitoring (DQM) tool used in laboratory and Tracker Beam tests. The group is also responsible for the development of the digitizer software for the proposed new tracker. Presently, the group is setting up a module test facility in the institute.

The CMS-GEM activities have been going on since several years with a view to upgrade the tracking and triggering capabilities of the CMS muon system in the high rapidity region. The upgrade is also important to cope up with the HL-LHC scenario.

An infrastructure is being set up which will be used to carry out several quality control steps related to the final production of GE1/1. In addition, the same infrastructure is expected to be used for detector R&D for GE2/1 and ME0 upgrades. It may be noted that a large fraction of the components for this R&D will be based on products made within the country.

We hope to use the same laboratory for studies related to muon tomography, which can be considered as a spin-off having societal applications.

Both ECAL and HCAL endcap calorimeters will be replaced with a new detector, known as HGCal that will utilize highly granular silicon pads for both ECAL and the front part of the HCAL. The group has been involved in simulation studies, beam test data analysis and in setting up a test facility locally in the institute.

8.1. Ph D Awarded

1. Atanu Modak [Subir Sarkar and Suchandra Dutta], Search for the Standard Model Higgs boson decaying to a Tau lepton pair in proton-proton collisions using the CMS detector at the LHC, University of Calcutta, March 2017.

8.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Debasish Das

1. Quarkonia results from LHC at the CNT workshop on Quarkonia production and suppression in High Energy Heavy Ion Collisions, University of Calcutta, Salt Lake Campus, February 14, 2017.

Tinku Sinha

1. Looking forward towards next decade for ALICE Muons, DAE-DST Special Task Force Meeting at BARC, Mumbai, September 3, 2016.

9. Nuclear Physics

The members have been successfully continuing their activities in Accelerator based Nuclear Physics (In-Beam gamma spectroscopy and Reaction studies) using National and International Accelerator Facilities. They have been invited to present their work in several School, Conferences and Symposia during this tenure.

The divison is involved in experiment done in international RIB facilities at GSI, Germany.

This group is a constituent member of the Indian National Gamma Array (INGA) collaboration since its inception. During this time-period, apart from collaborating with other National Institutes to utilize and maintain this INGA array, our group has actively participated in the submission of the upgrade proposal of INGA to DST.

Achievements from National Accelerator Based Work

The members have contributed significantly in understanding the shears mechanism and development of collectivity in nuclei in A~140 region. High-spin states in the dipole structure of ^{141}Sm have been investigated using the fusion-evaporation using the Indian National Gamma Array. Comparisons between the experimental characteristic and the semi-classical shears mechanism with the principal axis cranking model calculation has shown that one of the dipole band may be interpreted as a magnetic rotational band.

Threshold behavior of interaction potential, fusion barrier distribution and channel coupling have experimentally investigated for the weakly bound stable projectiles and targets in medium mass and heavy nuclei. Fusion cross-sections, at above and below the Coulomb barrier, with stable projectile have been studied to understand the effect of breakup or breakup-like processes with medium-mass target in comparison with a projectile which has a lower breakup threshold.

Breakup effects on α spectroscopic factor of light nuclei have been investigated. The study of astrophysically important reaction using weakly bound projectiles and breakup induced alpha transfer process for some bound states have been pursued.

Shell model studies of neutron-rich nuclei near ^{132}Sn done by divisional members have been successful in explaining data from National and International groups. Members have collaborated with other national institutes to study shape coexistence in rare-earth nuclei.

The high-spin states in ^{153}Ho have been studied using Indian National Gamma Array (INGA) setup. From the comparison of experimental and theoretical results, it is found that there are definite indications of shape coexistence in this nucleus. The experimental and calculated lifetimes of several isomers have been compared to follow the coexistence and evolution of shape with increasing spin.

Achievements from International Accelerator Based Work

Experiments proposed by member of this group have been performed at international accelerator facilities using RIB in collaboration with many institutes of repute from different countries. One of remarkable achievements is observation of disappearance of magic numbers in the neutron rich nuclei. Measurement to probe

neutron-skin of exotic nuclei has been undertaken which is important for improving nuclear equation of state important for understanding neutron-star properties.

First results are reported on the ground state configurations of the neutron-rich ^{29,30}Na isotopes, obtained via Coulomb dissociation (CD) at energies of 400–430 MeV/nucleon using the FRS-ALADIN-LAND setup at GSI, Darmstadt.

Achievements from In-house Developmental work

- The group has been consistently involved in developmental activities in in-house labs.
- Performance of axial field ionization chamber with Xenon gas has been tested.
- An old sum spectrometer consisting of six large NaI(Tl) detectors has been rejuvenated and set up with a CAEN 5780 digitizer, characterized and then utilized to suppress room background.

This year Saha Institute has hosted the 61st DAE-BRNS Symposium on Nuclear Physics during 4-9th December 2016. Nuclear Physics Division has been involved in the organization of the Symposium in a major way. The academic and organizational aspect of the Symposium has been highly appreciated by more than 500 participants coming from all parts of India and even abroad.

9.1. Ph D Awarded

1. Subhendu Rajbanshi [A. Goswami], Generation of angular momentum in weakly deformed nuclei in mass ~ 140 regions, University of Calcutta, October 2016.

9.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Anjali Mukherjee

1. Large back angle quasi-elastic scattering for weakly bound systems at near-barrier energies, DAE-BRNS Symposium on Nuclear Physics, SINP, Kolkata, December 5-9, 2016.
2. Study of Quasi-elastic scattering at back angles for weakly bound systems at near-barrier energies, International conference FUSION 17, Hobart, Australia, February 20-24, 2017.
3. Nuclear Astrophysics, Colloquium lecture at Dum Dum Motijheel College, March, 2017.

M. Saha Sarkar

1. Nuclear Physics: From Triviality to Eternity, National Workshop on Nuclear and Astrophysics: Two opposite ends of Dimensions (NATD-2017), Vidyasagar University, Midnapore, January 17-19, 2017.
2. Studies in Nuclear Structure relevant to Astrophysics: experimental efforts, 61st DAE-BRNS National Symposium on Nuclear Physics, Bhabha

Atomic Research Center (BARC), Mumbai [funded by Board of Research in Nuclear Physics (BRNS)], Kolkata, December 4-9, 2016.

3. Nuclear structure near exotic doubly closed Sn isotopes, Nuclear structure and inputs for possible experiments with upcoming high resolution gamma ray array at FAIR facility SPIN-2016 (2 Lectures), Department of Physics, University of Calicut, supported by Bose Institute Indo-FAIR Co-ordination Centre (BI-IFCC), Calicut, November 5-19, 2016.
4. Why and How Study Nuclear Physics?, National Conference on Nuclear and Accelerator Physics (NCNAP-2016), Centre for Applied Physics, Central University of Jharkhand, Brambe, Ranchi, October 4-6, 2016.
5. Nuclear Physics: From Triviality to Eternity, Rammohan College, Kolkata, September 22, 2016.
6. Study of isomers near doubly closed $_{208}$Pb with N<126, Workshop on isomer studies at the focal plane of HYRA, September 19, 2016.
7. Angular distribution, correlation, and DCO ratio, Experimental methods in gamma-ray spectroscopy (3 Lectures), Inter University Accelerator Centre, New Delhi, April 25-29, 2016.

9.3. Teaching elsewhere

Anjali Mukherjee

1. M.Sc. on Nuclear Physics (12 Lectures), West Bengal State University, Barasat, January – March, 2017.

Chinmay Basu

1. M.Sc. Advanced Course in Nuclear Reactions & Nuclear Astrophysics (25 Lectures), Rajabazar Science College, University of Kolkata, January-March 2017.

9.4. Miscellany

Anjali Mukherjee

1. Member of the International Advisory Committee for the FUSION 17 conference, held at Hobart, Australia.

10. Plasma Physics

Research activities in the plasma physics division encompass a variety of theoretical and experimental topics in the field of linear and nonlinear wave propagation. Theoretical studies using Lagrange fluid description for various types of waves in unmagnetized and magnetized plasmas have been carried out to understand wave breaking phenomena due to phase-mixing processes. In a relativistic scenario, wave breaking limit of a cold electrostatic wave in an electron-positron-ion plasma has been derived and its dependence on various mass ratios obtained. Such studies have relevance to particle acceleration and heating in astrophysical environments and laboratory experiments. Investigations on stationary solutions of Bursian and non-neutral plasma diodes and their stability characteristics in presence of external magnetic fields reveal interesting results that are relevant in the design of fast electron switches. Studies are also being pursued to understand the formation of different types of nonlinear coherent structures such as solitons, double layers and vortices in classical as well as quantum plasmas. Dynamics of charged particles in chaotic magnetic fields is being explored to understand diffusion and energization aspects.

Strongly coupled dusty plasma having a viscoelastic nature supports propagation of longitudinal acoustic and transverse shear modes. Linear and nonlinear coupling between these modes as well as excitation of various instabilities driven by velocity shear, non-Newtonian characteristics and density dependent viscosity have been investigated. Simulation studies using pseudo-spectral analysis are being carried out to study the formation and evolution of vortices as well as interaction between co and counter propagating mono polar Gaussian vortices in a strongly coupled collisional dusty plasma.

Experimental activities are being carried out in the MaPLE (Magnetized Plasma Linear Experiment) device, double Layer experimental device (DLX), glow discharge plasma and the currentless toroidal device.

MaPLE device has been designed to study waves and instabilities in a controlled parameter regime. In the regime where both hot and cold flowing electron species are present, excitation of electron acoustic wave has been observed in the low wave number regime. Excitation of electron acoustic mode is an unconventional phenomena in laboratory plasmas and an understanding behind the excitation mechanism has been obtained using a kinetic model. In order to enhance the density in the MaPLE device that is currently produced by electron cyclotron resonance discharge a quiescent filamentary source has been developed, fabricated, tested and integrated with the machine. This will facilitate study of magnetic electron drift mode.

Double layer experimental device enables studies in radio-frequency produced plasma in presence of diverging magnetic fields. Self-excited drift waves with frequency greater than ion cyclotron frequency have been observed in an argon plasma and termed upper drift modes to distinguish them from conventional low frequency drift modes. In helium plasma, two drift modes coexisting over a wide range of axial and radial locations have been observed and accorded to smaller values of ion Larmor radius of helium compared to argon.

Nonlinear dynamic experiments are being carried out in DC glow discharge plasmas having cylindrical and toroidal configurations revealing a variety of nonlinear phenomena.

Application of dipolar magnetic field using bar magnet has lead to excitation of canard orbit and mixed mode oscillations when the system is in excitable state and period doubling bifurcation when the system is in oscillatory state. In a currentless toroidal assembly, floating potential fluctuations associated with anodic fireballs have been found to exhibit different kinds of oscillations depending on the vertical magnetic field applied. Different statistical and spectral methods have been used to explore the complex dynamics of the plasma.

10.1. Ph D Awarded

1. Sudip Garai [M.S. Janaki and Nikhil Chakrabarti], Velocity shear driven phenomena in strongly copupled dusty plasma, HOMI Bhabha National Institute, April 2016.
2. Anwesa Sarkar [Nikhil Chakrabarti], Nonlinear waves in relativistic and nonrelativistic plasma, Homi Bhabha National Institute, May 2016.
3. Abhik Mukherjee [Prof. Anjan Kundu and M.S. Janaki], Study of nonlinear waves in oceanic and other physical systems, Homi Bhabha Nationl Institute, June 2016.
4. Sourav Pramanik [Nikhil Chakrabarti], Nonlinear particle dynamics of plasma diodes in presence of external magnetic field, Homi Bhabha National Institute, January 2017.

10.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Nikhil Chakrabarti

1. Oscillations in the view point of students and researchers, National conference on Recent Developments in Mathematics and its Applications, Ramkrishana Mission Vidyamandira, Belur Math, 26-27 September, 2016.
2. Plasma research: from beginners perspective, National conference on Plasma Physics and Nonlinear dynamics - 2017 (NCPPND-17), JIS University, Agarpara, Kolkata, 23-24, March, 2017.
3. DST-SERB school organized by Institute of Advanced Study in Science and Technology (IASST) (8 Lectures), November 9-12, 2016.

10.3. Teaching Elsewhere

M. S. Janaki

1. DST-SERB school organized by Institute of Advanced Study in Science and Technology (IASST) (4 Lectures), 9-12 November 9-12, 2016.
2. Short term course entitled 'Nonlinear dynamics, chaos and application' at Department of Physics (2 Lectures), NIT Durgapur, July 14, 2016.

11. Surface Physics & Material Science

In order to achieve superior device performances, it is absolutely necessary to explore the properties of new materials within multifunctional platforms in the nanometer length scale (~1-100 nm), where the surface and the interface essentially dictates the functions. Keeping this view in mind, research activities of the Surface Physics & Material Science (SPMS) Division mainly encompass the growth of low-dimensional metallic, semiconducting and organic materials via physical and chemical routes followed by their extensive characterizations with state-of-the-art techniques/tools for achieving tunable mechanical / electrical / magnetic / optical properties relevant in the forefront research areas of micro-nano science & technology. Synthesis of the condensed and soft materials in the form of ultra-thin layer and nanometer sized particles with different morphology are implemented by sophisticated growth techniques, like, molecular beam epitaxy (MBE), metal oxide vapour phase epitaxy (MOVPE), cluster ion deposition, sputtering, ion implantation, Langmuir-Blodgett (LB) techniques along with other conventional growth techniques, like, spin coating and wet chemical methods. The state-of-the-art characterization techniques, such as a 300 kV transmission electron microscope (TEM) attached with electron energy loss spectroscopy (EELS) and energy dispersive x-ray spectroscopy (EDX), high resolution scanning electron microscope (SEM) augmented with cathode luminescence (CL) optical detection system, versatile x-ray diffraction (VXRD) system, X-ray photoelectron spectroscopy (XPS) systems along with angle resolved detection capability, ultra high vacuum based scanning tunnelling microscope (STM) and ambient scanning probe microscopes (SPMs) are utilized for structural, compositional, optical, tribological and surface/interface analysis in routine manner. In short, the faculty members of SPMS division, with their diversified fields of expertise, have been working on systems where surface/interface plays a crucial role in dictating its properties relevant to applications, such as, MOS-based electronic devices, magnetic devices, photonic devices, sensors for detecting hazardous gas and human blood glucose monitoring, bio-imaging, solar cells, to name a few. Many faculty members of the division have also been using advanced synchrotron facilities in India and abroad for a further detailed understanding of these materials, apart from developing an SINP beam line at the INDUS II synchrotron at RRCAT, Indore.

That an atomically sharp interface (revealed by cross-sectional TEM) plays a crucial role in determining the quality of the cutting-edge new materials having possible applications in next generation electronic, spintronic and quantum computation devices, has recently been demonstrated in a high-temperature ferromagnetic topological insulator utilizing our TEM facility through an international collaborative work. Our TEM work has been instrumental in the discovery of a super dense nonmagnetic fcc phase of cobalt and demonstrating the growth of nanoscale nickel monosilicide, a desired material for the future complementary metal oxide semiconductor (CMOS) technology.

Formation of 2D-networked structures of disk-like islands for ultrathin Langmuir-Schaefer (LS) films of thiol-coated Au-nanoparticles (DT-AuNPs) on H-passivated Si substrates is evidenced for the first time, directly from a broad peak in grazing incidence small angle X-ray scattering (GISAXS) data and also from atomic force microscopy (AFM) images [*RSC Adv.* 2016, 6, 12326]. The structural information of the LS films, obtained at different surface pressure, helps to infer the growth of Langmuir monolayers of DT-AuNPs, which is very important in understanding the self-assembly process of nanoparticles at the air-water interface and in controlling the growth of 2D-networked nanostructures in large areas.

The crystallization process ZrO_2 thin-film is identified and found that 1-D crystal growth took place initially that spreads laterally with temperature and time without increasing their numbers. The growth of Zr-Silicate and silicide is also investigated using differential scanning calorimetry. The substrate dependent performance of the high-k dielectric film is also investigated. Charge storage properties of InP quantum dots in GaAs metal-oxide-semiconductor based nonvolatile flash memory devices is also investigated. A nanoparticle (NP)-based non-volatile memory devices with HfO_2 as tunnel and barrier layers are fabricated and characterized.

We work with nano dimensional organic semiconducting (OSc) thin films prepared on various substrates in ultra high vacuum chamber. Structure and electronic properties of these films are studied. OTFT devices are prepared and the field effect mobility of the devices is measured. We use various spectroscopic and microscopic techniques for our experiments such as XPS/UPS, NEXAFS, PRES (synchrotron based techniques), AFM etc. We also perform density functional theory calculations using StoBe and VASP software. The objective of our study is to understand interfacial's properties that are required for the development high mobility organic semiconductor devices.

We study the structures in different phases and their incorporation into the membrane depending on the temperature-surface pressure phase diagram of the mixed lipids. Self organization mechanism in supramolecular materials in presence of foreign species is also very crucial in developing new functional devices based on these self assembled materials. We have also demonstrated that these supramolecular nanofibers are very promising candidates for various applications such as solar cells, sensors, FETs, etc.

In our recent works on the dynamics in soft matter, i.e., the two-dimensional nanoscale pattern dynamics at air-water interface, we investigated the role of the nanoparticle–monolayer and monolayer–monolayer lipophilic attraction in influencing morphology and dynamics of AuNP cluster patterns in fatty acid monolayers. The corresponding pattern morphology, observed with a Brewster Angle Microscope (BAM) essentially reveals three stages in pattern evolution. On the otherhand, coalescence of myristic acid droplets on water surface is found to exhibit anomalous behaviour such as simultaneous increase of mean droplet size and droplet number with time at low surface pressure.

We have shown that the 3D micro-snowflake structured α-Fe_2O_3 synthesized by simple hydrothermal decomposition of $K_3[Fe(CN)_6]$ without using any surfactant can be used for highly selective, sensitive and stable amperometric sensing of H_2O_2 and N_2H_4 in presence of common coexisting electroactive interferes. As an ideal enzyme less sensing material, the sample has good stability and selectivity against common coexisting interferes. We also report non-equilibrium dynamics and giant spontaneous exchange bias obtained in zero field cooled mode for $Ni_{46}Mn_{43}In_{11}$ alloy. The dc magnetic measurements indicate a super spin glass type magnetic ground state in the system.

We have started work on epitaxial growth of $(Al_{1-y}Ga_y)_xIn_{1-x}P/(Al_{1-y'}Ga_{y'})_xIn_{1-x}P/GaAs$ QW structures. Initial low temperature photoluminescence measurements show peaks correspond to the QW emission. While working on the growth of AlxGa1-xAs epitaxial layers in the QW structures, we have observed natural superlattice ordering in the material, which is not reported on (100) GaAs grown by this technique. This growth behaviour is further studied by growth of thick $Al_xGa_{1-x}As$ layer with different composition and their thermal stability using different x-ray techniques, TEM

microscopy and photoluminescence. Effect of the superlattice on emission properties of the QW is also being studied in detail.

We have performed extensive studies of the antiferromagnetic NiO single crystals and ultrathin films using XPS, ARPES, LEED, LEEM, XMLD-PEEM methods and have been the subject of many publications. Electronic band structures of low-dimensional layered materials such as single crystal Graphite, MoS_2, $MoSe_2$ etc. have also been extensively investigated. Epitaxial Cr, V and Mn monolayers, and multilayers, as well as their oxides such as V_2O_3, MnO, Mn_3O_4 etc, have been studied in respect of their surface magnetism and electronic structures. Further systems studied includes ultrathin films and overlayers of CoO, MgO, Cu_2O, metallic Sn and SnO etc.

The time evolution of the spontaneous oxidation of the prepared film in air at room temperature (RT) was studied. A compositional analysis of the film was carried out in an ultra-high vacuum (UHV) deposition chamber using an in situ XPS system. The morphological aspects of the deposited film were studied with a high resolution scanning electron microscope (SEM) and an atomic force microscope (AFM). We report the spontaneous production of highly pure (95%) and technologically appealing nano-crystalline Cu_2O within 300 seconds of air exposure. The crystalline structure was probed using high resolution TEM (HRTEM) and the optical properties were studied using a cathodoluminescence (CL) device attached to a SEM.

Examination of radiative localized surface plasmon resonance (LSPR) modes of individual polyhedral nanoparticles (NPs) with high index facets, such as trisoctahedral (TOH) shaped or concave nanocube (CNC) shaped gold (Au) nanocrystals (NCs) using cathode luminescence (CL) across the visible spectral range show interesting results. Pronounced enhancement is observed in the Raman scattering on Rhodamine 6G (R6G)-covered TOH Au NPs aggregates on a Si substrate whereas for CNC shaped Au NPs, we report the existence of edge quadrupolar mode as well as substrate-mediated hybridized corner quadrupolar and octupolar modes.

11.1. Ph D Awarded

1. Tanmay Ghosh [Biswarup Satpati], Studies of Structural and Optical Properties of Low Dimensional Structures Using Transmission Electron Microscopy and Associated Techniques, University of Calcutta, June 2016.

11.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Biswarup Satpati

1. Transmission Electron Microscopy of Composite Materials, TEQIP II Sponsored One Day Seminar on Recent trend in composite material held at Mechanical Engineering Department, Jadavpur University, Kolkata, August 18, 2016.
2. MRSI Medal Lecture on Heteroepitaxy in chemically grown silver nanodendrites on germanium and mapping its surface plasmon associated photon emission, Victor Menezes Convention Centre, IIT, Mumbai, February 15, 2017.

3. Insight into the World of Nanomaterials: Microscopy and Spectroscopy with Electrons, UGC-SAP (DRS III) sponsored National Seminar on Advances in Materials Science, Department of Physics, Gauhati University, March 24-25, 2017.

Mrinmoy K. Mukhopadhyay

1. Beauty of Anisotropic Plasmonic Nanomaterials: Fundamentals and Multidirectional Applications, Discussion Meeting on Synchrotron Techniques in Material Research, Sponsored by Nanomission, DST; Dooars, West Bengal: February 2- 5, 2017.

Satyaranjan Bhattacharyya

1. Morphologies of the softlanded size-selected Cu nanoclusters over different substrates, Workshop on Nanoclusters Synthesis, Characterization and Applications, Okinawa Institute of Science and Technology (OIST), Japan, May 16-19, 2016.

12. Theory

Particle Physics Phenomenology

Flavor-changing decays of the top quark have been predicted to be small in the Standard Model. The experimental limits on these processes are much higher. We have set up theoretical framework in which experimentally accessible results can be expected in models of new physics. We have discussed two models of supersymmetry, one with conserved R-parity, and the other in which R-parity is mildly violated. We show that in the latter case there is a distinct possibility of detecting the rare decay of top quark decaying to a charm quark and a Z boson at the LHC.

We have also worked on intergenerational symmetries and tried to explain fermion masses and mixings.

