

CV of Somendra Mohan Bhattacharjee

1. *Name:* Somendra Mohan Bhattacharjee
2. *Position:* Senior Professor (Professor I)
3. *Address:*
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email: somen@iopb.res.in, somen00@gmail.com home-page:<http://www.iopb.res.in/~somen>
4. *Date of birth:* 24 January 1957 *Citizenship:* Indian
5. *Area of specialization:* Theoretical condensed matter physics
6. *Educational qualifications:*

Degree	University	Year
Ph. D.	Carnegie Mellon University (USA)	1980-84
M. Sc.	Calcutta University	1977 (Exam held in 1978-79)
B. Sc. (Hons)	Presidency College (Calcutta University)	1975 (Exam held in 1976-77)
7. *Research experience:*
Post-doc, AT&T Bell Labs, Murray Hill, USA, 1986-88
Post-doc, Univ. Massachusetts, Amherst, USA, 1984-86
8. *Details of employment.:*
 - (a) Senior Professor (I), Institute of Physics (IOP), Bhubaneswar, 2014-; Joined IOP in 1988 as Senior Lecturer.
 - (b) Lecturer, Maharaja Manindra Chandra College, Calcutta, 1979-80
9. *Professional recognitions, fellowships:*
 - (a) Fellow, Indian Academy of Sciences, Bangalore, since 2000
 - (b) Fellow, Indian National Science Academy (INSA), New Delhi, since 2008
 - (c) J. C. Bose Fellowship (DST, Govt. of India) 2010.
 - (d) Regular Associate, ICTP, Trieste (1994-2001).
10. *International Collaborations*
Several collaborations with groups in University of Padova, Italy, Applied Mathematics Research Centre, Coventry, UK, University of Köln, Germany, Research Center, Jülich (Indo-German project).
11. *Supervision:*
 - (a) *Ph. D. Students:* 8 graduated
 - (b) *M. Sc. Thesis:* 3
 - (c) *MCA Thesis:* 1
12. *Courses Taught:*
Regular courses (M. Sc and Ph.D. level): (i) Electrodynamics, (ii) Mathematical methods, (iii) Numerical methods, (iv) Quantum mechanics, (v) Statistical Mechanics, (vi) Non-equilibrium statistical mechanics, (vii) Solid state Physics, (viii) Many body physics.

Taught special courses like, (i) Phase transitions; (ii) Spin glass; (iii) Topology and condensed matter physics; (iv) Renormalization Group, (v) Polymer physics.

Many special short courses in National Schools, Refresher courses, and on invitation at various universities.

13. *Organizations:*

Organized an international workshop on Polymer physics (25 years of the Edwards Model), 1991. Proceedings published by World Scientific, Singapore

Organized a SERC School on "Models and Techniques of Statistical Physics" (Lecture notes Published by Narosa), 1994

Co-Director of a workshop on Thermodynamic behaviour of Biomolecules in ICTP Trieste, Italy, 2006

Started the ongoing conference series CMDAYS for condensed matter physics. It is now in its 25th year. Current Chairperson of the National committee of CMDAYS.

Director of a Science Academies Refresher course at Tezpur University, Jan 2015.

Director of a SERC School "Topology and Condensed Matter Physics" held in Nov-Dec 2015. Lecture notes to be published

14. *Conferences:*

Invited talks in many national and international conferences. Most recent invited talks in (i) the conference on "fluctuations in small systems II" in Venice, Oct 2014, (ii) Biology: DAE Spectra, Jan 2015 in SINP Kolkata, (iii) Current trends in condensed matter physics, NISER, Bhubaneswar, Feb 2015. (iv) PBCTE, IIT Mumbai, 2015, (v) CMDAYS 2016, Aizawl, (vi) DNA Physics, international conference at BITS Pilani, 2017, (vii) Mini StatPhys meeting, Calcutta University, 2017.

15. *Current Research Interest:*

Currently working on the fluctuation induced phase of triple stranded DNA near the duplex melting point. This is a thermal analog of the quantum Efimov effect. In addition to various analytical studies, mostly using real space and field theoretic renormalization group, attempts are being made to generate the phase diagram by Monte Carlo simulations.

Also interested in the rigidity of double stranded DNA and its dependence on bubbles as one approaches the melting point.

List of publications of S. M. Bhattacharjee

Total 94 publications including
9 Physical Review Letters,
9 EuroPhys. Letters,
12 J Phys A Letters.

