

# Buddhapriya Chakrabarti

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## ***Education***

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**Doctorate in Physics** Indian Institute of Science, Bangalore, India (1997-2003).

**Thesis:** *Instabilities, coarsening and chaos in driven systems: Growing interfaces and sheared wormlike micelles.*

**Advisor:** Prof. Chandan Dasgupta.

**Master of Science** (Physics), Jawaharlal Nehru University, New Delhi, India (1995-1997).

**Bachelor of Science** (Physics), Presidency College, Calcutta, India (1992-1995).

## ***Employment***

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**Postdoctoral Research Fellow**, Dept. of Physics, Harvard University, (Oct 2005 - present)

**Postdoctoral Research Fellow**, Dept. of Physics, Univ. of Massachusetts, Amherst, (Aug 2003- Aug 2005).

## ***Research Interests***

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- Nucleic Acids research, DNA and RNA unzipping, translocation through nanopores.
- Elasto-plastic deformations of rods and plates.
- Statistical mechanical modeling of proteins and other biologically motivated problems.
- Microtubule dynamics applied to cell division.
- Elasticity, hydrodynamics, and topological defects in liquid crystals and other soft materials.
- Rheological behavior of soft materials and “rheochaos”.
- Non equilibrium growth phenomena, pattern formation and chaos in out of equilibrium systems.
- Coarsening behavior of non-equilibrium systems.

## ***Fellowships***

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- Senior Research Fellowship, Indian Institute of Science, Bangalore, India, 1999 - 2003.
- Junior Research Fellowship, Indian Institute of Science, Bangalore, India, 1997-1999.
- Visiting Student Research Fellow, Harish Chandra Research Institute, Allahabad, India, (Dec 1995).
- Visiting Student Research Fellow, Institute of Mathematical Sciences, Madras, India (May 1995).
- Visiting Student Research Fellow, Harish Chandra Research Institute Allahabad, India (Dec 1994).

## Publications

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### Published

- Nonlinear Elasticity of an  $\alpha$ -helical polypeptide – Monte Carlo studies, **B. Chakrabarti**, and Alex J. Levine, **Phys. Rev. E**, **74**, 031903 (2006).
- Escape Configuration Lattice near the Nematic-Isotropic Transition: Tilt Analogue of Blue Phases, **B. Chakrabarti**, Y. Hatwalne, and N. V. Madhusudana, **Phys. Rev. Lett.** **96**, 157801 (2006).
- Rheological Chaos in Wormlike Micelles and nematic hydrodynamics, M. Das, R. Bandyopadhyay, **B. Chakrabarti**, S. Ramaswamy, C. Dasgupta, and A. K. Sood, in **Molecular Gels** (ed. P. Terech, and R. G. Weiss (Kluwer), Amsterdam (2006).
- Routes to spatiotemporal chaos in the rheology of nematogenic fluids, M. Das, **B. Chakrabarti**, C. Dasgupta, S. Ramaswamy, and A. K. Sood, **Phys. Rev. E**, **71**, 021707 (2005).
- Competing instabilities in mounded surface growth, **B. Chakrabarti**, and C. Dasgupta, **Phys. Rev. E**, **71**, 021601(R) (2005).
- Nonlinear Elasticity of an  $\alpha$ -helical polypeptide, **B. Chakrabarti**, and Alex J. Levine **Phys. Rev. E**, **71**, 031905 (2004).
- Spatiotemporal rheochaos in nematic hydrodynamics, **B. Chakrabarti**, M. Das, C. Dasgupta, S. Ramaswamy and A. K. Sood, **Phys. Rev. Lett.** **92**, 055501 (2004).
- Mound formation and coarsening from a nonlinear instability in surface growth, **B. Chakrabarti**, and C. Dasgupta, **Phys. Rev. E** **69**, 011601 (2004).
- Nonequilibrium phase transition in surface growth, **B. Chakrabarti**, and C. Dasgupta, **Europhys. Lett.** **61**, 547 (2003).
- Crack propagation and crack surface roughness, **B. Chakrabarti**, and B. K. Chakrabarti, **Physica A** **270**, 21 (1999).
- Holonomic Constraints in Classical Mechanics, **B. Chakrabarti**, **Physics Education**, **July - Sept**, 169 (1997).

