

# FOR A BETTER TOMORROW

FOUNDATION STONE LAYING CEREMONY OF INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH, KOLKATA AT THE SINP & VECC CAMPUS

ADVERTISER'S ANNOUNCEMENT

## 'IISER will provide the much needed impetus to boost scientific research in India'



Scientific research in India has reached an all time low-point. The situation appears even grimmer when one compares the standard of our scientific achievements in recent years, with the unprecedented and phenomenal growth of science and technology in Asia-Pacific sub-continent.

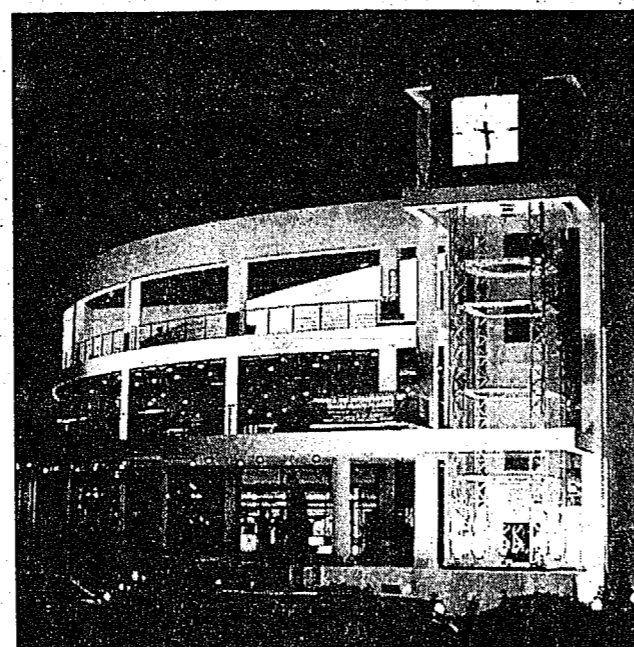
Even ten years ago, India held a pioneering position in scientific research with respect to global standards. Now, however, much to our dismay, the situation is radically altered. In terms of global standing, we are now placed in an extremely disadvantageous position below countries like South Korea and Singapore. China, which was once struggling to make its mark in the field of scientific and technological research, is now much ahead of us in almost all disciplines of science.

In India, most students prefer to secure a successful future by taking up engineering, medicine or management as it assures substantial financial returns, rather than exploring newer avenues of scientific research. Core science is often considered unproductive and is thereby neglected. Students, however, fail to realise the ample scope for a bright future in careers involving core study of science and technology and its industrial relevance. It is this prevalent scenario and mindset that has led to fewer students opting for higher education in pure science with passionate inclination passionately; rather than considering a PhD degree as a ticket to eventually go abroad. This attitude of the students has left researchers and professors feeling discouraged. If we are to relieve ourselves from this dismayed situation and encourage scientific research in India, an institute offering world-class scientific education is the need of the hour. Indian Institute of Science Education and Research (IISER) will provide, I am sure, the much needed impetus to boost scientific research in the country. IISER will have a diverse range of core and interdisciplinary courses pertaining to various scientific disciplines, from where students will have the freedom to pick and choose a subject according to their taste and inclination. The vitality of IISER, I sincerely hope will go a long way to revitalise our sagging scientific morale.

The foundation stone laying ceremony will be held at the SINP and VECC campus, Kolkata on July 11, 2006, which will be attended by the Honourable Prime Minister of India, Dr Manmohan Singh.

(Sinha is the director of Saha Institute of Nuclear Physics and Variable Energy Cyclotron Centre, Kolkata)

# Saha Institute of Nuclear Physics



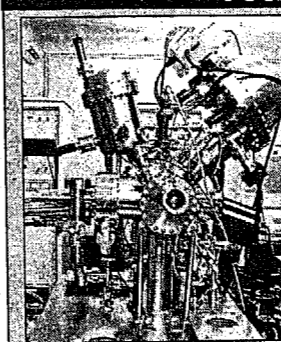
Saha Institute of Nuclear Physics (SINP), since its inception, has been working in different branches of Physical and Biophysical Sciences. Currently, about 135 faculty members and 150 graduate students and post-doctoral fellows are involved in research in different fields of Material Physics, Theoretical and Nuclear Physics, High Energy Physics, Condensed Matter Physics, Plasma Physics, Biophysics, Chemical Sciences and in interdisciplinary areas of non-conventional Physics. Beside those, there are R&D activities in the design of VLSI chips and cryogenic facilities. Teaching has also been an important element of SINP since

1954. One of the oldest course curricula for the PhD students in the form of Post M.Sc associateship courses in Physics and in Biophysical Science, since 1976, is running successfully.

During the Xth five-year plan, important theoretical contributions have been made in understanding supernova explosion, interior composition of neutron stars and black hole entropy. CRAY supercomputer for large scale simulation has been operational to embark on frontline theoretical research in high and medium energy physics, astrophysics and nonlinear dynamical systems including Quantum Chromodynamics, Quark Gluon Plasma, Lattice Gauge Theory, Neutrino Physics and Radioactive Ion Beams.