The SM at the LHC is being scrutinized at an unprecedented level of precision. It is only natural to have the competing BSM scenarios match the same order of accuracy in QCD as the SM observables.

At the LHC, first step towards a precision phenomenological study of the production of spin-2, coupling non-universally to the SM particles would be to compute form factors to the production of a singlet, on-shell spin-2 state via the quark-antiquark and gluon-gluon production channels, to the same order of accuracy as the SM background. A priori, it is not clear how the UV and IR structure would look like when spin-2 couples to particles of the SM with non-universal couplings, this is investigated up to the three loop level in QCD.

We have performed the very first calculation involving a massive spin-2particle at NNLO level in QCD for the production of a pair of leptons at hadron colliders. We have included all the relevant sub-processes that can contribute to the invariant mass distribution of the di-leptons. The methodology of reverse unitarity and IBP identities are systematically employed to achieve it.

The two-loop QCD correction to massive spin-2 graviton decaying to quark +antiquark + gluon is presented considering a generic universal spin-2coupling to the SM through the conserved energy-momentum tensor. The motivation are to (a) probe the structure of quantum field theory in the presence of a spin-2 field, to check the universality of IR pole structure in QCD and (b) present one of the important ingredients for full two-loop QCD correction for real graviton production in association with a jet.

Using the pseudo-scalar Higgs boson form factors that have recently become available up to three loops and the third order soft function from the real radiations, a complete N3LO threshold correction to the production of a pseudo-scalar Higgs boson at the LHC has been obtained. Using our approach, we have also computed the process dependent coefficient that appears in the threshold resumed cross section, which will be useful for resumed predictions at N3LL in QCD. Using threshold corrected N3LO results; we have presented a detailed phenomenological study of the pseudo-scalar Higgs boson production at the LHC for various center of mass energies as a function of its mass.

Non-perturbative studies of Quantum Field Theories

The standard Wilson lattice gauge theory with compact gauge fields is explicitly gauge-invariant at all stages of the calculation and does not require gauge fixing. This works perfectly well for vector-like gauge theories. However, for proposals of chiral gauge theories on the lattice, gauge invariance is lost because lattice fermions do necessarily break chiral symmetry, and as a result the redundant longitudinal gauge degrees of freedom end up coupling with physical degrees of freedom, and render the theories unsuitable. Gauge-fixing has been suggested as a possible remedy to control the couplings of the redundant degrees of freedom.

However, gauge-fixing at the non-perturbative level of compact gauge fields is a non-trivial business because of a rigorous no-go theorem by Neuberger which says that the partition function of a BRST-invariant theory of compact gauge fields is identically zero, apparently because of cancelling contributions from Gribov copies.

Here at SINP, we are pursuing particular proposals of non-perturbative gauge fixing both for Abelian and non-Abelian compact gauge theories.

For the Abelian case, a higher derivative gauge fixing term, breaking gauge and BRST invariance, is added to the Wilson term along with a counter-term to recover gauge symmetry. A new universality class is found at a continuous phase transition between a broken symmetry phase with regular order and another broken symmetry phase with spatially modulated order that has a vector condensate. Approaching this transition from the regularly ordered phase recovers the gauge symmetry and thereby decoupling the longitudinal gauge degrees of freedom. Contribution of the SINP group has been to determine the phase diagram beyond weak couplings and establish the availability of the new universality class to all gauge couplings through computation of various observables. Investigation of the Abelian gauge-fixing on the lattice has been completed in the past year.

The non-Abelian gauge fixing involves extension of the BRST called equi-variant BRST (eBRST) to evade the Neuberger's theorem. This is basically application of gauge fixing to the coset while a subgroup is kept gauge-invariant, and necessarily involves four-ghost term in the action. We have developed, from scratch, a code for generating gauge configurations with this eBRST action. The work is still in progress.

In pure QCD with free boundary conditions, work was also done to determine the lowest glue ball spectrum.

Gravity and Cosmology

An alternate model of gravity including torsion is being investigated. The main feature of this new model is it reduces to Einstein's theory at long distances and becomes a Yang-Mills' theory at short distances. However, no exact solution beyond the trivial ones (with non-vanishing torsion) has been found in which these features are exhibited. A report on this is yet to come out.

The number of observable e-foldings during inflation is sensitive to the post-inflationary history of the Universe. The generic presence of light scalar fields in theories motivated by supersymmetry or String theory leads to a late-time period of matter domination which lowers the required number of e-foldings, and in turn, the exact predictions of inflationary model. This issue has been explored in a concrete set-up of Kahler moduli inflation in String theory. The initial displacement of volume modulus has been calculated explicitly, and the generic expectation from

supergravity theory was confirmed that the initial displacement is of the order of Planck mass. The constraints from reheating has also been analysed for this model in a subsequent work. In separate projects, the issue of attractor models in non-minimal f(R) gravity, and the supergravity contributions to inflation in models with non-minimal coupling to gravity have been analysed.

Strings

It has been shown earlier by us that, like BPS Dp branes, bulk gravity gets decoupled from the brane even for the non-susy Dp branes of type II string theories indicating a possible extension of AdS/CFT correspondence for the non-supersymmetric case. The detailed decoupling limit and the throat geometry of the non-susy D3 brane when the charge associated with the brane is very large have been worked out. This leads to the gravity dual of a non-supersymmetric QCD-like gauge theory with running coupling constant having confinement property. Also starting from an anisotropic non-susy D2 brane solution of type IIA string theory an anisotropic space-like D2 brane solution has been constructed by the standard trick of double Wick rotation. It is shown that upon compactification on six dimensional hyperbolic space of time dependent volume of this SD2 brane solution leads to accelerating cosmologies on the resultant four dimensional universe. On the other hand, at early times this four dimensional space, under certain situations, leads to four dimensional Kasner-like cosmology. Unlike in the standard four dimensional Kasner cosmology here all three Kasner exponents could be positive definite, leading to expansions in all three directions.

New examples of Lifshitz type vacua in 10D massive typeIIA supergravity are constructed. These Lifshitz geometries arise when `massive' closed strings are excited in D2-D8 brane system. Upon compactification to four dimensions they produce 4-dimensional Lifshitz solutions (with dynamical exponent of time being 2) like in the Einstein-Proca model of Son et. al. We also studied M5 action in six dimensions using Yang-Mills fields and adjoint scalars with the help ofauxiliary vector field and new axion field. The 6D covariant action is well defined for 'instantonic' string solitons.

In addition, the following issues were explored and addressed: a) Building on earlier works that describe a certain steady-state configuration, the causal structure of an emergent geometry, which emerges from the dynamics of open strings, was explored within the context of gauge-string duality. The similarity of causal structures emerging from dynamical gravity and this particular kinematic space-time was elaborated on. b) Motivated by earlier works within holography, a preliminary study of candidate infrared fixed points were carried out in a system of arbitrary number of adjoint and fundamental degrees of freedom, in a strongly coupled large N gauge theory. A large class of exact solutions were obtained, which are non-perturbative in terms of the ratio of the number of fundamentals and the number of adjoints.

QCD at Finite Temperature and Density

A captivating nature of non-central heavy ion collisions indicates that a very strong anisotropic magnetic field is generated in the direction perpendicular to the reaction plane, due to the relative motion of the ions themselves. The initial magnitude of this magnetic field can be very high at RHIC and LHC energies at the time of the collision and then it decreases very fast. The presence of an external anisotropic field in the medium subsequently requires modification of the present theoretical tools that can be applied appropriately to investigate various properties of QGP. We have been

involved in developing theoretical tools appropriate for a hot magnetised QCD medium. Also involved in studying non-perturbative aspects of hot QCD medium with effective models.

Nuclear Theory

The strong and model independent correlations of neutron star radii with the linear combination of the slope of the nuclear matter incompressibility coefficient and slope of the nuclear symmetry energy coefficient are reported for the first time. Such correlations are found to be more or less independent of the neutron star mass over a wide range. This correlation is traced back to be linked to the empirical relation existing between the star radius and the pressure at a nucleonic density between one and two times saturation density.

Mathematical Physics

An su(m)-invariant Haldane-Shastry like quantum spin chain with long-range interaction and open boundary condition has been studied. It is shown that this spin chain is integrable for some suitable choice of the lattice sites depending on the roots of the Jacobi polynomial. The ground state wave function of such integrable spin model can be obtained from the chiral correlator of the c=m-1 free boson boundary conformal field theory. The partition function of this spin chain is computed by using the freezing trick. Moreover, a complete description for the spectrum of this spin chain is given in terms of Haldane's motifs and a related classical vertex model.

We analyzed the fermionic quasinormal modes of the BTZ black hole in the presence of space-time noncommutativity. Our analysis exploits a duality between a spinless and spinning BTZ black hole, the spin being proportional to the non commutative deformation parameter. Using theAdS/CFT correspondence we show that the horizon temperatures obtained from the dual CFT pick up non-commutative contributions. We demonstrate the equivalence between the quasinormal and non-quasinormal modes for the non-commutative fermionic probes, which provides further evidence of holography in the noncommutative setting. Finally we present an analysisof the emission of Dirac fermions and the corresponding tunnelling amplitude within this non-commutative framework.

We analyzed the effects of noncommutativity in conformal quantum mechanics (CQM) using the \kappa-deformed space-time as a prototype. Upto the first order in the deformation parameter, the symmetry structure of the CQMalgebra is preserved but the coupling in a canonical model of the CQM gets deformed. We show that the boundary conditions that ensure a unitary time evolution in the non-commutative CQM can break the scale invariance, leading to a quantum mechanical scaling anomaly. We calculate the scaling dimensions of the two and three point functions in the non-commutative CQM which are shown to be deformed. The AdS_2/CFT_1 duality for the CQM suggests that the corresponding correlation functions in the holographic duals are modified. In addition, the Breitenlohner-Freedman bound also picks up a non-commutative correction. The strongly attractive regime of a canonical model of the CQM exhibit quantum instability. We show that the non commutativity softens this singular behaviour and its implications for the corresponding holographic duals are discussed.

We showed that the realizations of noncommutative coordinates that are linear in the Lorentz generators form a closed Lie algebra under certain conditions. The star

product and the co-product for the momentum generators are obtained for these Lie algebras and the corresponding twist satisfies the co-cycle and normalization conditions. We also obtain the twisted flip operator and the \mathcal R-matrix that define the statistics of particles or quantum fields propagating in the se-non commutative space times. The Lie algebra obtained in this work contains a special case which has been used in the literature to put bounds on noncommutative parameters from the experimental limits on Pauli forbidden transitions. The general covariant framework presented here is suitable for analyzing the properties of particles or quantum fields at the Planck scale.

We showed that the N-particle Sutherland model with inverse-square and harmonic interactions exhibit orthogonality catastrophe. For a fixed value of the harmonic coupling, the overlap of the N-body ground state wave functions with two different values of the inverse-square inter action term goes to zero in the thermodynamic limit. When the two values of the inverse-square coupling differ by an infinitesimal amount, the wave function overlap shows an exponential suppression. This is qualitatively different from the usual power law suppression observed in the Anderson's orthogonality catastrophe. We also obtain an analytic expression for the wave function overlaps for arbitrary set of couplings, whose properties are analyzed numerically. The quasi-particles constituting the ground state wave functions of the Sutherland model are known to obey fractional exclusion statistics. Our analysis indicates that the orthogonality catastrophe may be valid in systems with more general kinds of statistics than just the fermionic type.

Recently unusual properties of water in single-walled carbon nanotubes (CNT) with diameters ranging from 1.05 nm to 1.52 nm were observed. It was found that water in the CNT remains in an ice-like phase even when the temperature ranges between 105 - 151 C and 87 - 117 C for CNTs with diameters 1.05 nm and 1.06 nm respectively. Apart from the high freezing points, the solid-liquid phase transition temperature was found to be strongly sensitive to the CNT diameter. In this paper we show that water in such CNT's can admit coherent nano-scale structures provided certain conditions are met. The formation of such coherent structures allows for high values of solid-liquid phase transition temperatures that are in qualitative agreement with the empirical data. The model also predicts that the phase transition temperature scales inversely with the square of the effective radius available for the water flow within the CNT. This is consistent with the observed sensitive dependence of the solid-liquid phase transition temperature on the CNT diameter.

12.1. Ph D Awarded

1. Atanu Kumar [Amit Ghosh], Evolution of cosmological perturbation through bounce in covariant perturbations theory and tests of linearity, Homi Bhabha National Institute, August 2016.
2. Arindam Mazumdar [Palash Baran Pal], Effect of preheating on cosmic microwave background, University of Calcutta, February 2017.
3. Chowdhury Aminul Islam [Munshi Golam Mustafa], Study of hot and dense nuclear matter in effective QCD Model, Homi Bhabha National Centre, February 2017.
4. Avirup Ghosh [Amit Ghosh], Thermodynamics of horizons: some aspects of semi-classical approaches, Homi Bhabha National Institute, March 2017.

12.2. Lectures/Talks given in Conference/ Symposium/ Workshop/ Schools

Arnab Kundu

1. Indian Association for the Cultivation of Science, SYK Model Black Hole Physics, Kolkata, February, 2017.
2. Fundamental Flavours, Veneziano Limit and Holography, Harish Chandra Research Institute, Allahabad, November-December, 2016.
3. Attaching Strings to Holography: A Study in Quantum Field Theories, Strings Attached, Indian Institute of Technology, Kanpur, February, 2017.
4. Many Bodies Meet Massive Bodies: A Holographic Perspective, Recent trends in Condensed Matter and High Energy Physics, IACS, Kolkata, January - February, 2017.
5. Fundamental Matters (Veneziano Limit and Holography), Indian Strings Meeting 2016 (International), IISER Pune, December 2016.
6. Gauge-String Duality and Strongly Coupled Systems, String Theory: The Present and the Future, Ramakrishna Mission Vidyamandira, September 2016.
7. Which way will the train go?, DST INSPIRE Internship Camp 2016, Visva-Bharati, Santiniketan, September 2016.
8. Fundamental Flavours, Veneziano Limit and Holography: a Continuing Story and Open Problems, HRI, November-December, 2016.
9. Gauge-String Duality with Flavours: Musings with Dirac-Born-Infeld Action, University of Amsterdam, Amsterdam, September 2016.
10. Three dimensional super Yang-Mills with compressible matter, IIT Bombay, Bombay, April, 2016.
11. Three dimensional super Yang-Mills with compressible matter, Quantum Spacetime Seminar Series, TIFR, Mumbai, April 2016.
12. Three dimensional super Yang-Mills with compressible matter, CHEP, IISc, April 2016.

Gautam Bhattacharyya

The hierarchy problem and physics beyond the standard model

1. Conference 'Pheno1@IISERM', Chandigarh, April 2016.
2. National Symposium on Physics (SYMPHY 2016), IIT Bombay, April 2016.
3. Indo-French network (INFRE-HEPNET) kick-off meeting, IISc, Bangalore, May 2016
4. Physics Department, IIT Guwahati, May 2016.
5. LAPTh, Annecy, France, July 2016.
6. India-CMS Workshop, SINP, Kolkata, August 2016.
7. Department of Physics, University of Valencia, Spain, September 2016.
8. Colloquium at ICTS, Bangalore, October 2016.
9. Physics Department, Delhi University, November 2016.

10. Plenary talk in XXII DAE-BRNS High Energy Physics Symposium, University of Delhi, December 2016.
11. School of Physics, NISER, Bhubaneswar, February 2017.

An Overview of Electroweak Precision Tests

1. Pedagogic Lecture for students in Sangam @ HRI 2016, HRI, Allahabad, February 2016.
2. Physics Department, Univ of Calcutta, February 2016.

Gauge-Higgs Unification

1. Looking for BSM physics, IISc, Bangalore, December 2016.

Fine-tuning in composite Higgs models

1. International Conference from Strings to LHC-IV, Chalsa, West Bengal, March 2017.
2. Scuola Normale Superiore, Pisa, Italy, June 2017.
3. INFN and Univ. Federico, Napoli, Italy, June 2017.
4. University of Rome, La Sapienza, Rome, Italy, June 2017.

Harvendra Singh

1. Entanglement thermodynamic laws and 62erturbativa corrections for Dp branes, ICTP, Trieste, November 22, 2016.
2. Entanglement thermodynamic laws and 62erturbativa corrections for Dp branes, INFN Sezione di Padova, Italy, December 06, 2016.
3. Entanglement thermodynamic laws and 62erturbativa corrections in AdS, ASC, LMU, Munich, Germany, December 02, 2016.

Koushik Dutta

1. Inflation Models in Supergravity, Strings 2 LHC IV (3 Lectures), Chalsa, March 2017.
2. Moduli Vacuum Mis-alignment and Precise Predictions in String Inflation, Ladders of the Universe, Mainz Institute of Theoretical Physics, Germany, June 2016.
3. Moduli Domination and Precise Prediction in Inflation, PHENO01@IISERM, Mohali, April 2016.
4. Ramanujan Conclave Meeting, SN Bose Centre, December, 2016.

Munshi G. Mustafa

1. Heavy quark production and propagation in heavy-ion collisions, FAIR Physics – Compressed Baryonic Matter at FAIR, Sikkim-Manipal Institute of Technology, Mongpo, Sikkim, June 21-24, 2016.

Palash Baran Pal

1. Unification of forces, Science Camp, Physics Department, Jadavpur University, March 14, 2017.
2. Neutrinos and astrophysics, CNT Lectures on Special Topics in Nuclear Astrophysics (4 lectures of 1.5 hours each), Variable Energy Cyclotron Centre, Calcutta, March 06–09, 2017.

3. Neutrinos and cosmology, Orientation session of the DAE Nuclear Physics Symposium, Saha Institute of Nuclear Physics, December 04, 2016.
4. Unification of forces, Current trends in modern physics, Department of Physical Sciences, IISER Kolkata, November 5, 2016.
5. Neutrinoless double beta decay and neutrino mass, NDBD workshop (4 lectures of 75 minutes each), IIT Ropar and Tata Institute of Fundamental Research, IIT Ropar, October 17–21, 2016
6. Symmetry and the PMNS matrix, First workshop on beyond standard model physics, IISER Mohali, April 06–09, 2016.
7. Unification of forces, Frontiers of modern physics, Department of Physics, Jogamaya Devi College, Kolkata, November 21, 2016.
8. Unification of forces, Science Colloquium, IIT Ropar, October 21, 2016.
9. Three horizons of scientific terminologies for Indian languages – Colloquium, Homi Bhabha Centre for Scientific Education, Mumbai, June 16, 2016.
10. Statistical Mechanics (2 lectures of 75 minutes each), NIUS (National Initiative on Undergraduate Science) Physics Camp, Homi Bhabha Centre for Scientific Education, Mumbai, June 14-15, 2016.

Prakash Mathews

1. Quantum Chromodynamics, School-cum-workshop on Collider Physics: Events, Analysis and QCD (3 Lectures), Indian Institute of Technology, Guwahati, March 27-31, 2017.

12.3. Teaching elsewhere

Munshi G. Mustafa

1. Electromagnetic Theory-II; Integrated MSc course in Bose Institute, Kolkata, February-May 2017.

12.4. Miscellany

Munshi G. Mustafa

1. A talk on “My Association with Prof. Dinesh K. Srivastava” on his 64th Birthday, VECC, Kolkata, June 30, 2016.

Palash Baran Pal

1. Curriculum revision, “Curriculum revision” organized by the Electrical Engineering Department, Jadavpur University, March 22, 2017.
2. Protecting mother tongues, “Protecting the mother tongue”, organized by Sahitya Akademi, New Delhi, February 21, 2017.
3. Bangla horoph (Bengali script), “The cultural heritage of Bengal”, organized by Narasinha Dutt College, Howrah, February 17, 2017.
4. Developing Bangtex, or Latex in Bengali, “Technology and the Bengali language”, organized by Sarsuna College and the Linguistics Department of Jadavpur University, held at Jadavpur University, November 25, 2016.

5. Wave-particle duality and the birth of Quantum Mechanics, Physics Department, Raja Peary Mohan College, Uttarparha, February 25, 2017.
6. বাংলায় বজ্ঞান চর্চা (Study of science in Bengali), “P. C. Ray Memorial Lecture” organized by the Breakthrough Science Society, January 15, 2017.
7. ক্যালেন্ডারের রহস্য (The mystery of calendars), “Public Lecture” organized by the New Garia Housing Society, January 8, 2017.
8. The history and mystery of calendars, “Public Lecture” at IIT Ropar, October 20, 2016.
9. The history and mystery of calendars, “Humbolt Club”, Kolkata, June 10, 2016.
10. মহাকর্ষের ঢেউ (Gravitational waves), “Young Scientists Forum”, held at the Senate Hall of Calcutta University, June 4, 2016.
11. Waves and particles, “In-service course for Physics teachers for CBSE Schools”, held at Kendriya Vidyalaya, Cossipore, May 24, 2016.
12. The history and mystery of calendars, Institute of Engineering and Management, Kolkata, April 19, 2016.

13. Facilities

13.1. Centre for Advanced Research & Education

One Year Pre-PhD Training Program

CARE coordinated SINP's participation in JEST, another nationwide written test conducted by several DAE institutions together, through Prof. M G Mustafa, the JEST coordinator of SINP. The written tests are followed by interviews conducted in SINP. The tests and interviews are conducted in two major areas – Physics and Biophysical Sciences. In 2016-17, 31 students were selected.

They are now going through the mandatory one-year pre-PhD course work. CARE coordinates the one-year course work following the HBNI guidelines through the Post-M.Sc. coordinators. It coordinates the formation of doctoral committee for each student as per HBNI guideline and reviews each PhD students' annual progress and renewals of fellowships following the recommendation of doctoral committees. CARE office acts as the office of Dean, students' welfare, HBNI, SINP.

Undergraduate Associateship Program & Summer Students' program

In 2016-17, 13 undergraduate associates were trained in various labs of the Institute – the program is coordinated by Prof. Krishna Menon. In 2016-17 summer, 32 summer students were trained in various labs of the Institute – this program is coordinated by Prof. Nikhil Chakrabarti.

Institute Colloquiums, Distinguished Visitors

CARE organized **32** Institute colloquiums through colloquium coordinators, Prof. Y Sudhakar, Prof. Pratik Majumdar and Prof. Dulal Senapati.

Organizing Schools/Workshops (after getting the required approval of DAE)

- 8-th CARE School on Genomics & Proteomics for Clinicians in April 2016 in SINP.
- Partial support in organizing the Saha Theory workshop in cosmology and astrophysics at SINP during January 16-20, 2017.
- A meeting of LIGO and SINP scientists on November 9, 2016.
- Jointly organize 34th Young Physicist colloquium 2016 with Indian Physical Society during August 18-19, 2016 at SINP.
- CARE Seminar delivered by Dr. Chama Mukherjee on 07.01.17 on Gender sensitive issues at workplace.The seminar was jointly organized by CARE and Women Cell of SINP.
- CARE Seminar given by Mark McCanghrean of British Council on 14.2.17

Outreach Programs of Care

- 19-th National Science Exhibition during August 10–14, 2016, at Surer Math, DumDum, Kolkata, organized by the Central Calcutta Science & Culture Organization for Youth.
- 21-st Sundarban Kristi Mela o Lokosanskriti Utsav during 20-29 December 2016 at Sundarban, S 24 Parganas.

