Dillip Kumar Nandy

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Professional Experience

Assistant Professor (March 2023 - Now)
P.G. Department of Physics,
S.K.C.G (Auto) College, Paralakhemundi, Odisha, India

Senior Researcher (March 2021 - Feb 2023)
Institute for basic science - Center for Theoretical Physics of Complex Systems
IBS-PCS, Daejeon, South Korea

Postdoc (January 2019 - December 2020)
Institute of Physics, Polish Academy of science (IFPAN), Warsaw, Poland,

Postdoc (January 2017 - December 2018)
Department of Physics and Astronomy, Aarhus University, Aarhus, Denmark

Visiting Researcher (September 2016 - December 2016)
Department of Physics, Indian Institute of Technology, Guwahati, India

Postdoc (September 2015 - August 2016)
Department of Theoretical Chemistry, University of Waterloo, Waterloo, Ontario, Canada

Education

Ph.D. (July 2010 - July 2015)
Theoretical Atomic Physics
Indian Institute of Technology, Gandhinagar, Gujarat, India

M.Sc, Physics, (June 2008 - June 2010)
Utkal University, Bhubaneswar, Odisha, India

B.Sc, Physics, (May 2005 - May 2008)
North Odisha University, Baripada, Mayurbhanja, Odisha, India

Research interests

- Quantum Chaos, many-body localization (MBL) and thermalization in finite lattice models
- Few-body physics with ultracold quantum gases
- Fractional Quantum Hall Efffect (FQHE)
- Numerical simulations using various techniques: Exact diagonalization (ED), DMRG, Monte-Carlo, Mean-field and Cluster Mean-field

- Relativistic Atomic many-body theory: Dirac-Hartree-Fock (DHF) method, Many-body perturbation theory (MBPT), Coupled-Cluster (CC)
- High precision calculations of various spectroscopic properties of atoms

CONFERENCE PRESENTATIONS

- Relativistic many body theory for the multipolar black body radiation shifts and their application to atomic clock, **Recent advances in many electron theory (RAMET)** 2011, Puri, Odisha, India, *Poster Presentation*

- Single ion clock using Ca^+ and Sr^+, **Workshop on highly charged ions and atomic collisions (WHCI) 2012)**, TIFR, Mumbai, India, *Poster Presentation*

- Role of precise relativistic calculation of black-body radiations shift for single ion clock, **Symposium on Atomic, Molecular and Optical Physics (ISAMP)**, 2012, IISER-KOLKATA, India, *Poster Presentation*

- Participated in the School and Conference, **CP violation in Elementary Particles and Composite Systems** 2013, Fountain Hotel, Mahabaleshwar, Maharashtra, India.

- Prospects of highly charged ions for probing temporal variation of fine structure constant, **Recent advances in many electron theory (SPARC)** 2014, TIFR, Mumbai, India, *Poster Presentation*

- Novel applications of relativistic coupled-cluster (RCC) methods in atomic systems, **The satellite symposium of International Congress of Quantum Chemistry (ICQC) entitled "Novel Computational Methods for Quantitative Electronic Structure Calculation" (QESC)** 2015, RIKEN, Kobe, Japan, *Poster Presentation*

- Novel Applications of Relativistic Coupled-Cluster methods for probing fundamental properties of atoms, **Frontiers in Electronic Structure Theory (FEST)** 2015, Goa, India, *Poster Presentation*

- Construction of local Hamiltonian from CFT, **Symposium on quantum matter**, ETH, Zurich (Switzerland), 19-15, June (2018), *Poster Presentation*

- Local Hamiltonians for one-dimensional critical models, **Quantum transport with ultracold atoms**, Ascona (Switzerland), 21-25, July (2018), *Poster Presentation*

- Relativistic coupled-cluster method, a route to high precision atomic calculations, IFPAN, Warsaw, (Poland), 26th-March (2019), *Talk*

- Dynamical properties of a few mass-imbalanced ultra-cold fermions confined in a double-well potential, **Coherence in Fermionic Matter: Fermion Pairing in cold Atoms and Superconductors**, Physikzentrum Bad Honnef (Germany), 13-16 October (2019), *Poster Presentation*

- Participated the webinar in the conference titled '**Fundamental sciences and Quantum technologies using atomic systems (FSQT-2020)**, India, 28th-Sept to 1st - Oct (2021)

- Participated the webinar in the conference titled, **'Nonequilibrium collective phenomena workshop'**, Gyeongju Hilton Hotel, (South Korea), 27th-Sept to 1st - Oct (2021)

- Participated the webinar in the international workshop titled, **'Quantum Many-Body Dynamics: Thermalization and its Violations'**, PCS-IBS, (South Korea), May 24−28, (2021)

- Participated (online) the Asia-Pacific Theoretical Physics Center(APCTP) conference on, **'Numerical Methods in Theoretical Physics'**, APCTP HQ, Pohang, (South Korea), May 15−21, (2022)

- Presented a Talk in a National conference titled, **National Conference on Recent Advances in Materials and Particle Physics (NRCAMPP-2023)**, 24-25th November, P.G. Dept. of Physics, Berhampur University, ODISHA

Research Publications

- **D. K. Nandy**, Yashpal Singh, B. K. Sahoo and C. Li, Sc III spectral properties of astrophysical interest, *J. Phys. B: At. Mol. Opt. Phys.*, 44, 2257 (2011)

- Bindiya Arora, **D. K. Nandy** and B. K. Sahoo, Multipolar blackbody radiations shifts in single ion clocks, *Phys. Rev. A*, 85, 012506 (2012)

- Yashpal Singh, **D. K. Nandy** and B. K. Sahoo, Reexamination of nuclear quadrupole moment in K isotopes, *Phys. Rev. A*, 86, 032509 (2012)

