

CURRICULUM VITAE

Name: Sudipto Muhuri

Designation: Assistant Professor

Contact Information :

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Current Position:

- Assistant Professor, Dept. of Physics, Savitribai Phule Pune University, India (2013 onwards-)

Employment held earlier:

- Assistant Professor, Dept. of Physics, BITS , Hyderabad, India (2012-2013)
- Post-Doc, Condensed Matter Theory Group, Institute of Physics, Bhubaneswar, India (2010-2012)
- Post-Doc, Theoretical Physics Division, Universitat des Saarlandes, Saarbrucken, Germany (2009-2010) (**With Prof. Karsten Kruse**)
- Post-Doc, Department of Fundamental Physics, Universitat de Barcelona, Barcelona, Spain (2007-2009)(**With Prof. Ignacio Pagonabarraga**)

Ph.D:

- Raman Research Institute, Bangalore, India (2000-2007))
Thesis Title :‘**Rheology and Transport in Active and Passive Filaments**’
(**With Prof. Madan Rao**)

Education:

- M.Tech (Materials Science), IIT Bombay, Mumbai, India
- M.Sc (Physics), Dept. of Physics, Pune University, Pune, India
- B.Sc (Physics), Presidency College, Calcutta, India

Publication List

- [1] Bidirectional motion of filaments: Role of motor proteins and passive cross linkers, Subhadip Ghosh, V N S Pradeep, **Sudipto Muhuri**, Ignacio Pagonabarraga and Debasish Chaudhuri.
Soft Matter **13**, 7129 (2017).
- [2] Driven transport on open filaments with interfilament switching processes, Subhadip Ghosh, Ignacio Pagonabarraga, and **Sudipto Muhuri**,
Phys. Rev. E **95**, 022417 (2017).
- [3] Catch bond mechanism in Dynein motor driven collective transport, Anil Nair, Sameep Chandel, Mithun K Mitra, **Sudipto Muhuri** and Abhishek Chaudhuri.
Phys. Rev. E **94**, 032403 (2016)
- [4] Mechanical stability of bipolar spindle assembly, Paolo Margaretti and **Sudipto Muhuri**.
EPL **115**, 28001 (2016)
- [5] Collective transport of weakly interacting molecular motors with Langmuir kinetics, Sameep Chandel, Abhishek Chaudhuri and **Sudipto Muhuri**.
EPL **110**, 18002 (2015).
- [6] Jamming transition in a driven lattice gas, **Sudipto Muhuri**.
EPL **106**, 28001 (2014).
- [7] Scale-invariant density profiles of a dynamically extending TASEP, **Sudipto Muhuri**.
EPL **101**, 38001 (2013).

- [8] Intrinsic oscillations of polymerizing antiparallel microtubules in a motor bath, **Sudipto Muhuri**, Ignacio Pagonabarraga and Jaume Casademunt. **EPL 98, 68005 (2012)**. (Selected as Editors choice for EPL 2012).
- [9] Phase segregation and transport in a two species multi-lane system, **Sudipto Muhuri** and Ignacio Pagonabarraga. **J.Stat.Mech, P11011 (2011)**.
- [10] Bidirectional transport in a multispecies TASEP model, **Sudipto Muhuri**, Lenin Shagolsem and Madan Rao. **Phys. Rev. E 84, 031921 (2011)**.
- [11] Lattice gas model for active vesicle transport by molecular motors with opposite polarities, **Sudipto Muhuri**, Ignacio Pagonabarraga. **Phys. Rev. E 82, 021925 (2010)**.
- [12] ‘Sequence’ dependent elasticity and local stiffness of a random heteropolymer, **Sudipto Muhuri** and Madan Rao. **J.Stat.Mech , P02005 (2010)**.
- [13] Collective vesicle transport on biofilaments carried by competing motors, **Sudipto Muhuri**, Ignacio Pagonabarraga. **EPL 84, 58009 (2008)**.
- [14] Shear flow induced isotropic to nematic transition in a suspension of active filaments, **Sudipto Muhuri**, Madan Rao and Sriram Ramaswamy. **EPL 78, 48002 (2007)**.

Sponsored research project

- **Project title:** A Theoretical Investigation of the Catch Bond in Dynein: Implications for Intracellular Processes, SERB Extra mural Research Funding, DST, Project No: EMR/2017/001335 (Approved). Principal Investigator: Sudipto Muhuri, Co-Principal Investigator: Mithun Mitra, IIT Bombay.
- **Project title:** Molecular Motor Driven Centrosomal Microtubule Motility: Mechanics and Spatio-temporal Organization, Department of Biotechnology (DBT), India, under Rapid grant for young investigators (RGYI) for 2011-12. Project No. BT/PR6715/GBD/27/463/2012. Co-Principal Investigator: Sudipto Muhuri.

Teaching Experience

I have taught M.Sc (Physics) courses for 9 semesters and 2 semesters of courses for undergraduate students. Apart from that I have also taught M.Phil courses. I have also been involved in designing of M.Sc syllabus for the courses of Classical Mechanics, and Soft Condensed Matter Physics.

Core Courses for M.Sc : Classical Mechanics, Statistical Mechanics, and Basic Computational and numerical Methods

Specialization Course for M.Sc: Soft Condensed Matter Physics

Course for Undergraduate program: Mechanics, Basic Physics Laboratory

Course for M.Phil: Classical Mechanics

Research Guidance:

M.Phil : 1 student

M.Sc project : 5 students

Statement of Research

The underlying purpose of current my research work is to theoretically study driven phenomenon. In particular I am interested in driven cellular processes with the focus being on the interplay of chemical kinetics with the mechanics, rheology and transport in cellular filaments. In this regard, I have taken recourse to phenomenological modelling approach, drawing upon techniques of non-equilibrium and equilibrium statistical mechanics, combined with numerical techniques such as Monte Carlo simulations. Further I envisage my research to be in close collaboration with experimental groups working in this area.

The thrust of my current research interests can be classified under following categories:

(A) Statistical Mechanics of driven system

- Dynamics, phases and nature of phase transitions.
- Condensation phenomenon in driven systems.
- Growth processes.

(B) Role of motor-filament complexes in structural aspects within cell

- Stability and Oscillations in treadmilling motor-filament complexes
- Centrosome Positioning in Cell
- Cytoskeletal Dynamics
- Mesoscopic description of treadmilling filaments
- Rheology and mechanical response of filament structure to mechanical stresses.

(C) Understanding the physical mechanisms responsible for intra-cellular transport

- Single particle modeling of transport of individual cargo(vesicle, organelles)
- Collective description : Role of multiple tracks for transport
- Coupling of transport to dynamics of tracks, for i.e; Growth of Fungal Hyphae
- Transport on filament networks : Effect of junctions and branching on transport