In house outreach programme organized by CARE on 08.11.2016

Science Day

CARE celebrated the Science Day on March 10, 2017. A day-long science outreach program was organized. About 500 students from local schools attended. Talks were delivered, followed by visits to several labs of the Institute. An interactive session was organized to address queries raised by the students. The day ended with a Science Quiz competition conducted by the SINP research fellows. Prizes were given to the winning schools by the Director.

Meghnad Saha Archive

CARE maintained and preserved the Prof. M.N. Saha Archive – a unique collection of numerous letters, documents, writings, personal items and memoirs of Prof. Saha and his colleagues. From time to time visitors from India and abroad, who are working on the history of Indian science, visit the archive. With permissions of our Director, CARE office hands over copies of these documents to scholars who are working on the subject.

Publication

Partial support in publishing a journal called Science and Culture, published by the Council of Indian Science News Association, Kolkata. Full financial support in developing the website of SINP and coordinating, preparing and publishing the annual report of SINP. CARE office also prints all posters requested by SINP students and faculties for participating in conference/workshops.

13.1.1. The Post-M Sc Associateship Course 2016 – 2017

Theoretical Physics

1. Anwesha Chattopadhyay
2. Aranya Bhattacharya
3. Avik Paul
4. Bishnu Awon (has not completed)
5. Bithika Karmakar
6. Supriyo Ghosh

Experimental Physics

1. Amrita Datta
2. Ashok Kumar Mondal

3. Dipak Mazumdar
4. Gourab Saha
5. Md Samsul Islam
6. Pintu Barman
7. Piyasi Biswas
8. Prithwijita Ray
9. Rajkumar Santra
10. Ram Sewak
11. Sathi Sharma
12. Sayan Ghosh
13. Smruti Ranjan Mohanty
14. Sunita Sahoo
15. Tanmay Maiti
16. Vishal Kumar

Biophysical Sciences

1. Anindita Das
2. Anushka Chakravorty
3. Biswendu Biswas
4. Deepro Bonnerjee
5. Gargi Biswas
6. Priyadarshani Suchismita Sethy
7. Rajkamal Srivastava
8. Satyaki Chatterjee
9. Subhoja Chakraborty

Theoretical & Experimental Physics courses

Compulsory Courses in the First Trimester (Aug – Nov 2016)

1) Quantum Mechanics (Subinit Roy, Satyajit Saha)
2) Statistical Mechanics (Abhik Basu)
3) Advanced quantum Mechanics (Amit Ghosh)
4) Advanced Statistical Mechanics (Pradeep Mohanty)
5) Quantum Field Theory I (Asit K De)
6) Computational and Numerical Methods including C++ programming: Supratik Mukhopadhyay, Nayana Majumdar, Sandip Sarkar, Debasish Das
7) Short Experiments in Research Laboratories (Satyajit Hazra and Indranil Das, Co-ordinators)

8) Research Methodology: a) Numerical Methods and Alogorithms b) Research Ethics c) Attending seminar/colloquium (Arti Garg, Kalpataru Pradhan, Debades Bandyopadhyay and Bijay Agrawal, Krishnakumar S R Menon, Biswajit Karmakar)

Advanced Courses (optional) in Second Trimester (Dec 2016 – Mar 2017)

1) Quantum Field Theory-II (Asit K De)
2) Particle Physics (Palash B Pal)
3) Advanced Condensed Matter-I (Arti Garg & Kalpataru Pradhan)
4) Astro-Particle Physics-I (Debashis Majumdar)
5) Geometry and Gravity (Amit Ghosh)
6) Advances in High Energy and Astroparticle Physics**: (**Pijushpani Bhattacharjee, Naba Kumar Mondal)
7) Advanced tools for High Energy Physics and related detectors: (Subir Sarkar and Satyaki Bhattacharya)
8) Advanced Nuclear Physics I (Nuclear Structure and advanced nuclear radiation detectors & techniques): Maitreyee Saha Sarkar and Haridas Pai
9) Advanced Nuclear Physics II (Nuclear Reactions): Chinmay Basu
10) Materials Science / Nanoscience / Physics of Surfaces and Interfaces: Sangam Banerjee
11) Some Topics on Detection and Measurement of Radiation: Debasish Das, Co-ordinator

Review works (Theoretical & Experimental physics) for 2015 – 16 batch

1. Avik Banerjee, Higgs as pseudo Nambu-Goldstone Boson (Gautam Bhattacharyya, Theory)
2. Aritra Das, Collective oscillations in isotropic and anisotropic quark gluon plasma (Pradip K Roy, HENPP)
3. Augniva Ray, Conformal Bootstrap: a classic Idea and a modern Revival (Arnab Kundu, Theory)
4. Samanwaya Mukherjee, Two component dark matter model (Debasish Majumdar, AP&C)
5. Madhurima Pandey, Singlet scalar feebly interacting massive particle dark matter (Debasish Majumdar, AP&C)
6. Sajad Ahmad Bhat, Equation of state of neutron star matter (Debades Bandyopadhyay, AP&C)
7. Sourav Chakraborty, Metal-Insulator transition in binary disorder model (Kalpataru Pradhan, CMP)
8. Udit Narayan Chowdhury, Galilean Conformal Field Theories (Rudranil Basu, Theory)
9. Pintu Barman:- Growth process of size-selected metal nanoclusters and fabrication of soft-landed films (Satyaranjan Bhattacharyya, SPMSD)

10. Ashok Kumar Mondal:- Determination of the ANC of ^{16}O states using $^{12}C(^{6}Li,d)^{16}O$ angular distribution data at sub-Coulomb energies (Chinmay Basu, NPD)
11. Piyasi Biswas:- Study of Quasi-elastic scattering for the system $^{7}Li + ^{159}Tb$ at around barrier energies (Anjali Mukherjee, NPD)
12. Sajad Ali:- Search for unobserved transitions and assignment of Multipolarity of different transitions: Investigation of level structures of ^{142}Eu (Asimananda Goswami, NPD)
13. Abhishek Rakshit:- Electron Energy Loss Spectroscopy of Magnetic Materials (Biswarup Satpati, SPMSD)
14. Jhuma Ghosh:- Charmonium Production as a function of rapidity and transverse momentum in pp and PbPb collisions (Sukalyan Chattopadhyay, HENPPD)
15. Wadut Shaikh:- Production yields of bottomonium states in pp and Pb-Pb collisions at LHC energies (Sukalyan Chattopadhyay, HENPPD)
16. Prasant Kumar Rout:- Particle Tracking In The Context Of CMS Experiment (Supratik Mukhopadhyay, ANPD)
17. Subhankar Roy:- Magnetothermal transports of 3D Dirac semimetal Cd3As2 (Prabhat Mandal,CMPD)
18. Moumita Das:- Giant magnetocaloric effect of rare earth orthoferrite GdFeO3 (Prabhat Mandal,CMPD)
19. Apurba Dutta:- Preparation and Characterization of MnPt Thin Film (Indranil Das, CMPD)
20. Snehal Mandal:- Deposition of thin film using magnetron sputtering and characterization using X-ray (Indranil Das, CMPD)
21. Arpita Das:- Slow Light in atomic medium & design of magneto-optical trap (Sankar De, ANPD)
22. Sridhar Tripathy:- Basic and Advanced aspects of Muon Tomgraphy (Nayana Majumdar, ANPD)
23. Bibhuti Bhusan Jena:- Antiferromagnetic/Antiferromagnetic coupling (Krishnakumar S R Menon, SPMSD)
24. Debabrata Bhowmik:- (Satyaki Bhattacharya, HENPPD)

Avik Banerjee in PMSC (Physics) was the recipient of: Best performance award in PMSc (Physics) and Prof. A. P. Patra Memorial Prize in PMSc (Physics) for the session 2015-2016.

Bio-physical Sciences courses

Compulsory Courses in the First Trimester (Aug – Nov 2016)

1. Biochemistry and Cell Biology (BCB) (40 lectures by Abhijit Chakrabarti, Oishee Chakrabarti, Subrata Banerjee, Chandrima Das, Kaushik Sengupta and Partha Saha)
2. Chemical Biology and Biophysics (CBB) (40 lectures by Montu Hazra, Padmaja Mishra and Sangram Bagh).
3. Spectroscopy and Nanoscience (SPN) (20 lectures by Samita Basu and Dulal Senapati)
4. Computer Programming & Bioinformatics (CPB) (40 lectures by Gautam Garai and Dhananjay Bhattacharyya)
5. Macromolecular Structure (MMS) (40 lectures by Rahul Banerjee, Dhananjay Bhattacharyya, Udayaditya Sen, Sampa Biswas, H Raghuraman, Kaushik Sengupta)
6. Radiochemistry & Radiation Physics (RRP) (20 lectures by Susanta Lahiri and Maitreyee Nandi)

Research Methodology (Compulsory)

i. Biochemical and Molecular Biology Techniques (BMBT) (by Debashis Mukhopadhyay, Partha Saha)

ii. Spectroscopy, Imaging and Crystallography Techniques (SICT) (by Padmaja Mishra, Montu Hazra, Dulal Senapati, Kaushik Sengupta and H Raghuraman)

iii. Good Laboratory Practices, Radiological safety (Radiation Protection Standards, Principles of Monitoring and Protection), Ethics of scientific research, writing of scientific articles and project proposals.

iv. Research colloquium: During the first two weeks of the course work, presentation on scientific research work carried out in the laboratories where students have opportunity to join for their doctoral work will be made by the respective faculty. Purpose of the colloquiums is to provide an overview of research activities at the Institute in the relevant subject area to the new students.

Advanced Courses (December 2016 – July 2017)

Each course consists of 20 lecture hours. Each student has to opt for 4 courses in total

1. Topics in Cell Biology - I (Kaushik Sengupta, Oishee Chakrabarti and Partha Saha)
2. Topics in Cell Biology – II (Chandrima Das and Subrata Banerjee)
3. Membrane Biophysics and Structural Dynamics of Membrane Proteins (H. Raghuraman)
4. Chromatography and Mass Spectrometry (Soumen Kanti Manna)
5. Synthetic Biology: 21st Century Biological Engineering (Sangram Bagh)

6. Macromolecular Crystallography (Udayaditya Sen and Sampa Biswas)
7. Advanced Spectroscopy and imaging (Samita Basu, Padmaja Mishra and Montu Hazra)
8. Drug Discovery: Modern Day Approach (Munna Sarkar)
9. Multi Scale Modeling (Dhananjay Bhattacharyya)
10. C programming language and its application in Bioinformatics (Gautam Garai)

Review/Project work (December 2016 – July 2017)

Each student has to do a literature review and laboratory work on a particular research topic under the supervision of a faculty in addition to their advance courses.

Review works (Biophysical sciences) for 2015 – 16 batch

1. Dibyashree Chowdhury, TDCR (Triple to Double Coincidence Ratio) - an excellent tool for low level analysis (Susanta Lahiri)
2. 2.Kathakali Sarkar, Synthetic gene circuits in therapeutics: Towards the making of biochemical digital decoder in Escherichia coli (Sangram Bagh)
3. Kaushik Chanda, Targeting RTK Signaling Pathways in Neurodegeneration (Debashis Mukhopadhyay)
4. Payel Mondal, Regulation of gene expression by transcription factor 19 (TCF19) in association with tumour suppressor proteins during glucose metabolism (Chandrima Das)
5. Rajdeep Das, Dynamics of ER-Mitochondrial junctions (Oishee Chakrabarti)
6. Samrat Basak, DNA-Protein interactions and beyond: A single molecule Biophysical approach (Padmaja P. Mishra)
7. Sandip Kumar De, Synthesis of different shaped gold nanoparticles and their electrocatalytic study in different redox reactions and as a SERS substrate to detect fungicides/pesticides (Dulal Senapati)
8. Satyabrata Maiti, Hybrid coarse grain analysis and simulation of nucleic acid double helices (Dhananjay Bhattacharyya)
9. Sauvik Sarkar, Cross talk between membrane lipids and the skeletal proteins (Abhijit Chakrabarti)
10. Sayak Mukhopadhyay, Synthetic genetic devices for space missions (Sangram Bagh)
11. Sweta Singh, Immune evasion by Human Herpes Viruses (Subrata Banerjee)
12. Suparna Saha, Neuromyelitis Optica (Debashis Mukhopadhyay)
13. Tanushree Chakraborty, Organelle-specific changes in metabolome associated with cancer (Soumen Manna)

14. Tulika Chakraborty, Structure of the transcription factor vpsR implicated in biofilm formation and its regulation by the second messenger c-di-GMP in Vibrio cholera (Udayaditya Sen).

13.2. Library

Library is the hub for every educational sector. In research and development organisation, library is the resource centre for information, knowledge management and dissemination of information and knowledge. The SINP Library is also one of the major information resource centres within Eastern India in the field of Physical and Biophysical Sciences. It is our privilege to support the institutes march towards its vision- to be the pioneer research institute in India. Through our well equipped and digitised library, the members of our institution and the other members associated

with our research and development program are being benefited and this will assist towards scientific development of our institute and our country at large. The Library not only acquires, organizes and disseminates knowledge; it has put its foot ahead towards policies and procedures, systems and services. The details of our library are given below.

13.2.1. Collections

Library has a huge collection of books, e-books and non-book materials. The details are given below:

- **Technical Books Accessioned:** 31980 (62 added in this year)
- **Non-Technical Books Accessioned:** E4315 (94 added in this year)
- **E- Books available:** 2929
- **Bound volumes of Journals Accessioned:** P51974
- **Current subscribed Journals:** 220 (Foreign)
- **Total no. of Online Journals including current subscription:** 3012 (Volume added from 2004 – 2012 of 8 Nature titles in this year)
- **Number of CD/DVD Rom Accessioned:** C1205 (total 26 CD added)
- **Theses accessioned:** T315 (26 added in this year)

13.2.2. Membership

In addition to our 609 institute members (faculties, research fellows and non academic), library has the privilege to serve more than six hundred (605) external users coming from different scientific and educational institutes of Eastern India. The external users includes; Calcutta University, Jadavpur University, Viswa Bharati, IACS, IICB, ISI, Bengal Engineering and Science University, WBUT, CMERI, Guwahati University, North-Eastern Hill University, Patna University etc. apart from numerous Under-Graduate/Post-Graduate colleges and project students.

13.2.3. Library Services

1. Borrowing of books and other documents.
2. Prints and Xerox of documents request by our students and faculties.
3. Prints all posters requested by our students and faculties for participating in conference/workshops.
4. Inter Library Loan request by our students and faculties.
5. Online access to more than three thousand journals.

13.2.4. Publications in Books/Monographs/Edited Volumes

Manlunching

1. Manlunching 2017, 'Information Needs of Bioinformatics Researchers' in Shri Ram, (ed), *Library and Information Services for Bioinformatics Education and Research*, pp.34-44. IGI Global Publisher, Hershey, PA.

Publications in Journals

Samit De

1. De, Samit (2016). Comparative research trends among five research institute, Kolkata. *International Journal of Information Dissemination and Technology*, 6(3), pp.216-233.

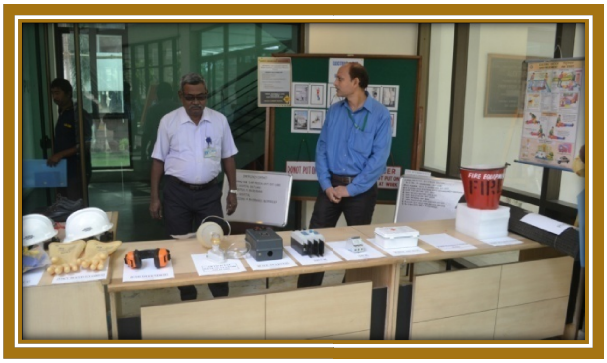
Publication in Conference proceedings

1. De, Samit (2016), A Study of Scientific Co-operation among SAARC Nations, *Proceedings of TIFR-BOSLA National Conference on Future Librarianship Innovation for Excellence*, pp.332-339.
2. De, Samit (2017), A Comparative Research Performance Study among Some R&D Institutes under Department of Atomic Energy, *Proceedings of National Conference on Library Innovations for Excellence (LIFE 2017)*.

13.3. Crisis Management Section

Safety Awareness Programme conducted by Crisis Management Committee

Crisis Management Section under the supervision of Crisis Management Committee looks after the safety aspects of different activities carried out. This includes regular surveillance of fire safety, radiation safety and safety against biological hazards. Staff members are advised about safety against chemical hazard, electrical and mechanical accidents.



Safety Awareness Programme

The Committee has organized a Safety Awareness Programme on November 11, 2016, at Saha Institute of Nuclear Physics. The technical program comprised of five lectures on Electrical, Radiation, Fire Safety and Occupational health hazard. Demonstration of handling electrical and fire safety equipment and of handling accidents was carried out.

A Two day Fire Safety Awareness Programme was organized by the Crisis Management Committee on March 16-17, 2017. The programme was conducted by West Bengal Fire & Emergency Services Department. Handling of different types of fire, emergency measures to be taken, several fire accidents in the state were discussed. A mock fire drill was conducted with some participating members.

14. Miscellany

14.1. Cosmetics Committee

Swatch Bharat Mission conducted by Cosmetics Committee

14.2. Women Cell

The Women Cell and CARE jointly organized a seminar on "Gender Sensitization: Issues at workplace". The lecture was deliverd by Dr. Chama Mukherjee, Advocate of the Calcutta High Court on November 18, 2016.

Director, SINP felicitating Dr. Chama Mukherjee

In the seminar, Dr. Mukherjee explains the growing need of spreading awareness on the "Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013". Staffs of SINP, irrespective of their gender, had attended the seminar.

15. Administration

15.1. Governing Council

Chairman:

Dr Sekhar Basu

Chairman, Atomic Energy Commission &
Secretary to the Government of India
Department of Atomic Energy

Members:

Shri Ajay Sule
Joint Secretary (R&D)
Government of India
Department of Atomic Energy

Joint Secretary (Finance)
Government of India
Department of Atomic Energy

Prof Sudhakar Panda
Director, Institute of Physics
Bhubaneswar

Prof Mustansir Barma
TIFR Centre for
Interdisciplinary Science
Hyderabad

Prof Amitava Raychaudhuri
Palit Professor of Physics
University of Calcutta

Prof NR Das
University of Calcutta

Prof Dilip Kumar Maity
University of Calcutta

Principal Secretary
Higher Education Department
Government of West Bengal

Prof Ajit Kumar Mohanty
Director
Saha Institute of Nuclear Physics
Kolkata

15.2. Audited Accounts

15.2.1. Balance Sheet

SAHA INSTITUTE OF NUCLEAR PHYSICS

Balance Sheet as at 31st March, 2017

CAPITAL FUND & LIABILITIES	Schedule	2016-17	2015-16
CORPUS / CAPITAL FUND	1	387790058.56	184352025.63
RESERVE & SURPLUS	2		
EARMARKED FUNDS / ENDOWMENT FUNDS	3	5917372.00	6909446.00
SECURED LOANS & BORROWINGS	4		
UNSECURED LOANS & BORROWINGS	5		
DEFFERED CREDIT LIABILITIES	6		
CURRENT LIABILITIES AND PROVISIONS	7	2963681313.12	2475322021.59
TOTAL		3357388743.68	2666583493.22
ASSETS			
FIXED ASSETS			
Gross Block	8	4178299888.84	4107123110.91
Less : Accumulated Depreciation	8	2502123858.55	2319377171.23
		1676176030.29	1787745939.68
INVESTMENTS- FROM EARMARKED/ ENDOWMENT FUNDS	9		
INVESTMENTS- OTHERS	10	593000.00	3510000.00
CURRENT ASSETS, LOANS & ADVANCES	11	1055684023.07	875327553.54
EXCESS OF EXPENDITURE OVER INCOME		624935690.31	
TOTAL		3357388743.68	2666583493.22
SIGNIFICANT ACCOUNTING POLICES	24		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25		

The Schedules referred to above form part of these Accounts

(V. P. Mishra)
Accounts Officer

(N. Sanyal)
Dy. Controller of Accounts

(Anirban Banerjee)
Registrar

(Ajit Kumar Mohanty)
Director

In terms of our attached Report of even date
For K. Sharma & Co
Chartered Accountants
FRN 302045E

(K. Sharma)
Partner
Membership No. 005313
1/B, Old Post Office Street, Room No.8, (First Floor),
Kolkata - 700 001
Dated :-05th September, 2017

K. SHARMA & CO. KOLKATA-1 CHARTERED ACCOUNTANTS

15.2.2. Income & Expenditure Account

SAHA INSTITUTE OF NUCLEAR PHYSICS

Income & Expenditure Account for the year ended 31st March, 2017

	Schedule	2016-17	2015-16
INCOME : -			
Income from Sales/Services	12	377600.00	642897.00
Grants	13	1005597579.37	883584669.27
Fees / Subscriptions	14		
Income from Investments	15		
Income from Royalty, Publication	16		
Interest Earned	17	5811907.00	3758762.12
Other Income	18	5460529.32	4586786.83
Increase / Decrease in stock of finished goods and works-in-progress	19		
Excess of Expenditure over Income transferred to Balance Sheet		624935690.31	708452967.77
		1642183306.00	1601026082.99
EXPENDITURE : -			
Establishment Expenses	20	1193448756.00	1164789486.60
Other Administrative Expenses	21	265676308.59	233272243.29
Expenditure on Grants, Subsidies	22		
Interest	23	19774.10	28630.00
Depreciation	8	183038467.31	202935723.10
		1642183306.00	1601026082.99

The Schedules referred to above form part of these Accounts

(V. P. Mishra)
Accounts Officer

(N. Sanyal)
Dy. Controller of Accounts

(Anirban Banerjee)
Registrar

In terms of our attached Report of even date
For K. Sharma & Co
Chartered Accountants
FRN 302045E

(K. K. Sharma)
Partner
Membership No. 005313
1/B, Old Post Office Street, Room No.8, (First Floor),
Kolkata - 700 001
Dated :-05th September, 2017

