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Publications: Google scholar
Last updated: June 29, 2025

Research interests

Biomaterial design using machine learning, Quantum dynamics, Statistical Mechanics

Education

2014 Ph.D. (Physics), S. N. Bose National Centre for Basic Sciences, Kolkata, India (degree awarded by University of Calcutta)
Thesis advisor: Prof. Jayanta K. Bhattacharjee
Thesis title: Aspects of Unusual Superconductivity
2009 M.Sc. (Physics), S. N. Bose National Centre for Basic Sciences, Kolkata, India (DGPA: 8.74/10, Degree awarded by West Bengal University of Technology)
2007 B.Sc. (Physics honors), Ramakrishna Mission Vidyamandira, University of Calcutta, Kolkata, India (70.5%, First class)

Positions

2024–Present	Assistant professor, Department of Physics, SRM University, Andhra Pradesh, India
2021–2024	Guest Scientist, Max Planck Institute for Polymer Research, Mainz, Germany
2021–2024	Postdoctoral fellow, Institute of Biochemistry II, Goethe University, Frankfurt, Germany
2018–2021	Postdoctoral fellow, Max Planck Institute for Polymer Research, Mainz, Germany
2017–2018	Postdoctoral fellow, Leibniz Institute for Polymer Research, Dresden, Germany
2016–2017	Postdoctoral fellow, Institute Charles Sadron, CNRS, Strasbourg, France
2014–2016	Postdoctoral fellow, Institute of Mathematical Sciences, Chennai, India

Publications

In journals:

1. Cristiani, A.; **Dutta, A.**; Poveda-Cuevas, S. A.; Kern, A.; Bhaskara, R. M.
Identification of Potential Selective Autophagy Receptors from Protein-Content Profiling of Autophagosomes.
Journal of Cellular Biochemistry 2024, *125* (11), e30405.
https://doi.org/10.1002/jcb.30405.
2. Sen, N.; Minocha, P.; **Dutta, A.**
Technology Licensing and Collusion.
International Journal of Economic Theory 2023, *19* (3), 694–752. https://doi.org/10.1111/ijet.12373.
3. Kaygisiz, K.; Rauch-Wirth, L.; **Dutta, A.**; Yu, X.; Nagata, Y.; Bereau, T.; Münch, J.; Synatschke, C. V.; Weil, T.
Data-Mining Unveils Structure–Property–Activity Correlation of Viral Infectivity Enhancing Self-Assembling Peptides.
Nature Communications 2023, *14* (1), 5121.
https://doi.org/10.1038/s41467-023-40663-6.
4. Kaygisiz, K.; **Dutta, A.**; Rauch-Wirth, L.; Synatschke, C. V.; Münch, J.; Bereau, T.; Weil, T.

Inverse Design of Viral Infectivity-Enhancing Peptide Fibrils from Continuous Protein-Vector Embeddings.
Biomaterials Science 2023, *11(15)*, 5251–5261.
https://doi.org/10.1039/D3BM00412K.

5. **Dutta, A.**; Bereau, T.; Vilgis, T. A.
Identifying Sequential Residue Patterns in Bitter and Umami Peptides.
ACS Food Science and Technolog 2022, *2* (11), 1773–1780.
https://doi.org/10.1021/acsfoodscitech.2c00251.
6. **Dutta, A.**; Vreeken, J.; Ghiringhelli, L. M.; Bereau, T.
Data-Driven Equation for Drug–Membrane Permeability across Drugs and Membranes.
Journal of Chemical Physics 2021, *154* (24), 244114.
https://doi.org/10.1063/5.0053931.
7. Centi, A.; **Dutta, A.**; Parekh, S. H.; Bereau, T.
Inserting Small Molecules across Membrane Mixtures: Insight from the Potential of Mean Force.
Biophysical Journal 2020, *118* (6), 1321–1332.
https://doi.org/10.1016/j.bpj.2020.01.039.
8. Schilling, C.; Mack, T.; Lickfett, S.; Sieste, S.; Ruggeri, F. S.; Sneideris, T.; **Dutta, A.**; Bereau, T.; Naraghi, R.; Sinske, D.; Knowles, T. P. J.; Synatschke, C. V.; Weil, T.; Knöll, B.
Sequence-Optimized Peptide Nanofibers as Growth Stimulators for Regeneration of Peripheral Neurons.
Advanced Functional Materials 2019, *29* (24), 1809112.
https://doi.org/10.1002/adfm.201809112. (*Featured in the Highlighted research of 2019 from the Max Planck Society, Germany*)
9. Connaughton, C.; **Dutta, A.**; Rajesh, R.; Siddharth, N.; Zaboronski, O.
Stationary Mass Distribution and Nonlocality in Models of Coalescence and Shattering.
Physical Review E 2018, *97* (2), 022137.
https://doi.org/10.1103/PhysRevE.97.022137.
10. Connaughton, C.; **Dutta, A.**; Rajesh, R.; Zaboronski, O.
Universality Properties of Steady Driven Coagulation with Collisional Evaporation. **Europhysics Letters** 2017, *117* (1), 10002.
https://doi.org/10.1209/0295-5075/117/10002.
11. **Dutta, A.**; Modak, S. K.
Holographic Entanglement Entropy in Imbalanced Superconductors.
Journal of High Energy Physics 2014, *2014* (1), 136. https://doi.org/10.1007/JHEP01(2014)136.
12. **Dutta, A.**; Bhattacharjee, J. K.
Lifshitz Tricritical Point and Its Relation to the FFLO Superconducting State.
Physics Letters A 2013, *377* (21–22), 1402–1406. https://doi.org/10.1016/j.physleta.2013.04.025.
13. **Dutta, A.**; Bhattacharjee, J. K.
Competing Order Parameters and a Tricritical Point with a Difference.
Physica B: Condensed Matter 2012, *407* (18), 3722–3726. https://doi.org/10.1016/j.physb.2012.05.050.