### In Preparation

- Microscopic approaches to DNA unzipping, **B. Chakrabarti**, and D. R. Nelson.
- Translocation of polymers through nanopores with diffusion and drift, M. Wanunu, **B. Chakrabarti**, J. Math e, D. R. Nelson and A. Meller.
- Stochastic chromosome dynamics as a probe of the mitotic apparatus and associated regulatory networks, David Lubin, **B. Chakrabarti**, and Alex J. Levine.
- Co-operative unfolding of protein domains, B. Chakrabarti, T. B. Liverpool, A. J. Levine, and D. J. Brockwell.
- Rheological Chaos of orientable fluids, **B. Chakrabarti**, International Journal of Modern Physics B (invited article in preparation).

## **Teaching Experience**

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- Teaching Assistant: Advanced Statistical Physics, Indian Institute of Science, Bangalore, India (Fall 2000).
- Teaching Assistant: Advanced Condensed Matter Physics, Indian Institute of Science, Bangalore, India. (Fall 1999).
- Teaching Assistant: Mathematical Methods of Physics, Indian Institute of Science, Bangalore, India. (Fall 1998).

*Duties involved grading assignments and holding tutorial sessions.*

## **Academic References**

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Prof. David R. Nelson  
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## **Presentations**

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### **Invited talks**

- *Nonlinear elasticity of an  $\alpha$  helical polypeptide*, Clarke University, Worcester, MA, USA (April 2004).
- *Dynamical phase transition and coarsening in surface growth*, Laboratoire de Physique Theorique et Modeles Statistiques, Orsay, France (Mar 2002).
- *Dynamical phase transition and coarsening in surface growth*, Laboratoire Physique Quantique Universit Paul Sabatier, Toulouse, France (Mar 2002).
- *Dynamical phase transition and coarsening in surface growth*, International Conference on Models of Epitaxial Crystal Growth, Max Planck Institute for Complex Systems, Dresden, Germany (Feb 2002).

### **Contributed talks**

- *Spatiotemporal rheological chaos in a sheared nematic fluid*, 22nd IUPAP International Conference on Statistical Physics, STATPHYS 22, Indian Institute of Science, Bangalore, India (Jul 2004).
- *Nonlinear elasticity of an  $\alpha$  helical domain* Meeting of the American Physical Society, Montreal, Canada (Mar 2004).
- *Mound formation and coarsening in epitaxial thin film growth*, Meeting of the American Physical Society, Montreal, Canada (Mar 2004).
- *Spatiotemporal rheochaos in nematic hydrodynamics*, 18th New England Complex Fluids meeting, Brown University, Providence, RI, USA (Mar 2004).
- *Nonlinear elasticity of  $\alpha$  helical domains*, 17th New England Complex Fluids meeting, Harvard University, Cambridge, MA, USA (Dec 2003).
- *Instabilities coarsening and chaos in driven systems: Growing interfaces and sheared wormlike micelles*, Greater Boston Area Statistical Mechanics meeting, Brandeis University, Waltham, MA, USA (Oct 2003).

### **Posters**

- *Mound formation and coarsening in surface growth*, 22<sup>nd</sup> IUPAP International Conference on Statistical Physics, STATPHYS 22, Indian Institute of Science, Bangalore, India (Jul 2004).
- *Nonlinear elasticity of  $\alpha$  helical domains*, 22nd IUPAP International Conference on Statistical Physics, STATPHYS 22, Indian Institute of Science, Bangalore, India.
- *Dynamical phase transition in surface growth*, International Conference on Statistical Physics, STATPHYS - KOLKATA IV, S. N. Bose National Center for Basic Sciences and Indian Association for Cultivation of Science, Calcutta, India (Jan 2002).
- *Dynamical phase transition in surface growth*, Slow dynamics and glass transition, Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore, India (Jan 2002).
- *Dynamical phase transition in surface growth*, India and Abroad: A Conference on Condensed Matter Physics, Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore, India (Jan 2002).
- *Dynamical phase transition in surface growth*, 21st IUPAP International Conference on Statistical Physics, STATPHYS 21, Cancun, Mexico (Jul 2001).
- *Dynamical phase transition in surface growth*, VIII Latin American Workshop on Nonlinear Phenomena: Extended and Out of Equilibrium Systems, Cocoyoc, Mexico (Jul 2001).
- *Crack propagation and crack surface roughness*, International Conference: "STATPHYS Calcutta - III", S. N. Bose National Center for Basic Sciences, Calcutta, India (Jan 1999).

## **Professional Association Memberships**

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- American Physical Society
- Referee for : Europhysics Letters, Physical Review Letters, Physical Review E.