Major achievements have been in the field of nanomaterials and nanotechnology, nanomagnetism and magnetic properties at low temperature, gamma-ray spectroscopy for the study of nuclear structure and properties of plasma. Scientists from SINP have been a part of the International collaboration (ALICE) for the Study

### FOCAL POINT



- ❑ New Initiatives at SINP
- ❑ Experimental High Energy Physics
- ❑ Indian Neutrino Observatory
- ❑ Surface Physics and Nanoscience
- ❑ Structural Genomics & Proteomics

of Quark Gluon Plasma at Large Hadron Collider (LHC) in CERN, Geneva and have played a significant role in building of the second tracking station of the Dimuon spectrometer project of the ALICE experiment.

MANAS, an application specific VLSI chip has been indigenously designed at SINP and fabricated in collaboration with semiconductor complex, Chandigarh. In total 1,00,000 MANAS chips will be used in the ALICE experiment. This is the first large scale production of an indigenously developed VLSI chip. The SINP scientists have taken active initiative in structural genomics and proteomics research in hematological and neurodegenerative diseases. Also, gene therapy of haemophilia and structural elucidation of two important haemoglobin variants, HbE & HbA2, implicated in thalassemia have been achieved.

Two new centres—Center for Advanced Research & Education (CARE) and Center for Applied Mathematics & Computational Science (CAMCS)—have recently surfaced with interdisciplinary research and educational activities respectively. The CARE's mandate is to bridge the gap between the education provided by the universities and the colleges

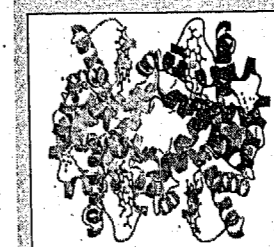
young' and get started in exploratory science at the earliest possible age.

Encouraged by successful application of mathematics and computational techniques studying life and social science phenomena, the CAMCS have taken the initiative to stride forward working in Econophysics (the term coined at SINP) of global wealth distributions. In the process it's making very important contributions in this new interdisciplinary research area.

The other areas include earthquakes and traffic systems where scientists are poised to develop newer predictive models.

### NEW INITIATIVES AT SINP

#### Gene Therapy

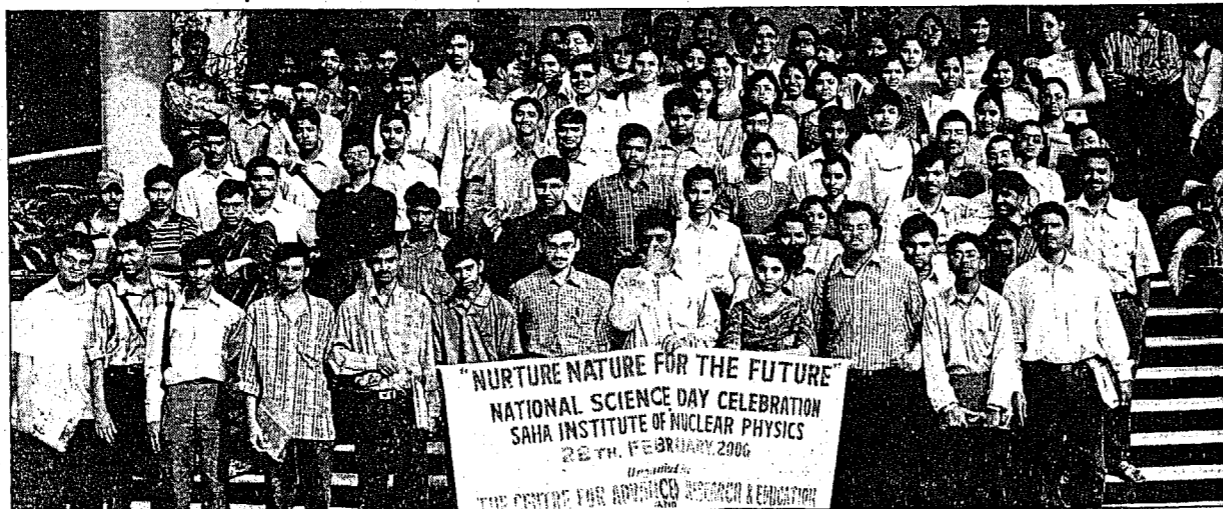


Haemophilia is caused by a deficiency of the blood-clotting factor VIII (FVIII) and is an attractive candidate for gene therapy. SINP scientist had recently demonstrated the generation of an engineered "safely modified" episomal Epstein-Barr virus (EBV) vector with a backbone that has the unique capacity to carry the full-length FVIII cDNA along with the von Willebrand factor (vWF) cDNA for treatment of haemophilia A using the hematopoietic cells as a target. In an extension of this work, the EBV vector has now been further modified to generate BCR-ABL siRNA to target human chronic myelogenous leukemia (CML) cells. The vector has also been modified to inhibit prolif-

eration of imatinib (commonly used antileukemic drug) resistant CML stem cells. This multi-gene delivery strategy for BCR-ABL+ CML cells by targeting not only the fusion transcript but also the downstream signaling to overcome drug resistance in the acute phase of CML, may emerge as an attractive alternative in treating leukemia.

#### Econophysics

The Centre for Applied Mathematics & Computational Science at Saha Institute have taken the initiative to work in the new area of Econophysics of global wealth distributions making very important contributions in understanding the dynamics of stock markets. Econophysics deals with application of natural science techniques to understand economic and social phenomena. It also improvises traditional mathematical techniques used in classical economics, including game theory. Minority game has emerged recently as an important model to mimic the dynamics of stock markets.



Science Day celebration with undergraduate college students at Saha Institute of Nuclear Physics, Kolkata