In Conference Proceedings:

1. **Dutta, A.**; Bhattacharjee, J. K.
Dynamical Structure Factor of Fulde–Ferrell–Larkin–Ovchinnikov Superconductors
AIP Conference Proceedings 2013, *1512*, 1128–1129.
https://doi.org/10.1063/1.4791444.

Code and data for most of our papers are publicly available, for instance:
https://zenodo.org/records/8079727
https://gitlab.com/arghyadutta/seq-to-infect
https://github.com/arghyadutta/patterns-to-taste

Achievements and awards

2013 Best talk, Bosefest 2013, S. N. Bose National Centre for Basic Sciences, Kolkata, India
2012 Best poster, DAE Solid State Physics Symposium, IIT Mumbai, India
2011 Best poster, Bosefest 2011, S. N. Bose National Centre for Basic Sciences, Kolkata, India
2011 Best scientific essay for an essay titled Topological Insulators: A New Enigma, S. N. Bose National Centre for Basic Sciences newsletter, 3, 2010–2011, Kolkata, India
2009 Lectureship (NET), Council of Scientific and Industrial Research, India
2007 National top 1% in the National Graduate Physics Examination, Indian Association of Physics Teachers
2007 All-India rank 125 in the Joint Entrance Screening Test (JEST)
2007 All-India rank 23 in Physics in the Joint Admission Test for M.Sc. (JAM), Indian Institute of Technology, 2007

Research fellowships

2014–2016 Postdoctoral Research Fellowship, Institute of Mathematical Sciences, India
2013 Travel Grant, International Centre for Theoretical Physics, Italy
2011–2014 Senior Research Fellowship, CSIR, India
2009–2011 Junior Research Fellowship, CSIR, India

Invited talks

2021 Molecular Biophysics Unit, IISc, Bangalore, India, *Data-driven search for drug–membrane permeability equations*
2021 Physical Chemistry Seminar Series, Rutgers University, USA, *Data-driven search for drug–membrane permeability equations*
2020 Applied Physics and Machine Learning Seminar Series, IIT Hyderabad, India, *Data-driven Search for Structure–Property Relations in Soft Matter*
2017 Leibniz Institute for Polymer Research, Dresden, Germany, *Polymer Entanglement in Motor Driven Topological Gels*
2016 University of Tokyo, Japan, *Modeling aggregation and fragmentation phenomena using the Smoluchowski equation*

Contributed talks

2021 BiGmax Workshop 2021, Magdeburg, Germany, *Data-driven search for drug–membrane permeability models*
2019 BiGmax Workshop 2019, Dresden, Germany, *Data mining in soft matter systems*
2015 Program on Non-equilibrium statistical physics, Bangalore, India, *Modeling aggregation and fragmentation phenomena using the Smoluchowski equation*
2015 Fluctuation driven phenomena in non-equilibrium statistical mechanics, Warwick, England, *Modeling aggregation and fragmentation phenomena using the Smoluchowski equation*
2013 Bosefest 2013, Kolkata, India, *Proposed evidence for superconductors with a Lifshitz tricritical point and a spatially-modulated Fulde–Ferrell–Larkin–Ovchinnikov-type order parameter*
2012 Bosefest 2012, Kolkata, India, *Ginzburg–Landau Theory Near the Multicritical Point of Exotic Superconductors*