Period:2010-2016

1. Jaya Maji, F. Seno, A. Trovato and S. M. Bhattacharjee, “Bubble-bound state of triple-stranded DNA: Efimov Physics in DNA with repulsion”, arXiv:1703.09432
2. S. M. Bhattacharjee, “What is dimension?”, To appear in a book ”Topology and condensed matter physics”
3. S. M. Bhattacharjee ,“Use of Topology in physical problems”, to appear in a book “Topology and condensed matter physics”
4. F. Mura, S. M. Bhattacharjee, J. Maji, M. Masetto, Flavio Seno, A. Trovato, “Efimov-like behaviour in low-dimensional polymer models” *J. Low Temp. Physics (Special issue)* Vol 183, No 5/6 (2016).
5. Tanmoy Pal and S. M. Bhattacharjee, “Rigidity of Melting DNA”, *Phys. Rev. E*93, 052102 (2016)
6. Tanmoy Pal, Poulomi Sadhukhan, and S. M. Bhattacharjee, “Efimov-like phase of a three-stranded DNA and the renormalization-group limit cycle”, *Phys. Rev. E* 91, 042105 (2015).
7. Poulomi Sadhukhan and S. M. Bhattacharjee, “Thermodynamic relations for DNA phase transitions”, *Ind. J. Physics* 88, 895(2014) (*Special Issue on the occasion of 125th Birth Anniversary of Sir C V Raman*)
8. Jaya Maji, S. M. Bhattacharjee, F. Seno and A. Trovato, “Melting behavior and different bound states in three-stranded DNA models” *Phys Rev E*89, 012121 (2014)
9. S. M. Bhattacharjee Achille Giacometti and Amos Maritan, “Flory theory for polymers”, *J. Phys.: Condens. Matter* 25 (2013) 503101
10. Tanmoy Pal, Poulomi Sadhukhan, and S. M. Bhattacharjee, “Renormalization Group Limit Cycle for Three-Stranded DNA” *Phys. Rev. Lett.* 110, 028105 (2013).
11. Garima Mishra, Poulomi Sadhukhan, S. M. Bhattacharjee, and Sanjay Kumar, “Dynamical phase transition of a periodically driven DNA”, *Phys. Rev. E* 87, 022718 (2013)
12. Poulomi Sadhukhan and S. M. Bhattacharjee “Signature of special behaviors of $1/r^2$ interaction in the quantum entanglement entropy”, *J. Phys. A: Math. Theor.* 45 (2012) 425302
13. Jaya Maji and S. M. Bhattacharjee “Efimov effect of triple-stranded DNA: Real-space renormalization group and zeros of the partition function”, *Phys. Rev. E* 86, 041147 (2012)
14. Poulomi Sadhukhan and S. M. Bhattacharjee “Entanglement entropy of a quantum unbinding transition and entropy of DNA”, *Europhys. Letts.* 98 (2012) 10008

15. Poulomi Sadhukhan, Jaya Maji and S. M. Bhattacharjee, “Type II DNA: When the interfacial energy becomes negative”, *EuroPhys. Letts.* 95 (2011) 48009
16. Jaya Maji and S. M. Bhattacharjee, “Dynamic phase transition in the conversion of B-DNA to Z-DNA”, *EuroPhys. Letts.* 92 (2010) 58004
17. Jaya Maji, S. M. Bhattacharjee, F. Seno, A. Trovato, “When a DNA triple helix melts: an analogue of the Efimov state”, *New J. Phys.* 12 (2010) 083057 (in IOPSELECT)
18. Poulomi Sadhukhan and S. M. Bhattacharjee, “Thermodynamics as a nonequilibrium path integral”, *J. Phys. A: Math. Theor.* 43 (2010) 245001
19. S M Bhattacharjee, “Interfacial instability and DNA fork reversal by repair proteins”, *J. Phys.: Condens. Matter* 22 155102 (2010) (in IOPSELECT)

Research Summary

Major research activities concentrated on (1) DNA physics, (2) miscut crystal surfaces, (3) polymers, surface growth, (4) dimer models, (5) Entanglement in condensed matter systems. Methodology used involves real space and field theoretical renormalization group, exact solutions for lattice models, Monte Carlo and exact numerical methods. The guiding principle is to get systematic, exact or rigorous results with a minimal description of a problem. Also involved in software developments for Indian language based searches.