K. SHARMA & CO. KOLKATA-1 CHARTERED ACCOUNTANTS

(Ajit Kumar Mohanty)
Director

SAHA INSTITUTE OF NUCLEAR PHYSICS

Receipts & Payments Account for the year ended 31st March, 2017

Receipts	2015-16	2016-17	Payments	2015-16	2016-17
Opening Balance b/f :-					
Cash in hand	54,196.00	16,82,322.00	Establishment Expenses	64,63,64,724.60	68,19,74,527.00
Current Account Balances	93,31,16,961.18	49,31,23,982.18	Administrative Expenses	22,97,08,845.29	26,30,15,206.59
			Bank Charges	28,630.00	19,774.10
Grant-in-aid received from DAE :-			Assets	7,79,74,871.23	7,11,76,777.93
Recurring	80,00,00,000.00	88,51,08,000.00	Expenses paid for ongoing projects of other agencies	70,37,87,800.38	4,21,04,617.17
Non-Recurring	35,00,00,000.00	30,00,00,000.00	HBA & Other Advances paid	11,28,190.00	9,35,807.00
Grant received from other agencies			Margin Money deposit	3,57,93,800.00	23,62,54,172.00
for on going projects	3,16,59,775.88	2,78,62,450.81	Other Deposit	1,01,78,000.00	6,65,08,000.00
HBA & Other Advance recovery	32,46,616.00	35,29,679.00	Advances paid	2,29,33,658.00	2,25,95,171.73
Realisation of Margin Money Deposit	5,07,49,300.00	10,33,84,216.00	Last Year's provision paid	42,45,658.00	39,70,346.00
Realisation from other Deposit	1,77,50,458.00	29,17,000.00	Last Year's current liabilities paid		
Realisation of other advances	2,26,93,172.00	2,06,18,629.73	Pension Fund Payments		
Interest Received	37,58,762.12	58,11,907.00	Closing Balance c/f :-		
Income Receipts	52,29,683.50	58,38,129.32	Cash in hand	16,82,322.00	90.00
Liabilities (Deposits)	86,91,557.00	1,35,63,445.00	Current Account Balances	49,31,23,982.18	47,48,85,271.52
Pension Fund Receipts					
	2,22,69,50,481.68	1,86,34,39,761.04		2,22,69,50,481.68	1,86,34,39,761.04

(V. P. Mishra)
Accounts Officer

(N. Sanyal)
Dy. Controller of Accounts

(Anirban Banerjee)
Registrar

(Ajit Kumar Mohanty)
Director

In terms of our attached Report of even date
For K. Sharma & Co
Chartered Accountants
FRN 302045E

(K. Sharma)
Partner
Membership No. 005313
1/B, Old Post Office Street, Room No.8, (First Floor),
Kolkata - 700 001
Dated :-05th September, 2017

K. SHARMA & CO. KOLKATA-1 CHARTERED ACCOUNTANTS

List of Publications – Without Collaboration

(April 2016 – March 2017)

1. *Adhikari, S.*; *Basu, C.*; Sugathan, P.; et al. (*Mitra, A. K.*). 'Breakup effects on alpha spectroscopic factors of O-16', JOURNAL OF PHYSICS G-NUCLEAR AND PARTICLE PHYSICS 44 (2017) Art No: 015102
2. Adhikary, Biswajit; *Chakraborty, Mainak; Ghosal, Ambar*. 'Flavored leptogenesis with quasidegenerate neutrinos in a broken cyclic symmetric model', PHYSICAL REVIEW D 93 (2016) Art No: 113001
3. *Adhya, Souvik Priyam; Mandal, Mahatsab*; Biswas, Subhrajyoti; *Roy, Pradip K.* 'Pionic dispersion relations in the presence of a weak magnetic field', PHYSICAL REVIEW D 93 (2016) Art No: 074033
4. Ahmed, Taushif; Banerjee, Pulak; Dhani, Prasanna K.; et al. (*Mathews, Prakash).* 'Three loop form factors of a massive spin-2 particle with nonuniversal coupling', PHYSICAL REVIEW D 95 (2017) Art No: 034035
5. Ahmed, Taushif; Banerjee, Pulak; Dhani, Prasanna K.; et al. (*Mathews, Prakash*). 'NNLO QCD corrections to the Drell-Yan cross section in models of TeV-scale gravity', EUROPEAN PHYSICAL JOURNAL C 77 (2017) Art No: 22
6. Ahmed, Taushif; *Das, Goutam; Mathews, Prakash*; et al. 'The two-loop QCD correction to massive spin-2 resonance -> q(q)over-barg', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 667
7. Ahmed, Taushif; Bonvini, Marco; Kumar, M. C.; *Mathews, Prakash*; et al. 'Pseudo-scalar Higgs boson production at $N^3LO_A+N^3LL'$', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 663
8. Ahmed, Taushif; Kumar, M. C.; *Mathews, Prakash*; et al. 'Pseudo-scalar Higgs boson production at threshold N^3 LO and N^3LL QCD', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 355
9. *Alam, N.; Agrawal, B. K.*; Fortin, M.; et al. 'Strong correlations of neutron star radii with the slopes of nuclear matter incompressibility and symmetry energy at saturation', PHYSICAL REVIEW C 94 (2016) Art No: 052801
10. Aomoa, N.; Sarmah, Trinayan; Sah, Puspalata; et al. (*Satpati, B.*). 'Development of a plasma assisted ITER level controlled heat source and observation of novel micro/nanostructures produced upon exposure of tungsten targets', FUSION ENGINEERING AND DESIGN 106 (2016) 63-70
11. Bagchi, Arjun; *Basu, Rudranil*; Kakkar, Ashish; et al. 'Flat holography: aspects of the dual field theory', JOURNAL OF HIGH ENERGY PHYSICS 12 (2016) Art No: 147
12. Bagchi, Arjun; *Basu, Rudranil*; Kakkar, Ashish; et al. Galilean Yang-Mills theory, JOURNAL OF HIGH ENERGY PHYSICS 4 (2016) Art No: 051
13. *Baksi, Shounak; Bagh, Sangram; Sarkar, Sandip;* et al. (*Mukhopadhyay, Debashis).* 'Systemic study of a natural feedback loop in Huntington's disease at the onset of neurodegeneration', BIOSYSTEMS 150 (2016) 46-51
14. Bandopadhyay, Manikankana; Sarkar, Neelakshi; (Datta, Sibnarayan; et al. (*Das, Chandrima*). 'Hepatitis B virus X protein mediated suppression of miRNA-122 expression enhances hepatoblastoma cell proliferation through cyclin G1-p53 axis', INFECTIOUS AGENTS AND CANCER 11(2016) Art No: 40

15. Bandyopadhyay, Abhijit; *Bhattacharjee, Pijushpani*; Chakraborty, Sovan; et al. (*Saha Satyajit).* 'Detecting supernova neutrinos with iron and lead detectors', PHYSICAL REVIEW D 95 (2017) Art No: 065022

16. *Bandyopadhyay, Aritra; Islam, Chowdhury Aminul; Mustafa, Munshi G.* 'Electromagnetic spectral properties and Debye screening of a strongly magnetized hot medium', PHYSICAL REVIEW D 94 (2016) Art No: 114034

17. *Bandyopadhyay, Aritra; Mustafa, Munshi G.* 'Power corrections to the electromagnetic spectral function and the dilepton rate in QCD plasma within operator product expansion in D=4', JOURNAL OF HIGH ENERGY PHYSICS 11 (2016) Art No: 183

18. *Banerjee, Amrita; Sanyal, Sulagna; Dutta, Shreya*si; et al. (*Das, Prajna Paramita; Das, Chandrima; Dasgupta, Dipak).* 'The plant alkaloid chelerythrine binds to chromatin, alters H3K9Ac and modulates global gene expression', JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS 35 (2017) 1491-1499

19. Banerjee, Avik; Kundu, Arnab; Kundu, Sandipan. 'Emergent horizons and causal structures in holography', JOURNAL OF HIGH ENERGY PHYSICS 9 (2016) Art No: 166

20. Banerjee, Indranil; De, Kakali; Mukherjee, Dibyanti; et al. (Mukherjee, Manabendra). 'Paclitaxel-loaded solid lipid nanoparticles modified with Tyr-3-octreotide for enhanced anti-angiogenic and anti-glioma therapy', ACTA BIOMATERIALIA 38 (2016) 69-81

21. Banerjee, K.; Ghosh, T. K.; Roy, P.; et al. (Bhattacharya, P.). 'Fission dynamics study in Am-243 and Fm-254', PHYSICAL REVIEW C 93 (2016) Art No: 064602

22. Banerjee, Manisha; Datta, Moumita; Bhattacharyya, Nitai P. 'Modulation of mutant Huntingtin aggregates and toxicity by human myeloid leukemia factors', INTERNATIONAL JOURNAL OF BIOCHEMISTRY & CELL BIOLOGY 82 (2017) 1-9

23. Banerjee, P.; Ganguly, S.; Pradhan, M. K.; et al. 'Band structure in Sn-113', PHYSICAL REVIEW C 94 (2016) Art No: 014316

24. Banik, Amit Dutta; Majumdar, Debasish; Biswas, Anirban. 'Possible explanation of indirect gamma ray signatures from hidden sector fermionic dark matter', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 346

25. Banik, Sanjib; Das, Kalipada; Das, I. 'Enhancement of the magnetoresistive property by introducing disorder in the (La1-xYx)(0.7)Ca0.3MnO3 compound', RSC ADVANCES 7 (2017) 16575-16580

26. Banik, Sanjib; Das, Kalipada; Das, I. 'Size-induced modification of magneto-transport properties in nanocrystalline Sm0.5Ca0.5MnO3 compound', JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS 403 (2016) 36-40

27. Banu, Nasrin; Singh, Surendra; Satpati, B.; et al. (Chakraborty, P.). 'Evidence of Formation of Superdense Nonmagnetic Cobalt', SCIENTIFIC REPORTS 7 (2017) Art No: 41856

28. Banu, Nasrin; Satpati, Biswarup; Bhukta, Anjan; et al. 'Nanoscale eta-NiSi formation via ion irradiation of Si/Ni/Si', JOURNAL OF APPLIED PHYSICS 121 (2017) Art No: 045302

29. Bardhan, Debjyoti; Bhattacharyya, Gautam; Ghosh, Diptimoy; et al. 'Detailed analysis of flavor-changing decays of top quarks as a probe of new physics at the LHC', PHYSICAL REVIEW D 94 (2016) Art No: 015026

30. Barman, A.; Saini, C. P.; Sarkar, P. K.; et al. (Satpati, B.). 'Probing electron density across Ar+ irradiation-induced self-organized TiO2-x nanochannels for memory application', APPLIED PHYSICS LETTERS 108 (2016) Art No: 244104

31. Basu-Mallick, B.; Finkel, F.; Gonzalez-Lopez, A. 'Integrable open spin chains related to infinite matrix product states', PHYSICAL REVIEW B 93 (2016) Art No: 155154

32. Bayan, Sayan; Mishra, Sheo K.; Satpati, Biswarup; et al. (Chakraborty, Purushottam). 'Modified photoluminescence and photodetection characteristics of chemically grown SnO coated ZnO nanoneedles', JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B 34 2016) Art No: 061201

33. Behera, Tapan Kumar; Sahu, Subash Chandra; Satpati, Biswarup; et al. 'Branched Platinum Nanostructures on Reduced Graphene: An excellent Transducer for Nonenzymatic Sensing of Hydrogen Peroxide and Biosensing of Xanthine', ELECTROCHIMICA ACTA 206 (2016) 238-245

34. Bera, A. K.; Yusuf, S. M.; Kumar, Amit; et al. (Majumder, M.). 'Long-range and short-range magnetic correlations, and microscopic origin of net magnetization in the spin-1 trimer chain compound CaNi3P4O14', PHYSICAL REVIEW B 93 (2016) Art No: 184409

35. Bera, Kallol; Sau, Abhishek; Mondal, Pritiranjan; et al. (Mukherjee, Rukmini; Mookherjee, Debdatto; Metya, Amaresh; Kundu, Asish K.; Mandal, Debranjan; Satpati, Biswarup; Chakrabarti, Oishee; Basu, Samita). 'Metamorphosis of Ruthenium-Doped Carbon Dots: In Search of the Origin of Photoluminescence and Beyond', CHEMISTRY OF MATERIALS 28 (2016) 7404-7413

36. Bera, Manindra; Ainavarapu, Sri Rama Koti; Sengupta, Kaushik. 'Significance of 1B and 2B domains in modulating elastic properties of lamin A', SCIENTIFIC REPORTS 6 (2016) Art No: 27879

37. Bera, Subhas C.; Sanyal, Kasturi; Senapati, Dulal; et al. (Mishra, Padmaja P.). 'Conformational Changes Followed by Complete Unzipping of DNA Double Helix by Charge-Tuned Gold Nanoparticles', JOURNAL OF PHYSICAL CHEMISTRY B 120 (2016) 4213-4220

38. Bhardwaj, Neha; Pandey, Akhilesh; Satpati, Biswarup; et al. 'Enhanced CO gas sensing properties of Cu doped SnO2 nanostructures prepared by a facile wet chemical method', PHYSICAL CHEMISTRY CHEMICAL PHYSICS 18 (2016) 18846-18854

39. Bharti, Rashmi; Dey, Goutam; Banerjee, Indranil; et al. (Mukherjee, Manabendra). 'Somatostatin receptor targeted liposomes with Diacerein inhibit IL-6 for breast cancer therapy', CANCER LETTERS 388 (2017) 292-302

40. Bhattacharya, G.; Giri, R. P.; Saxena, H.; et al. (Mukhopadhyay, M. K,). 'X-ray Reflectivity Study of the Interaction of an Imidazolium-Based Ionic Liquid with a Soft Supported Lipid Membrane', LANGMUIR 33 (2017) 1295-1304

41. Bhattacharya, M.; Mandal, A. R.; Das Chakraborty, S.; et al. (Maiti, Arpan; Maity, Achyut; Mondal, P.; Senapati, D.). 'Direct experimental observation of salt induced aspect ratio tunable PFPT silver-nanowire formation: SERS-based ppt level Hg2+ sensing from ground water', RSC ADVANCES 6 (2016) 45279-45289

42. Bhattacharya, Satyaki; Jain, Shilpi. 'A review of the discovery of SM-like Higgs boson in H ->gamma gamma decay channel with the CMS detector at the LHC', PRAMANA-JOURNAL OF PHYSICS 87 (2016) Art No: UNSP 35

43. Bhattacharya, Soumik; Bhattacharyya, S.; Das Gupta, S.; et al. (Goswami, A.). 'Deformed band structures at high spin in Tl-200', PHYSICAL REVIEW C 95 (2017) Art No: 014301

44. Bhattacharyya, Arpan; Sanyal, Milan K.; Mogera, Umesha; et al. (Mukhopadhyay, Mrinmay K.; Maiti, Santanu). 'In-Situ GISAXS Study of Supramolecular Nanofibers having Ultrafast Humidity Sensitivity', SCIENTIFIC REPORTS 7 (2017) Art No: 246

45. Bhattacharyya, Dhananjay; Halder, Sukanya; Basu, Sankar; et al. (Mukherjee, Debasish). 'RNAHelix: computational modeling of nucleic acid structures with Watson-Crick and non-canonical base pairs', JOURNAL OF COMPUTER-AIDED MOLECULAR DESIGN 31 (2017) 219-235

46. Bhattacharyya, Gautam; Das, Dipankar. 'Scalar sector of two-Higgs-doublet models: A minireview', PRAMANA-JOURNAL OF PHYSICS 87 (2016) Art No: UNSP 40

47. Bhattacherjee, Biplob; Chakraborty, Sabyasachi; Mukherjee, Swagata. 'Lepton flavor violating decay of 125 GeV Higgs boson to mu tau channel and excess in t(t)over-barH', MODERN PHYSICS LETTERS A 31 (2016) Art No: 1650174

48. Bhowmik, R. N.; Kazhugasalamoorthy, S.; Ranganathan, R.; et al. 'Tuning of composite cubic spinel structure in Co1.75Fe1.25O4 spinel oxide by thermal treatment and its effects on modifying the ferrimagnetic properties', JOURNAL OF ALLOYS AND COMPOUNDS 680 (2016) 315-327

49. Bhukta, Anjan; Ghosh, Arnab; Guha, Puspendu; et al. (Satpati, Biswarup). 'Effect of Au thickness on AuAg bimetallic growth on reconstructed Si(5512) surfaces', APPLIED PHYSICS A-MATERIALS SCIENCE & PROCESSING 123 (2017) Art No: 174

50. Biswas, Anirban. 'Explaining low energy gamma-ray excess from the galactic centre using a two-component dark matter model', JOURNAL OF PHYSICS G-NUCLEAR AND PARTICLE PHYSICS 43 (2016) Art No: 055201

51. Biswas, Debaleen; Sinh, Anil Kumar; Chakraborty, Supratic. 'Effects of oxygen partial pressure and annealing temperature on the residual stress of hafnium oxide thin-films on silicon using synchrotron-based grazing incidence X-ray diffraction', APPLIED SURFACE SCIENCE 384 (2016) 376-379

52. Biswas, Debaleen; Chakraborty, Ayan; Chakraborty, Supratic. 'Role of annealing temperature in the oxide charge distribution in high-kappa-based MOS devices: simulation and experiment', JOURNAL OF COMPUTATIONAL ELECTRONICS 15 (2016) 795-800

53. Borderie, B.; Raduta, Ad. R.; Ademard, G.; et al. (Chatterjee, M.). 'Probing clustering in excited alpha-conjugate nuclei', PHYSICS LETTERS B 755 (2016) 475-480

54. Britto, A. L. M.; Das, Ashok K.; Frenkel, J. 'Generalized Kadanoff-Baym relation in nonequilibrium quenched models', PHYSICAL REVIEW D 93 (2016) Art No: 105034

55. Chakrabarti, Abhijit; Halder, Suchismita; Karmakar, Shilpita. 'Erythrocyte and platelet proteomics in hematological disorders', PROTEOMICS CLINICAL APPLICATIONS 10 (2016) 403-414

56. Chakrabarti, Bikas K. ‘Can economics afford not to become natural science?’, EUROPEAN PHYSICAL JOURNAL-SPECIAL TOPICS 225 (2016) 3121-3125

57. Chakraborty, D.; Nandi, U. N.; Jana, D.; et al. (Dasgupta, P; Poddar, A). ‘Characterization of nonOhmic electrical transport in double perovskite compounds through bias scale and nonlinearity exponent’, JOURNAL OF PHYSICS AND CHEMISTRY OF SOLIDS 100 (2017) 19-24

58. Chakraborty, Suvankar; Menon, Krishnakumar S. R. ‘Growth and structural evolution of Sn on Ag(001): Epitaxial monolayer to thick alloy film’, JOURNAL OF VACUUM SCIENCE & TECHNOLOGY A 34 (2016) Art No: 041513

59. Chandra, Anjan Kumar; Basu, Abhik. ‘Diffusion controlled model of opinion dynamics’, REPORTS IN ADVANCES OF PHYSICAL SCIENCES 1 (2017) Art No:1740008

60. Chatterjee, A. ‘Is it "natural" to expect economics to become a part of the natural sciences?’, EUROPEAN PHYSICAL JOURNAL-SPECIAL TOPICS 225 (2016) 3145-3149

61. Chatterjee, Amit Kumar; Daga, Bijoy; Mohanty, P. K. ‘Phase coexistence and spatial correlations in reconstituting k-mer models’, PHYSICAL REVIEW E 94 (2016) Art No: 012121

62. Chatterjee, Arijit; Mohanty, P. K. ‘Multicritical absorbing phase transition in a class of exactly solvable models’, PHYSICAL REVIEW E 94 (2016) Art No: 062141

63. Chatterjee, Arnab; Ghosh, Asim; Chakrabarti, Bikas K. ‘Socio-economic inequality: Relationship between Gini and Kolkata indices’, PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS 466 (2017) 583-595

64. Chatterjee, Debarati; Chakraborty, Chandrachur; Bandyopadhyay, Debades. ‘Gravitomagnetic effect in magnetized neutron stars’, JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS Issue 1 (2017) Art No: 062

65. Chatterjee, Tridip; Halder, Suchismita; et al. (Chakrabarti, Abhijit). ‘A FACS based case study on two HbE-β thalassaemia member of a family, having similar mutational background’, SCIENTIFICA 2016 (2016) Art No:3181937

66. Chattopadhyay, Bidisa; Ahmed, Md. A.; Bandyopadhyay, S.; Halder, Suchismita; et al. (Chakrabarti, A.). ‘Magnetic ordering induced ferroelectricity in alpha-Cu2V2O7 studied through non-magnetic Zn doping’, JOURNAL OF APPLIED PHYSICS 121 (2017) Art No: 094103

67. Chaturvedi, Smita; Shyam, Priyank; Apte, Amey; et al. (Bhattacharyya, Arpan). ‘Dynamics of electron density, spin-phonon coupling, and dielectric properties of SmFeO3 nanoparticles at the spin-reorientation temperature: Role of exchange striction’, PHYSICAL REVIEW B 93 (2016) Art No: 174117

68. Chaubey, Neeraj; Mukherjee, S.; Sen, A.; et al. (Iyengar, A. N. Sekar). ‘Experimental observation of phase-flip transitions in two inductively coupled glow discharge plasmas’, PHYSICAL REVIEW E 94 (2016) Art No: 061201

69. Chaudhuri, A.; Sen, A.; Ghosh, T. K.; et al. (Bhattacharya, P.). ‘Fission fragment mass distributions in reactions populating Pb-200’, PHYSICAL REVIEW C 94 (2016) Art No: 024617

70. Chaudhuri, Punarbasu; Naskar, Nabanita; Lahiri, Susanta. ‘Measurement of background radioactivity in surface soil of Indian Sundarban’, JOURNAL OF RADIOANALYTICAL AND NUCLEAR CHEMISTRY 311 (2017) 1947-1952

71. Chauhan, Himani; Kumar, Yogesh; Dana, Jayanta; et al. (Satpati, Biswarup). 'Photoinduced ultrafast charge separation in colloidal 2-dimensional CdSe/CdS-Au hybrid nanoplatelets and corresponding application in photocatalysis', NANOSCALE 8 (2016) 15802-15812

72. Choudhuri, Madhumita; Datta, Alokmay. 'Critical behavior of a two-dimensional complex fluid: Macroscopic and mesoscopic views', PHYSICAL REVIEW E 93 (2016) Art No: 042804

73. Choudhuri, Madhumita; Datta, Alokmay. 'Time-structuring in the evolution of 2D nanopatterns through interactions with substrate', SOFT MATTER 12 (2016) 5867-5875

74. Choudhury, Kamalika Roy; Bucha, Sudha; Baksi, Shounak; et al. (Mukhopadhyay, Debashis; Bhatracharyya, Nitai P.). 'Chaperone-like protein HYPK and its interacting partners augment autophagy', EUROPEAN JOURNAL OF CELL BIOLOGY 95 (2016) 182-194

75. Chowdhury, Debasree; Satpati, Biswarup; Ghose, Debabrata. 'Temperature and high fluence induced ripple rotation on Si(100) surface', MATERIALS RESEARCH EXPRESS 3 (2016) Art No: 125003