Poster presentations

2022 21st International Conference on Systems Biology, Berlin, Germany, *Analyzing human E3 ligome for efficient design of PROTACs*

2022 3rd Frankfurt Conference on Quality Control in Life Processes, Frankfurt, Germany, *Analyzing human E3 ligome for efficient design of PROTACs*
2019 Mainz Materials Simulation Days 2019, Mainz, Germany, *Application of data mining in soft matter systems*
2018 BiGmax Workshop 2018, Irsee, Germany, *High-throughput screening of drug–membrane thermodynamics*
2016 Indian Statistical Physics Community Meeting 2016, Bangalore, India, *Modeling aggregation and fragmentation using the Smoluchowski equation*
2016 Avalanches, plasticity, and nonlinear response in nonequilibrium solids, Kyoto, Japan, *Modeling aggregation and fragmentation phenomena using the Smoluchowski equation*
2014 STATPHYS—KOLKATA VIII, Kolkata, India, *Ginzburg–Landau Theory near the Multicritical Point of Exotic Superconductors*
2013 Workshop on Ultracold Atoms and Gauge Theories, Trieste, Italy, *Lifshitz tricritical point and its relation to the FFLO superconducting state*
2012 DAE Solid State Physics Symposium, Mumbai, India, *Dynamical Structure Factor of Fulde–Ferrell–Larkin–Ovchinnikov Superconductors*
2012 International Conference on Statistical Physics and Nonlinear Dynamics, Kolkata, India, *Ginzburg–Landau Theory Near the Multicritical Point of Exotic Superconductors*
2011 Bosefest 2011, Kolkata, India, *Phenomenological Theory of Sarma Phase*

Conference participation

2021 Python for HPC, Garching, Germany
2021 BiGmax Summer School 2021, Düsseldorf, Germany
2020 Causal Data Science Meeting 2020, Maastricht, Netherlands
2020 Multiscale simulations of soft matter: new method developments and mathematical foundations, Mainz, Germany
2020 (Machine) Learning How to Coarse-grain, Mainz, Germany
2020 BiGmax Virtual Machine Learning Workshop, Germany
2018 NOMAD Summer—A hands-on course on tools for novel-materials discovery, Lausanne, Switzerland
2018 Machine Learning in Scientific Computing, Nierstein, Germany
2016 Bangalore School on Statistical Physics–VII, Bangalore, India
2016 Fracmeet 2016, Chennai, India
2015 Fracmeet 2015, Chennai, India
2014 Bangalore School on Statistical Physics–V, Bangalore, India
2013 International Workshop on Quantum Integrable Systems, Kolkata, India
2011 International School on Topology in Quantum Matter, Bangalore, India
2010 International School on Cold Ions and Atoms, Kolkata, India
2009 Workshop on Tools of Theoretical Physics and the Problem of Turbulence, Kolkata, India

Academic visits

Jun 2017	Leibniz Institute for Polymer Research, Dresden, Germany
Oct–Nov 2015	Mathematics Institute, University of Warwick, England
Jun–Jul 2013	Harish-Chandra Research Institute, Allahabad, India
Jan 2013	Inter-University Centre for Astronomy and Astrophysics, Pune, India
Jun–Jul 2012	Harish-Chandra Research Institute, Allahabad, India

Professional activities

Reviewed journal articles for:

- Computational Biology and Chemistry, Elsevier
- Scientific Reports, Springer Nature
- Chemical Papers, Springer Nature
- Journal of Applied Physics, American Physical Society

Teaching

- Engineering physics (B.Tech.)
  - 2024–25 Odd (7 credits, 4.4/5 (from 86 students), University average: 4.2/5)
  - 2024–25 Even (2 credits, 4.16/5 (from 67 students), University average: 4.08/5)
- Statistical mechanics (B.Sc. Physics)
  - 2024–25 Odd (2 credits, 5/5 (from 2 students), University average: 4.2/5)
- Statistical mechanics (M.Sc. Physics)
  - 2024–25 Even (2 credits, 5/5 (from 3 students), University average: 4.08/5)
- Artificial Intelligence in Complex Systems (Open elective, offered to B.Tech. students)
  - 2024–25 Even (3 credits, 4.5/5 (from 7 students), University average: 4.08/5)

Students guided

- Sunkara Tarun, 2nd year B.Sc. Physics student from KBN College, Vijaywada
  Project title: “Introduction to Probability for Quantum Mechanics” (A six-weeks reading project, April–May, 2025)