- **D. K. Nandy**, Yashpal Singh, B. P. Shah and B. K. Sahoo, Transition properties of potassium atom, *Phys. Rev. A*, 86, 052517 (2012)

- **D. K. Nandy**, and B. K. Sahoo, Developement of a relativistic coupled-cluster method for one electron detachment theory: Application to Mn IX, Fe X, Co XI, Ni XII ions, *Phys. Rev. A*, 88, 052512 (2013)

- **D. K. Nandy**, and B. K. Sahoo, Spectral properties of F-like ions, *Astronomy & Astrophysics*, 563, A25 (2014)

- **D. K. Nandy**, Yashpal Singh and B. K. Sahoo, Implementation and application of the relativistic equation-of-motion coupled-cluster method for the excited states of the closed shell atomic system, *Phys. Rev. A*, 89, 062509 (2014)

- **D. K. Nandy**, and B. K. Sahoo, Quadrupole Shifts for the Yb+ Ion Clocks: Experiments versus Theories, *Phys. Rev. A*, 90, 050503 (R) (2014)

- Jameet Kaur, **D. K. Nandy**, Bindiya Arora, and B. K. Sahoo, Long-range interactions between the alkali-metal atoms and alkaline earth ions, *Phys. Rev. A*, 90, 050503 (R) (2014)

- **D. K. Nandy**, and B. K. Sahoo, Relativistic calculations of radiative properties and fine structure constant varying sensitivity coefficients in astrophysically relevant Zn II, Si IV, and Ti IV ions , *MNRAS*, 447, 3812 (2015)

- **D. K. Nandy**, and B. K. Sahoo, Forbidden transition properties in the ground-state configurations of singly ionized noble gas atoms for stellar and interstellar media, *MNRAS*, 450, 1012 (2015)

- B. K. Sahoo, **D. K. Nandy**, B. P. Das, and Y. Sakemi, Correlation trend in the hyperfine Structures of ^{210,212}Fr, *Phys. Rev. A*, 91, 042507 (2015)

- **D. K. Nandy**, Sukhjit Singh, and B. K. Sahoo, Radiative properties of Fluorine and Chlorine like alkali and alkaline earth ions, *MNRAS*, 452, 2546 (2015)

- **D. K. Nandy**, and B. K. Sahoo, Highly charged W^{13+}, Ir^{16+}, and Pt^{17+} ions as promising optical clock candidates for probingvariations of the fine-structure constant, *Phys. Rev A*, 94, 032504 (2016)

- **D. K. Nandy**, Relativistic coupled-cluster calculations of transition properties in highly charged inert-gas ions, *Phys. Rev A*, 94, 052507 (2016)

- **Dillip K. Nandy**, N. S. Srivatsa, and Anne E. B. Nielsen, Local Hamiltonians for one-dimensional critical models, *J. Stat. Mech. (2018) 063107*

- **Dillip K. Nandy**, N. S. Srivatsa, and Anne E. B. Nielsen, Truncation of lattice fractional quantum Hall Hamiltonians derived from conformal field theory Phys. Rev. B 100, 035123 (2019)

- **Dillip K. Nandy**, Masud Hauque, and Anne E. B. Nielsen, Few-particle dynamics of fractional quantum Hall lattice models, *Phys. Rev. B*, 101, 205305 (2020)

- **Dillip K. Nandy** and Tomasz Sowinski, Dynamical properties of a few mass-imbalanced ultra-cold fermions confined in a double-well potential, *New J. Phys.*, 22, 053043 (2020)

- **Dillip K. Nandy** and Tomasz Sowinski, Dynamical resistivity of a few interacting fermions to the time-dependent potential barrier, *New J. Phys.*, 23, 043019 (2021)

- **Dillip K. Nandy** and B. K. Sahoo, Relativistic-coupled-cluster-theory analysis of properties of Co-like ions, *Phys. Rev. A*, 00, 002800 (2021)

- **Dillip K. Nandy**, Tilen Cadez, Barbara Dietz, Alexei Andreanov, Dario Rosa, Delayed Thermalization in Mass-Deformed SYK, arXiv:2206.08599 (2022), PHYSICAL REVIEW B 106, 245147 (2022)

- **Dillip K. Nandy** and Tomasz Sowinski, Sudden quench of harmonically trapped mass-imbalanced fermions, *Sci. Rep.* 12, 19710 (2022)

- Tilen Cadez, **Dillip K. Nandy**, Barbara Dietz, Alexei Andreanov, and Dario Rosa, The Rosenzweig-Porter model revisited for the three Wigner-Dyson symmetry classes, (arXiv:2404.05755v2, Accepted in New J. Phys.)

Cameron Beetar, Jeff Murugan, **Dillip K. Nandy** and Dario Rosa, Neural Networks as Universal Probes of Many-Body Localization in Quantum Graphs, (in preparation)

- **Dillip K. Nandy** and Tomasz Sowinski, Nonequilibrium thermodynamis of two-component mass-imbalanced fermionic system following sudden quench in a harmonic trap (in preparation)

Computer Skills

Programming Language: FORTRAN, MATLAB, JULIA, PYTHON, MATHEMATICA
Operating Systems: Windows, Linux

Interests

Listening Musics, Singing Hindi and Odia songs, Writting small stories and dramas, Playing Volly ball, Cricket, Long Walks, Cooking

SOCIAL ACTIVITIES

A member of a Non Government Organization (NGO), named "Help for you Foundation, (Jaleswar, Balasore, Odisha, India)", which is dedicated towards helping people.

REFERENCES

Prof. Bijaya Kumar Sahoo
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