76. Chowdhury, Debasree; Ghose, Debabrata. 'Nanoripple formation on GaAs (001) surface by reverse epitaxy during ion beam sputtering at elevated temperature', APPLIED SURFACE SCIENCE 385 (2016) 410-416

77. Chowdhury, Debasree; Ghose, Debabrata. 'Highly-ordered ripple structure induced by normal incidence sputtering on monocrystalline GaAs (001): ion energy and flux dependence', VACUUM 129 (2016) 122-125

78. Chowdhury, Ujjal; Goswami, Sudipta; Bhattacharya, Dipten; et al. (Midya, Arindam; Mandal, P.). 'Determination of intrinsic ferroelectric polarization in lossy improper ferroelectric systems', APPLIED PHYSICS LETTERS 109 (2016) Art No: 092902

79. Cicoli, Michele; Dutta, Koushik; Maharana, Anshuman; et al. 'Moduli vacuum misalignment and precise predictions in string inflation', JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS Issue: 8 (2016) Art No: 006

80. Daga, Bijoy; Mondal, Souvik; Chandra, Anjan Kumar; et al. (Banerjee, Tirthankar; Basu, Abhik). 'Nonequilibrium steady states in a closed inhomogeneous asymmetric exclusion process with generic particle nonconservation', PHYSICAL REVIEW E 95 (2017) Art No: 012113

81. Dalui, Amit; Chakraborty, Arup; Thupakula, Umamahesh; et al. (Satpati, Biswarup). 'Chemical Tailoring of Band Offsets at the Interface of ZnSe-CdS Heterostructures for Delocalized Photoexcited Charge Carriers', JOURNAL OF PHYSICAL CHEMISTRY C 120 (2016) 10118-10128

82. Dan, Shovan; Mukherjee, S.; Mazumdar, Chandan; et al. (Ranganathan, R). 'Zero thermal expansion with high Curie temperature in Ho2Fe16Cr alloy', RSC ADVANCES 6 (2016) 94809-94814

83. Das, A.; Chakrabarti, A.; Das, P. K. 'Probing protein adsorption on a nanoparticle surface using second harmonic light scattering', PHYSICAL CHEMISTRY CHEMICAL PHYSICS 18 (2016) 24325-24331

84. Das, Anjan; Mandal, Atis Chandra; Roy, Soma; et al. (Prashanth, Pendem; Ahamed, Sk Iza; Kar, Subhrasmita; Prasad, Mithun S.; Nambissan, P. M. G.). 'Synthesis and characterization of magnesium oxide nanocrystallites and probing the vacancy-type defects through positron annihilation studies',

PHYSICA E-LOW-DIMENSIONAL SYSTEMS & NANOSTRUCTURES 83 (2016) 389-397

85. Das, Anjan; Mandal, Atis Chandra; Roy, Soma; et al. (Nambissan, P. M. G.). 'Mn-Doping in NiO Nanoparticles: Defects-Modifications and Associated Effects Investigated Through Positron Annihilation Spectroscopy', JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY 16 (2016) 4153-4163

86. Das, B.; Rather, N.; Chattopadhyay, S.; et al. (Rajbanshi, S.; Goswami, A.). 'Three proton hole structure in Ag-106', PHYSICAL REVIEW C 93 (2016) Art No: 064322

87. Das, Bankim Chandra; Bhattacharyya, Dipankar; Das, Arpita; et al. (Chakrabarti, Shrabana; De, Sankar). 'Simultaneous observations of electromagnetically induced transparency (EIT) and absorption (EIA) in a multi-level V-type system of Rb-87 and theoretical simulation of the observed spectra using a multi-mode approach', JOURNAL OF CHEMICAL PHYSICS 145 (2016) Art No: 224312

88. Das Chakraborty, Sudeshna; Sau, Abhishek; Kuznetsov, Denis V.; et al. (Banerjee, Amrita; Bardhan, Munmun; Bhattacharya, Maireyee; Basu, Samita; Senapati, Dulal). 'Development of a Triplet-Triplet Absorption Ruler: DNA- and Chromatin-Mediated Drug Molecule Release from a Nanosurface', JOURNAL OF PHYSICAL CHEMISTRY B 120 (2016) 6872-6881

89. Das, Debashree; Pramanik, Ushasi; Patra, Malay; et al. (Chakrabarti, Abhijit). 'Differential interactions of imatinib mesylate with the membrane skeletal protein spectrin and haemoglobin', RSC ADVANCES 6 (2016) 55203-55210

90. Das, Debasis; Samanta, Dibyendu; Bhattacharya, Arpita; et al. (Chakrabarti, Abhijit). 'A Possible Role of the Full-Length Nascent Protein in Post-Translational Ribosome Recycling', PLOS ONE 12 (2017) Art No: e0170333

91. Das, Dipanwita; Sengupta, Isha; Sarkar, Neelakshi; et al (Das, Chandrima). 'Anti-hepatitis B virus (HBV) response of imiquimod based toll like receptor 7 ligand in hbv-positive human hepatocelluar carcinoma cell line', BMC INFECTIOUS DISEASES 17 (2017) Art No: 76

92. Das, Dipanwita; Sarkar, Neelakshi; Sengupta, Isha; et al. (Das, Chandrima). 'Anti-viral role of toll like receptor 4 in hepatitis B virus infection: An in vitro study', WORLD JOURNAL OF GASTROENTEROLOGY 22 (2016) 10341-10352

93. Das, Kalipada; Das, I. 'Magnetic and magnetoresistive properties of half-metallic ferromagnetic and charge ordered modified ferromagnetic manganite nanoparticles', JOURNAL OF APPLIED PHYSICS 121 (2017) Art No: 103904

94. Das, Kumar; Domcke, Valerie; Dutta, Koushik. 'Supergravity contributions to inflation in models with non-minimal coupling to gravity', JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS 1703 (2017) Art No: 036.

95. Das, Mala; Biswas, Nilanjan. 'Detection of bubble nucleation event in superheated drop detector by the pressure sensor', PRAMANA-JOURNAL OF PHYSICS 88 (2017) Art No: 14

96. Das, Samir; Chowdhury, Sanghati Roy; Dey, Sanjay; et al (Sen, Udayaditya). 'Structural and biochemical studies on Vibrio cholerae Hsp31 reveals a novel dimeric form and Glutathione-independent Glyoxalase activity', PLOS ONE 12 (2017) Art No: e0172629

97. Das, Srijit; Bhattacharyya, Nitai Pada. 'Huntingtin interacting protein HYPK is a negative regulator of heat shock response and is downregulated in models of Huntington's Disease', EXPERIMENTAL CELL RESEARCH 343 (2016) 107-117

98. Datta, Debi Prasad; Garg, Sandeep K.; Thakur, Indrani; et al. (Satpati, Biswarup). 'Facile synthesis of a superhydrophobic and colossal broadband antireflective nanoporous GaSb surface', RSC ADVANCES 6 (2016) 48919-48926

99. Datta, Ushasi; Rahaman, A.; Aumann, T.; et al. (Chakraborty, S.). 'Direct experimental evidence for a multiparticle-hole ground state configuration of deformed Mg-33', PHYSICAL REVIEW C 94 (2016) Art No: 034304

100. De, Asit K.; Sarkar, Mugdha. 'Tricritical points in a compact U(1) lattice gauge theory at strong coupling', PHYSICAL REVIEW D 93 (2016) Art No: 114504

101. Debnath, Sushanta; Ballav, Niladri; Maity, Arjun; et al. 'Competitive adsorption of ternary dye mixture using pine cone powder modified with beta-cyclodextrin', JOURNAL OF MOLECULAR LIQUIDS 225 (2017) 679-688

102. Dey, B.; Mukherjee, S.; Mukherjee, N.; et al. (Satpati, B; Senapati, D). 'Green silver nanoparticles for drug transport, bioactivities and a bacterium (Bacillus subtilis)-mediated comparative nano-patterning feature', RSC ADVANCES 6 (2016) 46573-46581

103. Dey, Debarati; Sarangi, Manas Kumar; Ray, Angana; et al. (Bhattacharyya, Dhananjay). 'Excited state hydrogen bonding fluorescent probe: Role of structure and environment', JOURNAL OF LUMINESCENCE 173 (2016) 105-112

104. Dey, S. K.; Dey, C. C.; Saha, S. 'Effects of Zr impurity on microscopic behavior of Hf metal', JOURNAL OF PHYSICS AND CHEMISTRY OF SOLIDS 95 (2016) 98-105

105. Dey, S. K.; Dey, C. C.; Saha, S. 'Low temperature structural modification in Rb2ZrF6: Investigations by perturbed angular correlation spectroscopy', JOURNAL OF PHYSICS AND CHEMISTRY OF SOLIDS 93 (2016) 145-156

106. Dey, S. K.; Dey, C. C.; Saha, S. 'Low temperature structural phase transition in hafnium and zirconium tetrafluoride trihydrates', JOURNAL OF PHYSICS AND CHEMISTRY OF SOLIDS 91 (2016) 18-24

107. Dhara, S.; Chowdhury, R. Roy; Bandyopadhyay, B. 'Observation of resistivity minimum at low temperature in CoxCu1-x (x similar to 0.17-0.76) nanostructured granular alloys', PHYSICAL REVIEW B 93 (2016) Art No: 214413

108. Dubey, R.; Sugathan, P.; Jhingan, A.; et al. (Chatterjee, M. B.). 'Interplay of fission modes in mass distribution of light actinide nuclei Pa-225,Pa-227', PHYSICS LETTERS B 752 (2016) 338-343

109. Dutta, Debanjan; Mukherjee, Riya; Patra, Mousumi; et al. (Mukherjee, Manabendra). 'Green synthesized cerium oxide nanoparticle: A prospective drug against oxidative harm', COLLOIDS AND SURFACES B-BIOINTERFACES 147 (2016) 45-53

110. Cicoli, Michele; Dutta, Koushik; Maharana, Anshuman; et al. 'Moduli Vacuum Misalignment and Precise Predictions in String Inflation', JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS 1608 (2016) Art No: 006

111. Dutta, Koushik; Panda, Sukanta; Patel, Avani. 'Viability of an arctan model of f(R) gravity for late-time cosmology', PHYSICAL REVIEW D 94 (2016) Art No: 024016

112. Dutta (Pal), Gopa; Chakraborty, Priyanka; Yadav, Somnath; et al. (Bardhan, Munmun). 'Time Resolved Spectroscopic Investigations to Compare the Photophysical Properties of a Short-Chain Dyad When Combined with Silver and Gold Nanoparticles to Form Nanocomposite Systems', JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY 16 (2016) 7411-7419

113. Dutta, Sruti; Choudhury, Debi; Roy, Sumana; et al. (Dattagupta, Jiban Kanti; Biswas, Sampa). 'Mutation in the Pro-Peptide Region of a Cysteine Protease Leads to Altered Activity and Specificity-A Structural and Biochemical Approach', PLOS ONE 11 (2016) Art No: e0158024

114. Dutta, S.; Bhattacharyya, M; Sengupta, K. 'Implications and assessment of the elastic behaviour of lamins in laminopathies', CELLS 5 (2016) E37

115. Faruque, Sk Abdul Kader Md; Debnath, Debika; Giri, Bimalesh; et al. (Chakraborty, Supratic). 'Crystal growth kinetics of ultra-thin ZrO2 film on Si by differential scanning calorimetry', JOURNAL OF CRYSTAL GROWTH 459 (2017) 38-42

116. Faruque, Sk Abdul Kader Md; Chakraborty, Supratic; Giri, Rajendra Prasad. 'Effect of N2O ratio on the crystallization temperature of ZrO2 film deposited on Si by reactive sputtering in Ar/O-2/N2O plasma', MATERIALS RESEARCH EXPRESS 3 (2016) Art No: 116406

117. Faruque, Sk Abdul Kader Md; Sinha, Anil Kumar; 'Chakraborty, Supratic. Oxidation kinetics of films on Si by differential scanning calorimetry', JOURNAL OF MATERIALS SCIENCE-MATERIALS IN ELECTRONICS 27 (2016) 4923-4927

118. Gangopadhyay, Moumita; Gantait, Saikat; Palchoudhury, Shouroseni; et al. 'UVC-priming mediated modulation of forskolin biosynthesis key genes against Macrophomina root rot of Coleus forskohlii-A tissue culture based sustainable approach', PHYTOCHEMISTRY LETTERS 17 (2016) 36-44

119. Ganguly, Bichitra Nandi; Verma, Vivek; Chatterjee, Debanuj; et al. (Satpati, Biswarup; Debnath, Sushanta; Saha, Partha). 'Study of Gallium Oxide Nanoparticles Conjugated with beta-Cyclodextrin: An Application To Combat Cancer', ACS APPLIED MATERIALS & INTERFACES 8 (2016) 17127-17137

120. Garai, S.; Janaki, M. S.; Chakrabarti, N. 'Nonlinear coupling of acoustic and shear mode in a strongly coupled dusty plasma with a density dependent viscosity', ASTROPHYSICS AND SPACE SCIENCE 361 (2016) Art No: 294

121. Garai, S.; Jana, S.; Janaki, M. S.; et al. (Chakrabarti, N.). 'Stability characteristics of a non-Newtonian strongly coupled dusty plasma in the presence of shear flow', EPL 114 (2016) Art No: 65003

122. Garai, S.; Banerjee, D.; Janaki, M. S.; et al. (Chakrabarti, N.). 'Shear flow driven instability in an incompressible dusty plasma with a density dependent viscosity', INDIAN JOURNAL OF PHYSICS 90 (2016) 717-724

123. Garai, Sudip. 'Stability characteristics of Rayleigh-Taylor instability in a strongly coupled incompressible dust fluid with finite shear flow', PHYSICS OF PLASMAS 23 (2016) Art No: 113706

124. Ghorai, Soumyajit; Bhunia, Satyaban; Roy, Madhusudan; et al. 'Mechanochemical devulcanization of natural rubber vulcanizate by dual

function disulfide chemicals', POLYMER DEGRADATION AND STABILITY 129 (2016) 34-46

125. Ghose, Srabantika; Gogurla, N.; Ranganathan, R.; et al. 'The simultaneous emergence of free exciton emission and d(0) ferromagnetism for undoped ZnO nanoparticles', RSC ADVANCES 6 (2016) 83909-83915

126. Ghosh, Abhijit; Saha, S. K.; Chowdhury, S.; et al. (Janaki, M. S.). 'Dual upper drift waves in RF produced magnetized helium plasma', PHYSICS OF PLASMAS 24 (2017) Art No: 012104

127. Ghosh, Asim; Chatterjee, Arnab; Inoue, Jun-ichi; et al. (Chakrabarti, Bikas K.). 'Inequality measures in kinetic exchange models of wealth distributions', PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS 451 (2016) 465-474

128. Ghosh, Avirup; Mishra, Rohit. 'Generalized geodesic deviation equations and an entanglement first law for rotating BTZ black holes', PHYSICAL REVIEW D 94 (2016) Art No: 126005

129. Ghosh, Kaustab; Lahiri, Susanta; Sarkar, Kangkana; et al. (Naskar, Nabanita; Choudhury, Dibyasree). 'Ionic liquid-salt based aqueous biphasic system for rapid separation of no-carrier-added Pb-203 from proton irradiated (Tl2CO3)-Tl-nat target', JOURNAL OF RADIOANALYTICAL AND NUCLEAR CHEMISTRY 310 (2016) 1311-1316

130. Ghosh, Kaustab; Lahiri, Susanta; Maiti, Moumita. 'Separation of no-carrier-added Hg-195(m,Hg-g),Hg-197m from Au target by ionic liquid and salt based aqueous biphasic systems', JOURNAL OF RADIOANALYTICAL AND NUCLEAR CHEMISTRY 310 (2016) 1345-1351

131. Ghosh, K.; Maiti, M; Lahiri, S. 'Separation of $^{195(m.g.),\ 197m}$Hg from bulk gold target by liquid-liquid extraction using hydrophobic ionic liquids', RADIOCHIMICA ACTA (2017)

132. Ghosh, S; Mukherjee, A; Mandal, M; et al. 'Spectral properties of rho meson in a magnetic field', PHYSICAL REVIEW D 94 (2016) Art No: 094043

133. Ghosh, Sabuj; Shaw, Pankaj Kumar; Saha, Debajyoti; et al. (Janaki, M. S.; Iyengar, A. N. Sekar). 'Hysteresis of fluctuation dynamics associated with a fireball in a magnetized glow discharge plasma in a currentless toroidal assembly', PHYSICS OF PLASMAS 23 (2016) Art no: 093511

134. Ghosh, Samiran; Chakrabarti, Nikhil. 'Nonlinear low-frequency electrostatic wave dynamics in a two-dimensional quantum plasma', ANNALS OF PHYSICS 371 (2016) 67-76

135. Ghosh, Snigdha; Mukherjee, Arghya; Mandal, Mahatsab; et al. (Roy, Pradip). 'Spectral properties of the rho meson in a magnetic field', PHYSICAL REVIEW D 94 (2016) Art No: 094043

136. Ghosh, Soumen; Chattopadhyay, P. K.; Ghosh, J.; et al. (Pal, R). 'Transition from single to multiple axial potential structure in expanding helicon plasma', JOURNAL OF PHYSICS D-APPLIED PHYSICS 50 (2017) Art No: 065201

137. Ghosh, Soumen; Yadav, S.; Barada, K. K.; et al. (Pal, R.). 'Formation of annular plasma downstream by magnetic aperture in the helicon experimental device', PHYSICS OF PLASMAS 24 (2017) Art No: 020703

138. Ghosh, Sujay; Mitra, Amrit Krishna; Pal, Uttam; et al. (Basu, Samita). 'Evidence of two structurally related solvatochromic probes complexed with

beta-cyclodextrin by using spectroscopic methods', JOURNAL OF MOLECULAR STRUCTURE 1130 (2017) 810-817

139. Ghosh, Tapas; Satpati, Biswarup. 'Role of oxygen in wetting of copper nanoparticles on silicon surfaces at elevated temperature', BEILSTEIN JOURNAL OF NANOTECHNOLOGY 8 (2017) 425-433

140. Giri, S. K.; Sahoo, R. C.; Dasgupta, Papri; et al. (Poddar, A.). 'Giant spontaneous exchange bias effect in Sm1.5Ca0.5CoMnO6 perovskite', JOURNAL OF PHYSICS D-APPLIED PHYSICS 49 (2016) Art No: 165002

141. Goswami, Sathi; Ray, Suhita; Sarkar, Munna. 'Spectroscopic studies on the interaction of DNA with the copper complexes of NSAIDs lornoxicam and isoxicam', INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES 93 (2016) Pt: A 47-56

142. Grassberger, Peter; Dhar, Deepak; Mohanty, P. K. 'Oslo model, hyperuniformity, and the quenched Edwards-Wilkinson model', PHYSICAL REVIEW E 94 (2016) Art No: 042314

143. Hazra, Bidhan; Das, Kamalika; Das Chakraborty, Sudeshna; et al. (Senapati, Dulal). 'Hollow Gold Nanoprism as Highly Efficient "Single" Nanotransducer for Surface-Enhanced Raman Scattering Applications', JOURNAL OF PHYSICAL CHEMISTRY C 120 (2016) 25548-25556

144. Hooda, Sonu; Khan, S. A.; Satpati, B.; et al. 'Thermal spike effect in sputtering of porous germanium to form surface pattern by high energy heavy ions irradiation', APPLIED PHYSICS LETTERS 108 (2016) Art No: 201603

145. Hooda, Sonu; Khan, S. A.; Satpati, B.; et al. 'Nanopores formation and shape evolution in Ge during intense ionizing irradiation', MICROPOROUS AND MESOPOROUS MATERIALS 225 (2016) 323-330

146. Houngbo, D; Bernardes, A.P.; David, J. C.; et al. (Lahiri, S.). 'Development of a liquid Pb-Bi target for high-power ISOL facilities', NUCLEAR INBSTRUMENTS AND METHOD IN PHYSICS RESEARCH B 376 (2016) 57-59

147. Indra, A.; Dey, K.; Majumdar, S.; et al. (Giri, R. P.; Khan, N.; Mandal, P.). 'Magnetoelectric memory in reentrant frozen state and considerable ferroelectricity in the multiferroic spin-chain compound Sm2BaNiO5', PHYSICAL REVIEW B 95 (2017) Art No: 094402

148. Indra, A.; Dey, K.; Midya, A.; et al. (Mandal, P.). 'Magnetoelectric coupling and exchange bias effects in multiferroic NdCrO3 (vol 28, 166005, 2016)', JOURNAL OF PHYSICS-CONDENSED MATTER 28 (2016) Art no: 279601

149. Indra, A.; Dey, K.; Midya, A.; et al. (Mandal, P.). 'Magnetoelectric coupling and exchange bias effects in multiferroic NdCrO3', JOURNAL OF PHYSICS-CONDENSED MATTER 28 (2016) Art No 166005

150. Jana, Sayanee; Banerjee, Debabrata; Chakrabarti, Nikhil. 'Formation and evolution of vortices in a collisional strongly coupled dusty plasma', PHYSICS LETTERS A 380 (2016) 2531-2539

151. Jana, Sayanee; Ghosh, Samiran; Chakrabarti, Nikhil. 'Nonlinear coherent structures of Alfven wave in a collisional plasma', PHYSICS OF PLASMAS 23 (2016) Art No: 072304

152. Jash, A.; Majumdar, N.; Mukhopadhyay, S.; et al. (Saha, S.). 'Numerical study on the effect of design parameters and spacers on RPC signal and timing properties', JOURNAL OF INSTRUMENTATION 11 (2016) Art No: C09014

153. Jash, A.; Majumdar, N.; Mukhopadhyay, S.; et al. 'Effect of plate roughness on the field near RPC plates', JOURNAL OF INSTRUMENTATION 11 (2016) Art No: C06010

154. Kalmani, S. D.; Joshi, A. V.; Bhattacharya, S.; et al. 'Performance enhancement of open loop gas recovery process by centrifugal separation of gases', JOURNAL OF INSTRUMENTATION 11 (2016) Art No: C11031

155. Kanrar, Sarat; Debnath, Sushanta; De, Pradip; et al. 'Preparation, characterization and evaluation of fluoride adsorption efficiency from water of iron-aluminium oxide-graphene oxide composite material', CHEMICAL ENGINEERING JOURNAL 306 (2016) 269-279

156. Kar, Satyaki; Yarlagadda, Sudhakar. 'Checkerboard-supersolidity in a two-dimensional Bose-Holstein model', ANNALS OF PHYSICS 375 (2016) 322-336

157. Karmakar, Mithun; Maity, Chandan; Chakrabarti, Nikhil; et al. 'Relativistic wave-breaking limit of electrostatic waves in cold electron-positron-ion plasmas', EUROPEAN PHYSICAL JOURNAL D 70 (2016) Art No: 144

