

Anjan Kundu , Senior Professor



Educational Background

1). 1981 : Ph.D. *Theor. Phys. Dept., Patrice Lumumba (PL) Univ., Moscow* 2). 1977: Integrated M.SC (Phys.) (*with Excellence*), *PL Univ, Moscow*

Earlier Appointments

1). 1983-85: BITS, Pilani, *Lecturer* 2). 1983: Jadavpur Univ., *CSIR-Pool Officer*
3). 1982-83: Joint Inst. for Nucl. Res. (Dubna, Moscow) *Res. Associate* 4). 1981-82: PL Univ (Moscow), *PDF*

Awards Honors and Distinctions :

1. Senior Associate, International Centre for Theoretical Physics (ICTP), Trieste, Italy (2006-2011)
2. *Humboldt Foundation Fellowship* (Senior), Germany [1993-4,1996, 2004, 2006]
3. Special Scholarship and Badges for *Excellent grades* in University (1973-1977)
4. Govt of India Scholarship for study abroad (1971-1977) 5. *National Merit Scholarship*, 1970
6. *National Science Talent Search Certificate & Scholarship*, 1970

Essential Strength of Research

Pioneering contributions to the understanding of integrable nonlinear systems both at the classical and quantum levels through theoretical frameworks, which include gauge-unification of solitonic systems [18,17], invention of original ancestor model scheme for unifying quantum integrable systems based on our extension of the quantum group [10] and a new braided Yang-Baxter equation (BYBE) [12,13] for solving non-ultralocal models including exactly solvable anyon models. I have proposed several new integrable models, including the well known Kundu equation [17,18], Kundu-Eckhaus equation [18], Radhakrishnan-Kundu-Lakshmanan (RKL) and Basumallick-Kundu [8] models and discovered several new quantum integrable systems, including relativistic quantum Toda chain [14], quantum derivative NLS model [15], pioneering 1D anyon gas models [9,3].

Future Research Plan

My most recent research contributions are the novel nonultralocal quantum group and quantum integrable anyonic oscillators, anyonic quantum field NLS and derivative NLS models, obtained through our BYBE. The future plan is to find the exact Bethe ansatz solutions, correlation functions and corresponding novel nonultralocal vertex models for such 1D anyon models. The plan is also to find solvable nonabelian anyon models, applicable toward stable quantum computers, as proposed in the celebrated work of Kitaev.

It would be a challenging problem to solve at the quantum level the variable mass and defect sine-Gordon models proposed by us recently [4,5], which preserve integrability with unusual properties of soliton deformation/creation/annihilation.

A pioneering scheme for nonlinearizing linear equations to integrable systems is proposed by me recently [2], where integrable perturbations were found for a series of nonlinear systems [1,2]. Future plan is to extend our scheme to discrete models and apply such new integrable systems, admitting exact

accelerating solitons to nonlinear optics and other areas. An ambitious program is to couple our non-linearization scheme with Zakharov's dressing method to propose new method for soliton construction using solution of linear equation.

Explaining recent experiments on magnetic pattern in MnSI through our novel noncircular symmetric topological solitons [19] is an immediate problem to be undertaken.

List of important publications

1. Anjan Kundu, *J. Math Phys.* **51**, 022901 (2010) *Two-fold integrable hierarchy of nonholonomic deformation of the DNLS and the Lenells-Fokas equation*
2. Anjan Kundu, *J. Math Phys.* **50**, 102702 (2009) *Nonlinearizing linear equations to integrable systems including new hierarchies of nonholonomic deformations*
3. M. T. Batchelor, X.-W. Guan, A. Kundu, *J. Phys.* (FTC) **A 41**, 352002 (2008) *D-anyons: one-dimensional anyons with competing δ -function and derivative δ -function potentials*
4. Habibullin, I. and Kundu, A. , *Nucl. Phys.* **B [FS] 795** (3), 549-568 (2008) *Quantum and classical integrable sine-Gordon model with defect*
5. Anjan Kundu, *Phys. Rev. Lett.* **99**, 154101-4 (2007) *Shape changing and accelerating solitons in integrable variable mass sine-Gordon model*
6. Anjan Kundu, *J Math Phys* **44** (2003) 4589 : *Unifying scheme for generating discrete integrable systems including inhomogeneous and hybrid models*
7. Anjan Kundu, *Nucl. Phys.* **B 618** (2001) 500-522 *Integrability and exact solution of correlated hopping multi-chain electron systems*
8. B. Basu-Mallick and Anjan Kundu, *Phys. Rev.*, **B 62** (2000) 9927 : *Exact solution of Calogero model with competing long-range interactions*
9. Anjan Kundu, *Phys. Rev. Lett.*, **83**, 1275-9 (1999) *Exact solution of double-delta function Bose gas through interacting anyon gas*
10. Anjan Kundu, *Phys. Rev. Lett.*, **82** , 3936-40 (1999) *Algebraic approach in unifying quantum integrable models*
11. Holger Frahm and A Kundu *J. Phys.* **C 11**, L557-62 (1999) *Phase diagram of an exactly solvable t - J ladder model*
12. L Hlavaty and A Kundu, *Int J. Mod. Phys.* **A 11** (1996) 2143-2165 *Quantum Integrability of Nonultralocal Models through Baxterisation of Quantised Braided algebra*
13. Anjan Kundu, *Mod Phys Lett*, **A 10**, 2955-66 (1995) *Exact Bethe ansatz solution of nonultralocal quantum mKdV model*
14. A. Kundu *Phys. Lett.* **A 190**, 79-84 (1994) *Generation of a quantum integrable class of discrete-time or relativistic periodic Toda chains*
15. A. Kundu & B Basu-mallick *J. Math. Phys.* **34** 1252 (1993) *Classical and Quantum integrability of a novel derivative NLS model related to quantum group structures*
16. S. Ghosh & Anjan Kundu *Phys. Rev. Lett.*, **63**, (1989) 1207-10 : *Test of integrability for $SU(2)$ nonlinear σ - models*
17. Anjan Kundu, *Physica D: Nonlinear Physics*, **25**, 399-406 (1987) *Exact solutions to higher order nonlinear equations through gauge transformation*
18. Anjan Kundu, *J. Math. Phys.* , **25**, 3433-8 (1984) *Landau-Lifshitz and higher order nonlinear systems gauge generated from NLS type equations*
19. Anjan Kundu, *Phys. Lett.*, **B110**, 61-3 (1982) *Instanton in anisotropic sigma-models*
20. Anjan Kundu & Yu.P. Rybakov, *J. Phys.* , **A 15**, 269-75 (1982) *Closed vortex-type solution with Hopf index*