158. Karmakar, Mithun; Maity, Chandan; Chakrabarti, Nikhil. 'Wave-breaking amplitudes of relativistic upper-hybrid oscillations in a cold magnetized plasma', PHYSICS OF PLASMAS 23 (2016) Art No: 064503

159. Karmakar, Prasanta; Satpati, Biswarup. 'The influence of projectile ion induced chemistry on surface pattern formation', JOURNAL OF APPLIED PHYSICS 120 (2016) Art No: 025301

160. Karthigeyan, Dhanasekaran; Surabhi, Sudhevan; Mizar, Pushpak; et al. (Banerjee, Amrita; Dasgupta, Dipak). 'A Dual Non-ATP Analogue Inhibitor of Aurora Kinases A and B, Derived from Resorcinol with a Mixed Mode of Inhibition', CHEMICAL BIOLOGY & DRUG DESIGN 87 (2016) 958-967

161. Kashyap, V. K. S.; Yadav, C.; Sehgal, S. T.; et al. (Mohanty, A. K.). 'Plastic scintillator-based hodoscope for the characterization of large-area resistive plate chambers', PRAMANA-JOURNAL OF PHYSICS 87 (2016) Art No: 92

162. Katmis, Ferhat; Lauter, Valeria; Nogueira, Flavio S.; et al. (Satpati, Biswarup). 'A high-temperature ferromagnetic topological insulating phase by proximity coupling', NATURE 533 (2016) 513-+

163. Kaur, Balwinder; Srivastava, Rajendra; Satpati, Biswarup. 'Highly Efficient CeO2 Decorated Nano-ZSM-5 Catalyst for Electrochemical Oxidation of Methanol', ACS CATALYSIS 6 (2016) 2654-2663

164. Kaur, Balwinder; Satpati, Biswarup; Srivastava, Rajendra. 'ZrO2 supported Nano-ZSM-5 nanocomposite material for the nanomolar electrochemical detection of metol and bisphenol A', RSC ADVANCES 6 (2016) 65736-65746

165. Khan, N.; Sarkar, P.; Midya, A.; et al. (Mandal, P.; Mohanty, P. K.). 'Continuously Varying Critical Exponents Beyond Weak Universality', SCIENTIFIC REPORTS 7 (2017) Art No: 45004

166. Kisslinger, Leonard S.; Das, Debasish. 'Psi(2S) and Y(3S) Suppression in p-Pb 8 TeV Collisions and Mixed Heavy Quark Hybrid Mesons', INTERNATIONAL JOURNAL OF THEORETICAL PHYSICS 55 (2016) 5152-5156

167. Kisslinger, Leonard S.; Das, Debasish. 'Ψ and Y Production in p-p Collisions at E = 5, 14 TeV; and Comparison with Experiment at E = 7 TeV', INTERNATIONAL JOURNAL OF THEORETICAL PHYSICS 55 (2016) 4362-4370

168. Konar, Sushan; Bagchi, Manjari; Bandyopadhyay, Debades; et al. 'Neutron Star Physics in the Square Kilometre Array Era: An Indian Perspective', JOURNAL OF ASTROPHYSICS AND ASTRONOMY 37 (2016) SI Art No: 36

169. Kratochvil, Huong T.; Carr, Joshua K.; Matulef, Kimberly; et al. (Raghuraman, H.). 'Instantaneous ion configurations in the K+ ion channel selectivity filter revealed by 2D IR spectroscopy', SCIENCE 353 (2016) 1040-1044

170. Kumar, Deepak; Maiti, Moumita; Lahiri, Susanta. 'Experimental probe for the production of Ru-97 from the Li-7+Nb-93 reaction: A study of precompound emissions', PHYSICAL REVIEW C 94 (2016) Art No: 044603

171. Kumar, Mukesh; Soni, Kiran; Satpati, Biswarup; et al. 'Exploration of magnetically separable Ag@AgxNiy core/graded-alloy-shell nanostructures', CHEMICAL COMMUNICATIONS 52 (2016) 8737-8740

172. Kumari, Chanda; Sain, Dibyendu; Kumar, Ashish; et al. (Debnath, Sushanta; Saha, Partha). 'Intracellular detection of hazardous Cd2+ through a fluorescence imaging technique by using a nontoxic coumarin based sensor', DALTON TRANSACTIONS 46 (2017) 2524-2531

173. Kumari, Chanda; Sain, Dibyendu; Kumar, Ashish; et al. (Debnath, Sushanta; Saha, Partha). 'A real time colorimetric 'two in one' kit for tracking ppb levels of uric acid and Hg2+ in live HeLa S3 cells and Hg2+ induced keto-enol tautomerism', RSC ADVANCES 6 (2016) 62990-62998

174. Kundu, Anjan. 'Exact Bethe ansatz solution of a nonlinear quantum field model in quasi-two dimensions linked to the Landau-Lifshitz equation', NUCLEAR PHYSICS B 913 (2016) 1-14

175. Kundu, Anjan. 'Exact asymmetric Skyrmion in anisotropic ferromagnet and its helimagnetic application', NUCLEAR PHYSICS B 909 (2016) 73-85

176. Kundu, Arnab; Kundu, Nilay. 'Fundamental flavours, fields and fixed points: a brief account', JOURNAL OF HIGH ENERGY PHYSICS 3 (2017) Art No: 071

177. Kundu, Asish K.; Menon, Krishnakumar S. R. 'Growth and characterization of ultrathin epitaxial MnO film on Ag (001)', JOURNAL OF CRYSTAL GROWTH 446 (2016) 85-91

178. Kundu, Ranadip; Bhattacharya, Sanjib; Roy, Debasish; et al. (Nambissan, P.M.G.). 'Positron annihilation studies and complementary experimental characterization of xAg(2)O-(1-x)(0.3CdO-0.7MoO(3)) metal oxide glass nanocomposites', RSC ADVANCES 7 (2017) 8131-8141

179. Kundu, Sourav; Karmakar, S. N. 'Electronic transport in single-helical protein molecules: Effects of multiple charge conduction pathways and helical symmetry', PHYSICS LETTERS A 380 (2016) 2395-2399

180. Kundu, Sourav; Karmakar, S. N. 'Detection of base-pair mismatches in DNA using graphene-based nanopore device', NANOTECHNOLOGY 27 (2016) Art No: 135101

181. Kuznetsov, V. I.; Pramanik, Sourav; Gerasimenko, A. B.; et al. (Chakrabarti, Nikhil). 'Stability properties of the steady state solutions of a non-neutral plasma diode when there is a uniform magnetic field along transverse direction', PHYSICS OF PLASMAS 24 (2017) Art No: 023107

182. Lakshmanan, M.; Chakrabarti, Bikas K. 'Anjan Kundu (1953-2016)', CURRENT SCIENCE 112 (2017) 865-866

183. Lala, S.; Satpati, B.; Pradhan, S. K. 'Sintering behavior and growth mechanism of beta-TCP in nanocrystalline hydroxyapatite synthesized by mechanical alloying', CERAMICS INTERNATIONAL 42 (2016) 13176-13182

184. Lone, Muzalfar Qadir; Yarlagadda, S. 'Decoherence dynamics of interacting qubits coupled to a bath of local optical phonons', INTERNATIONAL JOURNAL OF MODERN PHYSICS B 30 (2016) Art no: 1650063

185. Maiti, Arpan; Maity, Achyut; Satpati, Biswarup; et al. 'Efficient Excitation of Higher Order Modes in the Plasmonic Response of Individual Concave Gold Nanocubes', JOURNAL OF PHYSICAL CHEMISTRY C 121 (2017) 731-740

186. Maiti, Santanu; Sanyal, Milan K.; Jana, Manoj K.; et al. 'Evidence of contact epitaxy in the self-assembly of HgSe nanocrystals formed at a liquid-liquid interface', JOURNAL OF PHYSICS-CONDENSED MATTER 29 (2017) Art No: 095101

187. Maity, Achyut; Maiti, Arpan; Satpati, Biswarup; et al. (Chini, Tapas Kumar). 'Probing Localized Surface Plasmons of Trisoctahedral Gold Nanocrystals for Surface Enhanced Raman Scattering', JOURNAL OF PHYSICAL CHEMISTRY C 120 (2016) 27003-27012

188. Maity, Santu; Datta, Arpita; Lahiri, Susanta; et al. 'A dynamic chitosan-based self-healing hydrogel with tunable morphology and its application as an isolating agent', RSC ADVANCES 6 (2016) 81060-81068

189. Maity, Sujan; Mukherjee, Koel; Banerjee, Amrita; et al. (Dasgupta, Dipak). 'Inhibition of Porcine Pancreatic Amylase Activity by Sulfamethoxazole: Structural and Functional Aspect', PROTEIN JOURNAL 35 (2016) 237-246

190. Majhi, Abhishek. 'Proof of Bekenstein-Mukhanov ansatz in loop quantum gravity', MODERN PHYSICS LETTERS A 31 (2016) Art No: 1650171

191. Majhi, Abhishek. 'Thermodynamic Partition Function from Quantum Theory for Black Hole Horizons in Loop Quantum Gravity', ADVANCES IN HIGH ENERGY PHYSICS (2016) Art No: 1068757

192. Majumdar, Anupa; Sarkar, Munna. 'Small Mismatches in Fatty Acyl Tail Lengths Can Effect Non Steroidal Anti-Inflammatory Drug Induced Membrane Fusion', JOURNAL OF PHYSICAL CHEMISTRY B 120 (2016) 4791-4802

193. Majumder, Gourab; Garg, Arti. 'Drude weight in hard-core boson systems: Possibility of a finite-temperature ideal conductor', PHYSICAL REVIEW B 94 (2016) Art No: 134508

194. Majumder, M.; Ghoshray, A.; Khuntia, P.; et al. (Mazumdar, C.; Poddar, A.; Ghoshray, K.). 'Absence of low energy magnetic spin-fluctuations in isovalently and aliovalently doped LaCo2B2 superconducting compounds', JOURNAL OF PHYSICS-CONDENSED MATTER 28 (2016) Art No: 345701

195. Majumder, Priyanka; Chakrabarti, Oishee. 'ESCRTs and associated proteins in lysosomal fusion with endosomes and autophagosomes', BIOCHEMISTRY AND CELL BIOLOGY 94 (2016) SI 443-450

196. Majumder, S.; Saha, B.; Dey, S.; et al. (Banerjee, S.). 'A highly sensitive non-enzymatic hydrogen peroxide and hydrazine electrochemical sensor based on 3D micro-snowflake architectures of alpha-Fe2O3', RSC ADVANCES 6 (2016) 59907-59918

197. Mandal, Suman; Pal, Somnath; Kundu, Asish K.; et al. (Menon, Krishnakumar S. R.). 'Direct view at colossal permittivity in donor-acceptor (Nb, In) co-doped rutile TiO2', APPLIED PHYSICS LETTERS 109 (2016) Art No: 092906

198. Mandal, Suman; Das, Jayanta; Menon, Krishnakumar S. R. 'Surface magnetism of NiO investigated by magnetic spectromicroscopies', JOURNAL OF ELECTRON SPECTROSCOPY AND RELATED PHENOMENA 208 (2016) SI 51-55

199. Mazumdar, Arindam; Modak, Kamakshya Prasad. 'Constraints on variations in inflaton decay rate from modulated preheating', JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS Issue: 6 (2016) Art No: 030

200. Meghna, K. K.; Biswas, S.; Jash, A.; et al. (Saha, S). 'Effects of variation of environmental parameters on the performance of Resistive Plate Chamber detectors', NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT 816 (2016) 1-8

201. Mehta, Romil; Brahmbhatt, H.; Mukherjee, M.; et al. 'Tuning separation behavior of tailor-made thin film poly (piperazine-amide) composite membranes for pesticides and salts from water', DESALINATION 404 (2017) 280-290

202. Mishra, D. K.; Garg, P.; Netrakanti, P. K.; et al. (Mohanty, A. K.). 'Effect of resonance decay on conserved number fluctuations in a hadron resonance gas model', PHYSICAL REVIEW C 94 (2016) Art No: 014905

203. Mitra, Piyali; Pal, Uttam; Maiti, Nakul Chandra; et al. (Basu, Samita). 'Identification of modes of interactions between 9-aminoacridine hydrochloride hydrate and serum proteins by low and high resolution spectroscopy and molecular modelling', RSC ADVANCES 6 (2016) 53454-53468

204. Mitra, Vramori; Prakash, N. Hari; Solomon, Infant; et al. (Iyengar, A. N. Sekar). 'Mixed mode oscillations in presence of inverted fireball in an excitable DC glow discharge magnetized plasma', PHYSICS OF PLASMAS 24 (2017) Art No: 022307

205. Mitra, Vramori; Sarma, Bornali; Sarma, Arun; et al. (Janaki, M. S.; Iyengar, A. N. Sekar). 'Investigation of complexity dynamics in a DC glow discharge magnetized plasma using recurrence quantification analysis', PHYSICS OF PLASMAS 23 (2016) Art No: 062312

206. Modak, Rajkumar; Samantaray, B.; Mandal, P.; et al. 'Thickness dependent structural, magnetic and magneto-dynamic properties of Mn rich Ni-Mn-Sn films', JOURNAL OF ALLOYS AND COMPOUNDS 692 (2017) 529-534

207. Mollick, Safiul Alam; Kumar, Mohit; Singh, Ranveer; et al. (Satpati, Biswarup; Ghose, Debabrata). 'Gold-decorated highly ordered self-organized grating-like nanostructures on Ge surface: Kelvin probe force microscopy and conductive atomic force microscopy studies', NANOTECHNOLOGY 27 (2016) Art No: 435302

208. Mondal, C.; Agrawal, B. K.; Centelles, M.; et al. 'Model dependence of the neutron-skin thickness on the symmetry energy', PHYSICAL REVIEW C 93 (2016) Art No: 064303

209. Mondal, C.; Agrawal, B. K.; De, J. N.; et al. (Samaddar, S. K.). 'Sensitivity of elements of the symmetry energy of nuclear matter to the properties of neutron-rich systems', PHYSICAL REVIEW C 93 (2016) Art No: 044328

210. Mondal, Manas; Halder, Sukanya; Chakrabarti, Jaydeb; et al. (Bhattacharyya, Dhananjay). 'Hybrid Simulation Approach Incorporating Microscopic Interaction Along with Rigid Body Degrees of Freedom for Stacking Between Base Pairs', BIOPOLYMERS 105 (2016) 212-226

211. Mukherjee, Rukmini; Chakrabarti, Oishee. 'Regulation of Mitofusin1 by Mahogunin Ring Finger-1 and the proteasome modulates mitochondrial fusion', BIOCHIMICA ET BIOPHYSICA ACTA-MOLECULAR CELL RESEARCH 1863 (2016) 3065-3083

212. Mukherjee, Soumita; Chakraborty, Prabal; Saha, Partha. 'Phosphorylation of Ku70 subunit by cell cycle kinases modulates the replication related function of Ku heterodimer', NUCLEIC ACIDS RESEARCH 44 (2016) 7755-7765

213. Mukherjee, Sudip; Chatterjee, Arnab. 'Disorder-induced phase transition in an opinion dynamics model: Results in two and three dimensions', PHYSICAL REVIEW E 94 (2016) Art No: 062317

214. Mukhopadhyay, Sayak; Saha, Rohini; Palanisamy, Anbarasi; et al. (Ghosh, Madhurima; Pal, Arijit; Sarkar, Kathakali; Bagh, Sangram). 'A systems biology pipeline identifies new immune and disease related molecular signatures and networks in human cells during microgravity exposure', SCIENTIFIC REPORTS 6 (2016) Art No: 25975

215. Nag, Sabyasachi; Garg, Arti; Ramakrishnan, T. V. 'Nature of single-particle states in disordered graphene', PHYSICAL REVIEW B 93 (2016) Art No: 235426

216. Nagamatsu, Shin-ichi; Takao, Shinobu; Samjeske, Gabor; et al. (Gayen, Sirshendu; Velaga, Srihari; Saniyal, Milan K.). 'Structural and Electronic Transformations of Pt/C, Pd@Pt(1 ML)/C and Pd@Pt(2 ML)/C Cathode Catalysts in Polymer Electrolyte Fuel Cells during Potential-step Operating Processes Characterized by In-situ Time-resolved XAFS', SURFACE SCIENCE 648 (2016) SI 100-113

217. Naiya, Gitashri; Raha, Paromita; Mondal, Manas Kumar; et al. (Bhattacharyya, Dhananjay). 'Conformational selection underpins recognition of multiple DNA sequences by proteins and consequent functional actions', PHYSICAL CHEMISTRY CHEMICAL PHYSICS 18 (2016) 21618-21628

218. Nandi, M.; Mandal, P. 'Magnetic and magnetocaloric properties of quasi-one-dimensional Ising spin chain CoV2O6', JOURNAL OF APPLIED PHYSICS 119 (2016) Art No: 133904

219. Nandi, Rana; Char, Prasanta; Chatterjee, Debarati; et al. (Bandyopadhyay, Debades). 'Role of nuclear physics in oscillations of magnetars', PHYSICAL REVIEW C 94 (2016) Art No: 025801

220. Nandy, Maitreyee; Sarkar, P. K.; Sanami, T.; et al. 'Neutron emission and dose distribution from natural carbon irradiated with a 12 MeV amu(-1) C-12(5+) ion beam', JOURNAL OF RADIOLOGICAL PROTECTION 36 (2016) 456-473

221. Naskar, Nabanita; Lahiri, Susanta; Chaudhuri, Punarbasu; et al. (Srivastava, Alok). 'Measurement of naturally occurring radioactive materials, U-238 and Th-232: anomalies in photopeak selection', JOURNAL OF RADIOANALYTICAL AND NUCLEAR CHEMISTRY 310 (2016) 1381-1396

222. Naskar, Nabanita; Lahiri, Susanta; Chaudhuri, Punarbasu. 'HF-free microwave assisted dissolution of soil samples for quantitative assessment of potassium', JOURNAL OF THE INDIAN CHEMICAL SOCIETY 93 (2016) 799-803

223. Nayak, Losiana; Bhattacharyya, Nitai P.; De, Rajat K. 'Wnt signal transduction pathways: modules, development and evolution', BMC SYSTEMS BIOLOGY 10 (2016) Suppl. 2 Art No: 44

224. Nayek, Kuntal; Roy, Shibaji. 'Decoupling limit and throat geometry of non-susy D3 brane', PHYSICS LETTERS B 766 (2017) 192-195

225. Pais, H.; Sulaksono, A.; Agrawal, B. K.; et al. 'Correlation of the neutron star crust-core properties with the slope of the symmetry energy and the lead skin thickness', PHYSICAL REVIEW C 93 (2016) Art No: 045802

226. Pakhira, Santanu; Mazumdar, Chandan; Ranganathan, R.; et al. 'Large magnetic cooling power involving frustrated antiferromagnetic spin-glass state in R2NiSi3 (R = Gd,Er)', PHYSICAL REVIEW B 94 (2016) Art No: 104414

227. Pal, Barnana. 'Condensation under controlled cooling: a simulation study', INTERNATIONAL JOURNAL OF EMERGING TECHNOLOGY AND ADVANCED ENGINEERING, 7 (2017) 92-96

228. Pal, Barnana. 'Fourier Transform Ultrasound Spectroscopy for the determination of wave propagation parameters', ULTRASONICS 73 (2017) 140-143

229. Pandey, Abhishek; Mazumdar, Chandan; Ranganathan, R.; et al. 'Multiple crossovers between positive and negative magnetoresistance versus field due to fragile spin structure in metallic GdPd3', SCIENTIFIC REPORTS 7 (2017) Art No: 42789

230. Parashar, Kamya; Ballav, Niladri; Debnath, Sushanta; et al. 'Rapid and efficient removal of fluoride ions from aqueous solution using a polypyrrole coated hydrous tin oxide nanocomposite', JOURNAL OF COLLOID AND INTERFACE SCIENCE 476 (2016) 103-118

231. Parashar, Kamya; Ballav, Niladri; Debnath, Sushanta; et al. 'Hydrous TiO2@polypyrrole hybrid nanocomposite as an efficient selective scavenger for the defluoridation of drinking water', RSC ADVANCES 6 (2016) 99482-99495

232. Pariari, A.; Khan, N.; Singha, R.; et al. 'Tuning the scattering mechanism in the three-dimensional Dirac semimetal Cd3As2', PHYSICAL REVIEW B 94 (2016) Art No: 165139

233. Pariari, Arnab; Mandal, Prabhat. 'Coexistence of topological Dirac fermions on the surface and three-dimensional Dirac cone state in the bulk of ZrTe5 single crystal', SCIENTIFIC REPORTS 7 (2017) Art No: 40327

234. Patnaik, R.; Lahiri, S.; Chahar, V.; et al. 'Study of uranium mobilization from Himalayan Siwaliks to the Malwa region of Punjab state in India', JOURNAL OF RADIOANALYTICAL AND NUCLEAR CHEMISTRY 308 (2016) 913-918

235. Patra, Malay; Mandal, Manoj; Chakrabarti, Abhijit; et al. 'Localization and dynamics of the anticarcinogemic curcumibn with GMI and other miceller assemblies', GLYCOCONJUGATE JOURNAL 34 (2017) 171-179

236. Pattanayak, Sutanuka; Chakraborty, Sharmila; Mollick, Md. Masud Rahaman; et al. (Basu, Samita). 'In situ fluorescence of lac dye stabilized gold nanoparticles; DNA binding assay and toxicity study', NEW JOURNAL OF CHEMISTRY 40 (2016) 7121-7131

237. Paul, Barnita; Chatterjee, Swastika; Roy, Anushree; et al. (Midya, A.; Mandal, P.). 'Geometrically frustrated GdInO3: An exotic system to study negative

thermal expansion and spin-lattice coupling', PHYSICAL REVIEW B 95 (2017) Art No: 054103

238. Paul, Rima; Paramanik, Tapas; Das, Kalipada; et al. (Satpati, B.; Das, I.). 'Magnetocaloric effect at cryogenic temperature in gadolinium oxide nanotubes', JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS 417 (2016) 182-188

239. Paul, Rima; Sen, Pintu; Das, I. 'Effect of morphology on the magnetic properties of Gd2O3 nanotubes', PHYSICA E-LOW-DIMENSIONAL SYSTEMS & NANOSTRUCTURES 80 (2016) 149-154

240. Paul, Sabyasachi; Nandy, Maitreyee; Mohanty, A. K.; et al. 'Preequilibrium neutron emission in heavy ion reaction: Mean field effect and multiple emission', PHYSICAL REVIEW C 94 (2016) Art No: 034607

241. Paul, Tapas; Bera, Subhas Chandra; Agnihotri, Nidhi; et al. (Mishra, Padmaja P.). 'Single-Molecule FRET Studies of the Hybridization Mechanism during Noncovalent Adsorption and Desorption of DNA on Graphene Oxide', JOURNAL OF PHYSICAL CHEMISTRY B 120 (2016) 11628-11636

242. Paul, Tapas; Mishra, Padmaja P. 'Direct observation of spatial configuration and structural stability of locked Y-shaped DNA structure', RSC ADVANCES 6 (2016) 103270-103274

243. Payghan, Pavan V.; Bera, Indrani; Bhattacharyya, Dhananjay; et al. 'Capturing state-dependent dynamic events of GABA(A)-receptors: a microscopic look into the structural and functional insights', JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS 34 (2016) 1818-1837

244. Ponnusamy, Rajeswari; Selvaraj, Selva Chandrasekaran; Ramachandran, Meera; et al (Nambissan, PMG). 'Diverse Spectroscopic Studies and First-Principles Investigations of the Zinc Vacancy Mediated Ferromagnetism in Mn-Doped ZnO Nanoparticles', CRYSTAL GROWTH & DESIGN 16 (2016) 3656-3668

245. Pradhan, Bapi; Kumar, Gundam Sandeep; Dalui, Amit; et al. 'Shape-controlled cobalt phosphide nanoparticles as volatile organic solvent sensor', JOURNAL OF MATERIALS CHEMISTRY C 4 (2016) 4967-4977

246. Pradhan, Jayita; Mukherjee, Soham; Khan, Ali Hossain; et al. 'Two-Dimensional Hybrid Organohalide Perovskites from Ultrathin PbS Nanocrystals as Template', JOURNAL OF PHYSICAL CHEMISTRY C 121 (2017) 6401-6408

247. Pramanik, Dibyadyuti; Sarkar, S.; Sarkar, M. Saha; et al. (Ray, Sudatta; Dasgupta, Shinjinee; Ray, Indrani; Pradhan, M. K.; Bhattacharya, S.; Mukherjee, A.; Banerjee, P.; Goswami, A.). 'Shape coexistence in Ho-153', PHYSICAL REVIEW C 94 (2016) Art No: 024311

248. Pramanik, Sourav; Kuznetsov, V. I.; Gerasimenko, A. B.; et al (Chakrabarti, Nikhil). 'Time-independent states of a non-neutral plasma diode when emitted electrons are partially turned around by a transverse magnetic field', PHYSICS OF PLASMAS 23 (2016) Art No: 103105

249. Pramanik, Sourav; Kuznetsov, V. I.; Bakaleinikov, L. A.; et al. (Chakrabarti, Nikhil). 'A study on the steady-state solutions of a relativistic Bursian diode in the presence of a transverse magnetic field', PHYSICS OF PLASMAS 23 (2016) Art No: 082110

250. Pramanik, Sourav; Maity, Chandan; Chakrabarti, Nikhil. 'The phase mixing of an upper hybrid wave in a magnetized pair-ion plasma', PHYSICA SCRIPTA 91 (2016) Art No: 065602

251. Pramanik, Sourav; Kuznetsov, V. I.; Gerasimenko, A. B.; et al. (Chakrabarti, Nikhil). 'Non-neutral plasma diode in the presence of a transverse magnetic field', PHYSICS OF PLASMAS 23 (2016) Art No: 062118

252. Prusty, Sudakshina; Siva, Vantari; Shukla, Neeraj; et al. (Satpati, Biswarup). 'Unusual ferromagnetic behaviour of embedded non-functionalized Au nanoparticles in Bi/Au bilayer films', RSC ADVANCES 6 (2016) 106584-106590

253. Ragavendran, K.; Xia, H.; Mandal, P.; et al. 'Jahn-Teller effect in LiMn2O4: influence on charge ordering, magnetoresistance and battery performance', PHYSICAL CHEMISTRY CHEMICAL PHYSICS 19 (2017) 2073-2077

254. Rahangdale, H. V.; Mitra, D.; Das, P. K.; et al. (De, S.; Saha, S). 'Spectroscopic investigations of L-shell ionization in heavy elements by electron impact', JOURNAL OF QUANTITATIVE SPECTROSCOPY & RADIATIVE TRANSFER 174 (2016) 79-87

255. Rajak, Atanu; Divakaran, Uma. 'Effect of double local quenches on the Loschmidt echo and entanglement entropy of a one-dimensional quantum system', JOURNAL OF STATISTICAL MECHANICS-THEORY AND EXPERIMENT (2016) Art No: 043107

256. Rajbanshi, S.; Ali, Sajad; Bisoi, Abhijit; et al. Chattopadhyay, S.; Sarkar, M. Saha; Goswami, A. (). 'Shears mechanism and development of collectivity in Sm-141', PHYSICAL REVIEW C 94 (2016) Art No: 044318

257. Rani, Poonam; Satpati, Biswarup; Srivastava, Rajendra. 'Natural Template Mediated Sustainable Synthesis of Nanocrystalline Zeolite with Significantly Improved Catalytic Activity', CHEMISTRYSELECT 2 (2017) 2870-2879

258. Rani, Poonam; Srivastava, Rajendra; Satpati, Biswarup. 'One-Step Dual Template Mediated Synthesis of Nanocrystalline Zeolites of Different Framework Structures', CRYSTAL GROWTH & DESIGN 16 (2016) 3323-3333

259. Rath, S; Halder, O; Pradhani, A.; et al. (Satpati, B.; Maity, A.; Chini, T. K.). 'White-light emission by phonon assisted coherent mixing of excitons in Au8–CdS hybrid nanorods', NANOTECHNOLOGY 27 (2016) 495706

260. Raveendrababu, K.; Behera, P. K.; Satyanarayana, B.; et al. (Mukhopadhayay, S.; Majumdar, N.). 'Effect of water vapor on the performance of glass RPCs in avalanche mode operation', JOURNAL OF INSTRUMENTATION 11 (2016) Art No: C08001

261. Roy, Abhijit; Maiti, Arpan; Chini, Tapas Kumar; et al. (Satpati, Biswarup). 'Annealing Induced Morphology of Silver Nanoparticles on Pyramidal Silicon Surface and Their application to Surface-Enhanced Raman Scattering', ACS APPLIED MATERIALS & INTERFACES 9 (2017) 34405

262. Roy, Debasis; Roy, Madhusudan; Zubko, Maciej; et al. 'Solid-State Thermal Reaction of a Molecular Material and Solventless Synthesis of Iron Oxide', INTERNATIONAL JOURNAL OF THERMOPHYSICS 37 (2016) Art No: 93

263. Roy, I.; Hazra, S. 'Structures of spin-coated and annealed monolayer and multilayer poly(3-dodecylthiophene) thin films', RSC ADVANCES 7 (2017) 2563-2572

264. Roy, Raktim; Shilpa, P. Phani; Bagh, Sangram. 'A Systems Biology Analysis Unfolds the Molecular Pathways and Networks of Two Proteobacteria in Spaceflight and Simulated Microgravity Conditions', ASTROBIOLOGY 16 (2016) 677-689

265. Roychowdhury, Krishanu; Wadhawan, Disha; Mehta, Poonam; et al. (Karmakar, Biswajit). 'Quantum Hall realization of polarized intensity interferometry', PHYSICAL REVIEW B 93 (2016) Art No: 220101

266. Saha, Srilekha; Maiti, Santanu K.; Karmakar, S. N. 'Multiple mobility edges in a 1D Aubry chain with Hubbard interaction in presence of electric field: Controlled electron transport', PHYSICA E-LOW-DIMENSIONAL SYSTEMS & NANOSTRUCTURES 83 (2016) 358-364

267. Saha, Srilekha; Maiti, Santanu K.; Karmakar, S. N. 'Circulating persistent current and induced magnetic field in a fractal network', PHYSICS LETTERS A 380 (2016) 1741-1749

268. Sain, S.; Kar, A.; Mukherjee, M.; et al. 'Structure, optical and magnetic characterizations of Mn doped ZnS dilute magnetic semiconductor synthesized by mechanical alloying', ADVANCED POWDER TECHNOLOGY 27 (2016) 1790-1799

269. Saini, C. P.; Barman, A.; Das, D.; et al. (Satpati, B.; Bhattacharyya, S. R.). 'Role of Oxygen Vacancy on the Hydrophobic Behavior of TiO2 Nanorods on Chemically Etched Si Pyramids', JOURNAL OF PHYSICAL CHEMISTRY C 121 (2017) 278-283

270. Saini, C. P.; Barman, A.; Kumar, M.; et al. 'Self-decorated Au nanoparticles on antireflective Si pyramids with improved hydrophobicity', JOURNAL OF APPLIED PHYSICS 119 (2016) Art No: 134904

271. Samal, Alaka; Swain, Smrutirekha; Satpati, Biswarup; et al. '3D Co-3(PO4)(2)-Reduced Graphene Oxide Flowers for Photocatalytic Water Splitting: A Type II Staggered Heterojunction System', CHEMSUSCHEM 9 (2016) 3150-3160

272. Samanta, Rome; Chakraborty, Mainak; Roy, Prabir; et al. (Ghosal, Ambar). 'Baryon asymmetry via leptogenesis in a neutrino mass model with complex scaling', JCAP 1703 (2017) Art No:025

273. Samanta, Rome; Roy, Prabir; Ghosal, Ambar. 'Complex scaling in neutrino mass matrix', ACTA PHYSICA POLONICA B 9 (2016) Special issue 807-8o8

274. Samanta, Rome; Roy, Probir; Ghosal, Ambar. 'Extended scaling and residual flavor symmetry in the neutrino Majorana mass matrix', EUROPEAN PHYSICAL JOURNAL C 76 Art No: 662

275. Samanta, Rome; Ghosal, Ambar. 'Probing maximal zero textures with broken cyclic symmetry in inverse seesaw', NUCLEAR PHYSICS B 911 (2016) 846-862

276. Samanta, Tanusree; Sinha, Sumona; Mukherjee, M. 'Effect of added salt on swelling dynamics of ultrathin films of strong polyelectrolytes', POLYMER 97 (2016) 285-294

277. Samantaray, B.; Singh, Akhilesh Kr; Banerjee, Chandrima; et al. (Mandal, P.). 'Perpendicular Standing Spin Wave and Magnetic Anisotropic Study on Amorphous FeTaC Films', IEEE TRANSACTIONS ON MAGNETICS 52 (2016) Art No: 2003104

278. Sarkar, Kangkana; Lahiri, Susanta; Sen, Kamalika. 'Incorporation of no-carrier added Pb-200,Pb-203 and Tl-200,Tl-201,Tl-202 in calcium alginate and

hesperidin incorporated calcium alginate beads', APPLIED RADIATION AND ISOTOPES 121 (2017) 16-21

279. Sarkar, Kangkana; Sen, Kamalika; Lahiri, Susanta. 'Separation of long-lived Eu-152 radioisotopes from a binary mixture of Eu-152 and Cs-134 by calcium alginate: a green technique', JOURNAL OF RADIOANALYTICAL AND NUCLEAR CHEMISTRY 311 (2017) 2001-2006

280. Sarkar, Kangkana; Lahiri, Susanta; Sen, Kamalika. 'Separation of no-carrier-added Pb-203, a surrogate radioisotope, from proton irradiated (Tl2CO3)-Tl-nat target using calcium alginate hydrogel beads', RADIOCHIMICA ACTA 104 (2016) 891-896

281. Sarmah, Bhaskar; Srivastava, Rajendra; Satpati, Biswarup. 'Highly Efficient Silver Nanoparticles Supported Nanocrystalline Zirconosilicate Catalyst for the Epoxidation and Hydration Reactions', CHEMISTRYSELECT 1 (2016) 1047-1056

282. Sarmah, Bhaskar; Satpati, Biswarup; Srivastava, Rajendra. 'Cu ion-exchanged and Cu nanoparticles decorated mesoporous ZSM-5 catalysts for the activation and utilization of phenylacetylene in a sustainable chemical synthesis', RSC ADVANCES 6 (2016) 87066-87081

283. Sau, Abhishek; Bera, Kallol; Mondal, Pritiranjan; et al. (Satpati, Biswarup; Basu, Samita). 'Distance-Dependent Electron Transfer in Chemically Engineered Carbon Dots', JOURNAL OF PHYSICAL CHEMISTRY C 120 (2016) 26630-26636

284. Scheck, M.; Mishev, S.; Ponomarev, V. Yu.; et al. (Pai, H.). 'Beta decay as a new probe for the low-energy E1 strength', ACTA PHYSICA POLONICA B 48 (2017) 547-552

285. Sengupta, Chaitrali; Sarangi, Manas Kumar; Sau, Abhishek; et al. (Basu, Samita). 'Micellar control over tautomerization and photo-induced electron transfer of Lumichrome in the presence of aliphatic and aromatic amines: a transient absorption study', METHODS AND APPLICATIONS IN FLUORESCENCE 5 (2017) Art No: 014008

286. Sengupta, Chaitrali; Mitra, Piyali; Seth, Banabithi Koley; et al. (Basu, Samita). 'Electronic and spatial control over the formation of transient ion pairs during photoinduced electron transfer between proflavine-amine systems in a subpicosecond time regime', RSC ADVANCES 7 (2017) 15149-15157

287. Sengupta I; Das, C; Das, D; et al. 'HBx hijacks nuclear body protein Sp110 and promotes viral pathogenesis', JOURNAL OF CLINICAL AND EXPERIMENTAL HEPATOLOGY 6 (2016) Suppl.1 S10

288. Sengupta, Mohor B.; Saha, Suparna; Mohanty, Pradeep K.; et al. Increased expression of ApoA1 after neuronal injury may be beneficial for healing, MOLECULAR AND CELLULAR BIOCHEMISTRY 424 (2017) 45-55

289. Sengupta, Mohor Biplab; Chakrabarti, Arunabha; Saha, Suparna; et al. (Mukhopadhyay, Debashis). 'Clinical proteomics of enervated neurons', CLINICAL PROTEOMICS 13 (2016) Art No:10

290. Seth, Banabithi Koley; Saha, Arpita; Haldar, Srijan; et al. (Chakraborty, Partha Pratim; Saha, Partha; Basu, Samita). 'Structure dependent selective efficacy of pyridine and pyrrole based Cu(II) Schiff base complexes towards in vitro cytotoxicity, apoptosis and DNA-bases binding in ground and excited state',

JOURNAL OF PHOTOCHEMISTRY AND PHOTOBIOLOGY B-BIOLOGY 162 (2016) 463-472

291. Seth, Susnata; Das, Mala. Radiation linear energy transfer and drop size dependence of the low frequency signal from tiny superheated droplets, NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT 837 (2016) 92-98

292. Seth, Susnata; Das, Mala. 'The simulation of the response of superheated emulsion to alpha particles', JOURNAL OF INSTRUMENTATION 11 (2016) Art No: P04015

293. Shaikh, Md. Moin; Das, Mili; Roy, Subinit; et al. (Sinha, M.; Basu, P.; Datta, U.). 'Threshold behavior of interaction potential for the System Li-7+Ni-64: Comparison with Li-6+Ni-64', NUCLEAR PHYSICS A 953 (2016) 80-94

294. Shaikh, Md Moin; Roy, Subinit; Rajbanshi, S.; et al. (Mukherjee, A.; Pradhan, M. K.; Basu, P.). 'Measurement of fusion excitation function for 7Li+64Ni near the barrier', EPJ Web of Conferences 117 (2016) Art No:08020

295. Shaikh, Md Moin; Roy, Subinit; Rajbanshi, S.; et al. (Mukherjee, A.; Pradhan, M. K.; Basu, P.). 'Probing the fusion of Li-7 with Ni-64 at near-barrier energies', PHYSICAL REVIEW C 93 (2016) Art No: 044616

296. Shaw, Pankaj Kumar; Saha, Debajyoti; Ghosh, Sabuj; et al. (Janaki, M. S.; Iyengar, A. N. Sekar). 'Investigation of multifractal nature of floating potential fluctuations obtained from a dc glow discharge magnetized plasma', PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS 469 (2017) 363-371

297. Shaw, Pankaj Kumar; Ghosh, Sabuj; Saha, Debajyoti; et al. (Janaki, M. S.; Iyengar, A. N. Sekar). 'Investigation of coherent modes and their role in intermittent oscillations using empirical mode decomposition', PHYSICS OF PLASMAS 23 (2016) Art No: 112103

298. Sheela, T.; Bhajantri, R. F.; Nambissan, P. M. G.; et al. 'Ionic conductivity and free volume related microstructural properties of LiClO4/PVA/NaAlg polymer composites: Positron annihilation spectroscopic studies', JOURNAL OF NON-CRYSTALLINE SOLIDS 454 (2016) 19-30

299. Shyam, R.; Tsushima, K. '(D)over-barD meson pair production in antiproton-nucleus collisions', PHYSICAL REVIEW D 94 (2016) Art No: 074041

300. Singha, Ratnadwip; Pariari, Arnab Kumar; Satpati, Biswarup; et al. (Mandal, Prabhat). 'Large nonsaturating magnetoresistance and signature of nondegenerate Dirac nodes in ZrSiS', PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 114 (2017) 2468-2473 Published: MAR 7 2017

301. Sinha, A.; Shukla, A.; Saha, L.; et al. (Bhattacharjee, P.). 'Long-term study of Mkn 421 with the HAGAR Array of Telescopes', ASTRONOMY & ASTROPHYSICS 591 (2016) Art No: A83

302. Sinha, Roopam; Samanta, Rome; Ghosal, Ambar. 'Maximal zero textures in Linear and Inverse seesaw', PHYSICS LETTERS B 759 (2016) 206-213

303. Sinha, Sumona; Islam, A. K. M. Maidul; Vorokhta, Mykhailo; et al. (Mukherjee, Manabendra). Interaction at the F16CuPc/TiO2 Interface: 'A Photoemission and X-ray Absorption Study', JOURNAL OF PHYSICAL CHEMISTRY C 121 (2017) 3365-3372

304. Siva, Vantari; Chettah, Abdelhak; Satpati, Biswarup; et al. Enhanced surface and interface diffusion in Ni-Bi bilayers by swift heavy ion irradiation, RSC ADVANCES 6 (2016) 58950-58956

305. Srivastava, Devika; Mukherjee, Rukmini; Mookherjee, Debdatto; et al. (Chakrabarti, Oishee). 'Mahogunin-mediated regulation of G alpha(i) localisation during mitosis and its effect on spindle positioning', BIOCHEMISTRY AND CELL BIOLOGY 94 (2016) 359-369

306. Srivastava, Vishal; Bhattacharya, C.; Rana, T. K.; et al. (Roy, Subinit; Shaikh, Md. M.) 'Experimental investigation of T=1 analog states of Al-26 and Mg-26', PHYSICAL REVIEW C 93 (2016) Art No: 044601

List of Publications in International Collaboration

(April 2016 – March 2017)

1. ALICE Collaboration. 'J/Psi suppression at forward rapidity in Pb-Pb collisions at root s(NN)=5.02 TeV', PHYSICS LETTERS B 766 (2017) 212-224

2. ALICE Collaboration. 'Determination of the event collision time with the ALICE detector at the LHC', EUROPEAN PHYSICAL JOURNAL PLUS 132 (2017) Art No: 99

3. ALICE Collboration. 'W and Z boson production in p-Pb collisions at TeV root s(NN)=5.02 TeV', JOURNAL OF HIGH ENERGY PHYSICS (2017) Issue: 2 Art No: 077

4. ALICE Collaboration. 'Charged-particle multiplicities in proton-proton collisions at root s=0.9 to 8 TeV', EUROPEAN PHYSICAL JOURNAL C 77 (2017) Art No: 33

5. ALICE Collaboration. 'Jet-like correlations with neutral pion triggers in pp and central Pb-Pb collisions at 2.76 TeV', PHYSICS LETTERS B 763 (2016) 238-250

6. ALICE Collaboration. 'D-meson production in p-Pb collisions at root S-NN=5.02 TeV and in pp collisions at root S=7 TeV', PHYSICAL REVIEW C 94 (2016) Art No: 054908

7. ALICE Collaboration. 'Pseudorapidity dependence of the anisotropic flow of charged particles in Pb-Pb collisions at root s(NN)=2.76 TeV', PHYSICS LETTERS B 762 (2016) 376-388

8. ALICE Collaboration. 'Correlated Event-by-Event Fluctuations of Flow Harmonics in Pb-Pb Collisions at root S-NN=2.76 TeV', PHYSICAL REVIEW LETTERS 117 (2016) Art No: 182301

9. ALICE Collaboration. 'Higher harmonic flow coefficients of identified hadrons in Pb-Pb collisions at root sNN=2.76 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 9 (2016) Art No: 164

10. ALICE Collaboration. 'Measurement of transverse energy at midrapidity in Pb-Pb collisions at root s(NN)=2.76 TeV', PHYSICAL REVIEW C 94 (2016) Art No: 034903

11. ALICE Collaboration. 'Multiplicity dependence of charged pion, kaon, and (anti)proton production at large transverse momentum in p-Pb collisions root S-NN=5.02 TeV', PHYSICS LETTERS B 760 (2016) 720-735

12. ALICE Collaboration. 'Elliptic flow of electrons from heavy-flavour hadron decays at mid-rapidity in Pb-Pb collisions at root s(NN)=2.76 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 9 (2016) Art No: 028
13. ALICE Collaboration. 'Measurement of D-meson production versus multiplicity in p-Pb collisions at root s(NN)=5.02 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 8 (2016) Art No: 078
14. ALICE Collaboration. 'Multi-strange baryon production in p-Pb collisions at root(NN)-N-S=5.02 TeV', PHYSICS LETTERS B 758 (2016) 389-401
15. ALICE Collaboration. 'Centrality dependence of (sic)(2S) suppression in p-Pb collisions at root s(NN)=5.02 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 6 (2016) Art No: 050
16. ALICE Collaboration. 'Centrality Dependence of the Charged-Particle Multiplicity Density at Midrapidity in Pb-Pb Collisions at root(NN)-N-S=5.02 TeV', PHYSICAL REVIEW LETTERS 116 (2016) Art No: 222302
17. ALICE Collaboration. 'Measurement of an Excess in the Yield of J/psi at Very Low p(T) in Pb-Pb Collisions at root s(NN)=2.76 TeV', PHYSICAL REVIEW LETTERS 116 (2016) Art No: 222301
18. ALICE collaboration. 'Differential studies of inclusive J/psi and psi (2S) production at forward rapidity in Pb-Pb collisions at root s(NN)=2:76 TeVe', JOURNAL OF HIGH ENERGY PHYSICS Issue: 5 (2016) Art No: 179
19. ALICE Collaboration. 'Particle identification in ALICE: a Bayesian approach', EUROPEAN PHYSICAL JOURNAL PLUS 131 (2016) Art No: 168
20. ALICE Collaboration. 'Multipion Bose-Einstein correlations in pp, p-Pb, and Pb-Pb collisions at energies available at the CERN Large Hadron Collider', PHYSICAL REVIEW C 93 (2016) Art No: 054908
21. ALICE Collaboration. 'Centrality dependence of charged jet production in p-Pb collisions at root(NN)-N-S=5.02 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Published: MAY 17 2016
22. ALICE Collaboration. 'Production of K*(892)(0) and phi(1020) in p-Pb collisions at root s(NN)=5.02 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 245
23. ALICE Collaboration. 'Inclusive quarkonium production at forward rapidity in pp collisions at root s=8 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 184
24. ALICE Collaboration. 'Anisotropic Flow of Charged Particles in Pb-Pb Collisions at root S-NN=5.02 TeV', PHYSICAL REVIEW LETTERS 116 (2016) Art No: 132302
25. ALICE Collaboration. 'Upsilon production measurements in pp, p-Pb and Pb-Pb collisions with ALICE' [Das, Indranil], NUCLEAR PHYSICS A 956 (2016) 709-712
26. ALICE Collaboration. 'Charge-dependent flow and the search for the chiral magnetic wave in Pb-Pb collisions at root s(NN)=2.76 TeV', PHYSICAL REVIEW C 93 (2016) Art No: 044903
27. ALICE Collaboration. 'Beam test evaluation of electromagnetic calorimeter modules made from proton-damaged PbWO4 crystals', JOURNAL OF INSTRUMENTATION 11 (2016) Art No: P04012

28. CMS Collaboration. 'Combined search for anomalous pseudoscalar HW couplings in VH(H -> b(b)over-bar) production and H -> VV decay', PHYSICS LETTERS B 759 (2016) 672-696

29. CMS collaboration. 'Overview of large area triple-GEM detectors for the CMS forward muon upgrade', NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT 845 (2017) 298-303

30. CMS collaboration. 'R&D on a new type of micropattern gaseous detector: The Fast Timing Micropattern detector', NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT 845 (2017) 313-317

31. CMS collaboration. 'Fiber Bragg Grating (FBG) sensors as flatness and mechanical stretching sensors', NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT 824 (2016) 493-495

32. CMS collaboration. 'Status report of the upgrade of the CMS muon system with Triple-GEM detectors', NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT 824 (2016) 521-525

33. CMS collaboration. 'Measurement and QCD analysis of double-differential inclusive jet cross sections in pp collisions at root s=8 TeV and cross section ratios to 2.76 and 7 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 3 (2017) Art No: 156

34. CMS Collaboration. 'Observation of Charge-Dependent Azimuthal Correlations in p-Pb Collisions and Its Implication for the Search for the Chiral Magnetic Effect', PHYSICAL REVIEW LETTERS 118 (2017) Art No: 122301

35. CMS Collaboration. 'Measurement of the t(t)over-bar production cross section using events in the e mu final state in pp collisions at root s=13 TeV', EUROPEAN PHYSICAL JOURNAL C 77 (2017) Art No: 172

36. CMS Collaboration. 'Search for CP violation in t(t)over-bar production and decay in proton-proton collisions at root s=8 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 3 (2017) Art No: 101

37. CMS Collaboration. 'Search for heavy neutrinos or third-generation leptoquarks in final states with two hadronically decaying tau leptons and two jets in proton-proton collisions at root s=13 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 3 (2017) Art No: 077

38. CMS Collaboration. 'Measurements of differential cross sections for associated production of a W boson and jets in proton-proton collisions at root s=8 TeV', PHYSICAL REVIEW D 95 (2017) Art No: 052002

39. CMS Collaboration. 'Searches for invisible decays of the Higgs boson in pp collisions at root S=7, 8, and 13 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 2 (2017) Art No: 135

40. CMS Collaboration. 'Measurement of the transverse momentum spectra of weak vector bosons produced in proton-proton collisions at root s=8TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 2 (2017) Art No: 096

41. CMS Collaboration. 'Measurement of the production cross section of a W boson in association with two b jets in pp collisions at root s=8TeV', EUROPEAN PHYSICAL JOURNAL C 77 (2017) Art No: 92

42. CMS Collaboration. 'Evidence for collectivity in pp collisions at the LHC', PHYSICS LETTERS B 765 (2017) 193-220

43. CMS Collaboration. 'Search for anomalous Wtb couplings and flavour-changing neutral currents in t-channel single top quark production in pp collisions at root s=7 and 8 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 2 (2017) Art No: 028

44. CMS Collaboration. 'Jet energy scale and resolution in the CMS experiment in pp collisions at 8 TeV', JOURNAL OF INSTRUMENTATION 12 (2017) Art No: P02014

45. CMS Collaboration. 'Search for supersymmetry in events with one lepton and multiple jets in proton-proton collisions at root s=13 TeV', PHYSICAL REVIEW D 95 (2017) Art No: 012011

46. CMS Collaboration. 'Search for R-parity violating supersymmetry with displaced vertices in proton-proton collisions at root s=8 TeV', PHYSICAL REVIEW D 95 (2017) Art No: 012009

47. CMS Collaboration. 'Search for high-mass Z gamma resonances in e(+)e(-)gamma and mu(+)mu(-)gamma final states in proton-proton collisions at root s=8 and 13 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 1 (2017) Art No: 076

48. CMS Collaboration. 'Search for Dark Matter and Supersymmetry with a Compressed Mass Spectrum in the Vector Boson Fusion Topology in Proton-Proton Collisions at root s=8 TeV', PHYSICAL REVIEW LETTERS 118 (2017) Art No: 021802

49. CMS Collaboration. 'Observation of the decay B+ -> psi(2S)phi(1020)K+ in pp collisions root s=8 TeV', PHYSICS LETTERS B 764 (2017) 66-86

50. CMS Collaboration. 'Measurements of the t(t)over-bar production cross section in lepton plus jets final states in pp collisions at 8 and ratio of 8 to 7 cross sections', EUROPEAN PHYSICAL JOURNAL C 77 (2017) Art No: 15

51. CMS Collaboration. 'Inclusive search for supersymmetry using razor variables in pp collisions at root s=13 TeV', PHYSICAL REVIEW D 95 (2017) Art Nor: 012003

52. CMS Collaboration. 'The CMS trigger system', JOURNAL OF INSTRUMENTATION 12 (2017) Art No: P010120

53. CMS Collaboration. 'Searches for R-parity-violating supersymmetry in pp collisions at root s=8 TeV in final states with 0-4 leptons', PHYSICAL REVIEW D 94 (2016) Art No: 112009

54. CMS Collaboration. 'Search for dark matter particles in proton-proton collisions at root 8 = TeV using the razor variables', JOURNAL OF HIGH ENERGY PHYSICS Issue: 12 (2016) Art No: 088

55. CMS Collaboration. 'Measurement of the ZZ production cross section and Z -> l(+)l(-)l '(+)l '(-) branching fraction in pp collisions at root s=13TeV', PHYSICS LETTERS B 763 (2016) 280-303

56. CMS Collaboration. 'Search for lepton flavour violating decays of the Higgs boson to e tau and e mu in proton-proton collisions at root s=8 TeV', PHYSICS LETTERS B 763 (2016) 472-500

57. CMS Collaboration. Studies of inclusive four-jet production with two b-tagged jets in proton-proton collisions at 7 TeV', PHYSICAL REVIEW D 94 (2016) Art No: 112005

58. CMS Collaboration. 'Search for long-lived charged particles in proton-proton collisions at root s=13 TeV', PHYSICAL REVIEW D 94 (2016) Art No: 112004

59. CMS Collaboration. 'Search for new physics in final states with two opposite-sign, same-flavor leptons, jets, and missing transverse momentum in pp collisions at TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 12 (2016) Art No: 013

60. CMS Collaboration. 'Measurement of electroweak production of a W boson and two forward jets in proton-proton collisions at root s=8 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 11 (2016) Art No: 147

61. CMS Collaboration. 'Measurement of the W boson helicity fractions in the decays of top quark pairs to lepton plus jets final states produced in pp collisions at root s=8 TeV', PHYSICS LETTERS B 762 (2016) 512-534

62. CMS Collaboration. 'Search for third-generation scalar leptoquarks in the t tau channel in proton-proton collisions at root s = 8 TeV (vol 7, 042, 2015)', JOURNAL OF HIGH ENERGY PHYSICS Issue: 11 (2016) Art No: 056

63. CMS Collaboration. 'Phenomenological MSSM interpretation of CMS searches in pp collisions at root s=7 and 8 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 10 (2016) Art No: 129

64. CMS Collaboration. 'Measurement of the integrated and differential t(t)over-bar production cross sections for high-p(T) top quarks in pp collisions at root s=8 TeV', PHYSICAL REVIEW D 94 (2016) Art No: 072002

65. CMS Collaboration. 'Upsilon (nS) polarizations versus particle multiplicity in pp collisions at root s=7 TeV', PHYSICS LETTERS B 761 (2016) 31-52

66. CMS Collaboration. 'Search for new physics with the M-T2 variable in all-jets final states produced in pp collisions at root s=13 Tev', JOURNAL OF HIGH ENERGY PHYSICS Issue: 10 (2016) Art No: 006

67. CMS Collaboration. 'Dose rate effects in the radiation damage of the plastic scintillators of the CMS hadron endcap calorimeter', JOURNAL OF INSTRUMENTATION 11 (2016) Art No: T10004

68. CMS Collaboration. 'Measurement of dijet azimuthal decorrelation in pp collisions at root s=8 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 536

69. CMS Collaboration. 'Search for two Higgs bosons in final states containing two photons and two bottom quarks in proton-proton collisions at 8 TeV', PHYSICAL REVIEW D 94 (2016) Art No: 052012

70. CMS Collaboration. 'Search for direct pair production of scalar top quarks in the single- and dilepton channels in proton-proton collisions at root S = 8 TeV', (vol 07, 027, 2016), JOURNAL OF HIGH ENERGY PHYSICS Issue: 9 (2016) Published: SEP 12 2016

71. CMS Collaboration. 'Search for R-parity violating decays of a top squark in proton-proton collisions at root s=8TeV', PHYSICS LETTERS B 760 (2016) 178-201

72. CMS Collaboration. 'Measurements of t(t)over-bar charge asymmetry using dilepton final states in pp collisions at root s=8 TeV', PHYSICS LETTERS B 760 (2016) 365-386

73. CMS Collaboration. 'Measurement of the Z gamma -> nu(nu)over-bar gamma production cross section in pp collisions at root s=8 TeV and limits on anomalous ZZ gamma and Z gamma gamma trilinear gauge boson couplings', PHYSICS LETTERS B 760 (2016) 448-468

74. CMS Collaboration. 'Search for Higgs boson off-shell production in proton-proton collisions at 7 and 8 TeV and derivation of constraints on its total decay width', JOURNAL OF HIGH ENERGY PHYSICS Issue: 9 (2016) Art No: 051

75. CMS Collaboration. 'Measurement of the differential cross sections for top quark pair production as a function of kinematic event variables in pp collisions at root s=7 and 8 TeV', PHYSICAL REVIEW D 94 (2016) Art No: 052006

76. CMS Collaboration. 'Azimuthal decorrelation of jets widely separated in rapidity in pp collisions at root s=7 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 8 (2016) Art No: 139

77. CMS Collaboration. 'Search for supersymmetry in pp collisions at root s=13 TeV in the single-lepton final state using the sum of masses of large-radius jets', JOURNAL OF HIGH ENERGY PHYSICS Issue: 8 (2016) Art No: 122

78. CMS Collaboration. 'Evidence for exclusive gamma gamma -> W (+) W (-) production and constraints on anomalous quartic gauge couplings in pp collisions at and 8 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 8 Art No: 119

79. CMS Collaboration. 'Search for direct pair production of supersymmetric top quarks decaying to all-hadronic final states in pp collisions at root s=8 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 460

80. CMS Collaboration. 'Measurement of the double-differential inclusive jet cross section in proton-proton collisions at root s=13TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Issue 8

81. CMS Collaboration. 'Search for supersymmetry in events with soft leptons, low jet multiplicity, and missing transverse energy in proton-proton collisions at root s=8 TeV', PHYSICS LETTERS B 759 (2016) 9-35

82. CMS Collaboration. 'Study of Z boson production in pPb collisions at root S-NN=5.02 TeV', PHYSICS LETTERS B 759 (2016) 36-57

83. CMS Collaboration. 'Search for neutral resonances decaying into a Z boson and a pair of b jets or tau leptons', PHYSICS LETTERS B 759 (2016) 369-394

84. CMS Collaboration. 'Search for supersymmetry in electroweak production with photons and large missing transverse energy in pp collisions at root s=8TeV', PHYSICS LETTERS B 759 (2016) 479-500

85. CMS Collaboration. 'Measurement of the inelastic cross section in proton-lead collisions at root s(NN)=5.02 TeV', PHYSICS LETTERS B 759 (2016) 641-662

86. CMS Collaboration. 'Search for new physics in same-sign dilepton events in proton-proton collisions at', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 439

87. CMS Collaboration. 'Measurement of the t(t)over-bar production cross section in the e mu channel in proton-proton collisions at root s=7 and 8 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 8 (2016) Art No: 029

88. CMS Collaboration. 'Search for Resonant Production of High-Mass Photon Pairs in Proton-Proton Collisions at root s=8 and 13 TeV', PHYSICAL REVIEW LETTERS 117 (2016) Art No: 051802

89. CMS Collaboration. 'Measurement of the W+W- cross section in pp collisions at root s=8 TeV and limits on anomalous gauge couplings', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 401

90. CMS Collaboration. 'Search for Narrow Resonances in Dijet Final States at root s=8 TeV with the Novel CMS Technique of Data Scouting', PHYSICAL REVIEW LETTERS 117 (2016) Art No: 031802

91. CMS Collaboration. 'Search for supersymmetry in the multijet and missing transverse momentum final state in pp collisions at 13 TeV', PHYSICS LETTERS B 758 (2016) 152-180

92. CMS Collaboration. 'Search for a low-mass pseudoscalar Higgs boson produced in association with a b(b)over-bar pair in pp collisions at root s=8 TeV', PHYSICS LETTERS B 758 (2016) 296-320

93. CMS Collaboration. 'Measurement of spin correlations in tf production using the matrix element method in the muon plus jets final state in pp collisions at root S=8 TeV', PHYSICS LETTERS B 758 (2016) 321-346

94. CMS Collaboration. 'Measurement of t(t)over-bar production with additional jet activity, including b quark jets, in the dilepton decay channel using pp collisions at root s=8TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 379

95. CMS Collaboration. 'Search for heavy resonances decaying to two Higgs bosons in final states containing four b quarks', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 371

96. CMS Collaboration. 'Measurement of inclusive jet production and nuclear modifications in pPb collisions at root s(NN)=5.02 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 372

97. CMS Collaboration. 'Search for the associated production of a Higgs boson with a single top quark in proton-proton collisions at root s=8 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 6 (2016) Art No 177

98. CMS Collaboration. 'Search for pair-produced vectorlike B quarks in proton-proton collisions at root s=8 TeV', PHYSICAL REVIEW D 93 (2016) Art No: 112009

99. CMS Collaboration. 'Forward-backward asymmetry of Drell-Yan lepton pairs in pp collisions at root s=8 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 325

100. CMS Collaboration. 'Search for lepton flavour violating decays of heavy resonances and quantum black holes to an e mu pair in proton-proton collisions at root s=8 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 317

101. CMS Collaboration. 'Search for supersymmetry in events with a photon, a lepton, and missing transverse momentum in pp collisions at root s=8 TeV', PHYSICS LETTERS B 757 (2016) 6-31

102. CMS Collaboration. 'Measurement of the CP-violating weak phase phi(s) and the decay width difference Delta Gamma(s) using the B-s(0) -> J/psi phi (1020) decay channel in pp collisions at root s=8 TeV', PHYSICS LETTERS B 757 (2016) 97-120

103. CMS Collaboration. 'Inclusive and differential measurements of the t(t)over-bar charge asymmetry in pp collisions at root s=8 TeV', PHYSICS LETTERS B 757 (2016) 154-179

104. CMS Collaboration. 'Search for supersymmetry in pp collisions at root s=8 TeV in final states with boosted W bosons and b jets using razor variables', PHYSICAL REVIEW D 93 (2016) Art No: 092009

105. CMS Collaboration. 'Measurement of the top quark mass using charged particles in pp collisions at root s=8 TeV', PHYSICAL REVIEW D 93 (2016) Art No: 092006

106. CMS Collaboration. 'Measurement of the inclusive jet cross section in pp collisions at root s=2.76 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 265

107. CMS Collaboration. 'Measurement of the ratio B(B-s(0) -> J/psi f(0)(980))/B(B-s(0) -> J/psi phi(1020)) in pp collisions at root s=7 TeV', PHYSICS LETTERS B 756 (2016) 84-102

108. CMS Collaboration. 'Search for massive WH resonances decaying into the l nu b(b)over-bar final state at root s=8 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 237

109. CMS Collaboration. 'Measurement of Long-Range Near-Side Two-Particle Angular Correlations in pp Collisions at root s=13 TeV', PHYSICAL REVIEW LETTERS 116 (2016) Art No: 172302

110. CMS Collaboration. 'Measurement of top quark polarisation in t-channel single top quark production', JOURNAL OF HIGH ENERGY PHYSICS Issue: 4 (2016) Art No: 073

111. CMS Collaboration. 'Search for new phenomena in monophoton final states in proton-proton collisions at root s=8 TeV', PHYSICS LETTERS B 755 (2016) 102-124

112. CMS Collaboration. 'Search for W ' decaying to tau lepton and neutrino in proton-proton collisions at root s=8 TeV', PHYSICS LETTERS B 755 (2016) 196-216

113. CMS Collaboration. 'Searches for a heavy scalar boson H decaying to a pair of 125 GeV Higgs bosons hh or for a heavy pseudoscalar boson A decaying to Zh, in the final states with h -> tau tau', PHYSICS LETTERS B 755 (2016) 217-244

114. CMS Collaboration. 'Measurement of the top quark mass using proton-proton data at root(s)=7', PHYSICAL REVIEW D 93 (2016) Art No: 072004

115. CMS Collaboration. 'Search for anomalous single top quark production in association with a photon in pp collisions at root s=8 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 4 (2016) Art No: 035

116. CMS Collaboration. 'Comparison of the Z/gamma* + jets to gamma + jets cross sections in pp collisions at root s = 8 (vol 10, 128, 2015)', JOURNAL OF HIGH ENERGY PHYSICS Issue: 4 (2016) Art No: 010

117. CMS Collaboration. 'Measurement of differential and integrated fiducial cross sections for Higgs boson production in the four-lepton decay channel in pp

collisions at root s=7 and 8 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 4 (2016) Art No: 005

118. CMS Collaboration. 'Measurement of the differential cross section and charge asymmetry for inclusive pp -> W-+/- + X production at root s=8 TeV', EUROPEAN PHYSICAL JOURNAL C 76 (2016) Art No: 469
119. CMS Collaboration. 'Decomposing transverse momentum balance contributions for quenched jets in PbPb collisions at root s(NN)=2.76 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 11 (2016) Art No: 055
120. CMS Collaboration. 'Search for massive resonances decaying in to WW,WZ or ZZ bosons in proton-proton collisions at root s=13 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 3 (2017) Art No: 162
121. CMS Collaboration. 'Search for dark matter and unparticles in events with a Z boson and missing transverse momentum in proton-proton collisions at root s=13 TeV', JOURNAL OF HIGH ENERGY PHYSICS Issue: 3 (2017) Art No: 061
122. CMS Collaboration. 'Search for dark matter inproton-proton collisions at 8 TeV with missing transverse momentum and vector boson tagged jets', JOURNAL OF HIGH ENERGY PHYSICS Issue: 12 (2016) Art No: 083
123. CMS Muon Collaboration. 'The Triple GEM Detector Control System for CMS forward muon spectrometer upgrade', JOURNAL OF INSTRUMENTATION 12 (2017) Art No: P02003
124. LCTPC Collaboration. 'A Time Projection Chamber with GEM-Based Readout', NUCLEAR INSTRUMENTS AND METHODS IN PHYSICS RESEARCH SECTION A: ACCELERATORS, SPECTROMETERS, DETECTORS AND ASSOCIATED EQUIPMENT 856 (2017) 109-118
125. MAGIC Collaboration. 'Very high-energy gamma-ray follow-up program using neutrino triggers from IceCube', JOURNAL OF INSTRUMENTATION 11 (2016) Art No: P11009
126. MAGIC Collaboration. 'A Search for Spectral Hysteresis and Energy-Dependent Time Lags from X-Ray and Tev Gamma-Ray Observations of Mrk 421', ASTROPHYSICAL JOURNAL 834 (2017) Art No: 2
127. MAGIC Collaboration. 'Long-term multi-wavelength variability and correlation study of Markarian 421 from 2007 to 2009', ASTRONOMY & ASTROPHYSICS 593 (2016) Art No: A91
128. MAGIC Collaboration. 'Super-orbital variability of LS I+61 degrees 303 at TeV energies', ASTRONOMY & ASTROPHYSICS 591 (2016) Art No: A76
129. MAGIC Collaboration. 'Multiwavelength observations of the blazar 1ES 1011+496 in Spring 2008', MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 459 (2016) 2286-2298
130. MAGIC Collaboration. 'Investigating the peculiar emission from the new VHE gamma-ray source H1722+119', MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 459 (2016) 3271-3281
131. MAGIC Collaboration. 'Deep observation of the NGC1275 region with MAGIC: search of diffuse gamma-ray emission from cosmic rays in the Perseus cluster', ASTRONOMY & ASTROPHYSICS 589 (2016) Art No: A33
132. MAGIC Collaboration. 'Detection of very high energy gamma-ray emission from the gravitationally lensed blazar QSO B0218+357 with the MAGIC telescopes', ASTRONOMY & ASTROPHYSICS 595 (2016) Art No: A98

133. MAGIC Collaboration. 'Search for VHE gamma-ray emission from Geminga pulsar and nebula with the MAGIC telescopes', ASTRONOMY & ASTROPHYSICS 591 (2016) Art No: A138

134. MAGIC Collaboration. 'MAGIC observations of the February 2014 flare of 1ES 1011+496 and ensuing constraint of the EBL density', ASTRONOMY & ASTROPHYSICS 590 (2016) Art No: A24

135. PICASSO Collaboration. 'Final results of the PICASSO dark matter search experiment', ASTROPARTICLE PHYSICS 90 (2017) 85-92

136. R3B Collaboration. 'Coulomb dissociation of 20,21N', PHYSICAL REVIEW C 93 (2016) Art No: 065807

137. R3B Collaboration. 'Determination of the neutron-capture rate of C 17 for r-process nucleosynthesis', PHYSICAL REVIEW C 95 (2017) Art No: 014613

138. R3B Collaboration. 'Systematic investigation of projectile fragmentation using beams of unstable B and C isotopes', PHYSICAL REVIEW C 93 (2016) Art No: 054601

Author Index

The number given against the author indicates the list of publication serial number.

***