

# Rajesh Singh

## Curriculum Vitae

The Institute of Mathematical Sciences

Chennai 600113, India

+919444985120

+91-44-22543-116

rsingh@imsc.res.in

rajeshrinet.github.io

### Present Position

- 2012- Ph.D. student in Physics at The Institute of Mathematical Sciences, Chennai, India  
Supervisor Professor Ronojoy Adhikari
- Description Currently, I am working in soft condensed matter physics. In particular, my work involves the study of hydrodynamic interactions in systems of active colloids. We use the boundary integral formulation of the Stokes equation to analytically obtain the equations of motion of these colloids. We then use these equations of motion to perform computer simulations of active colloids in various geometries. We find excellent agreements of our theory with experiments on synthetic active colloids and microorganisms.

### Education

- 2010–12 M. Sc. Physics, Indian Institute of Technology Kanpur, India, *CPI* – 8.5/10  
Master thesis: Design and Study of Erbium Doped Fiber Ring Laser
- 2007–10 B. Sc. (Honours) Physics, Hindu College, University of Delhi, India, *Percentage* – 79

### Publications

- 2016 Universal hydrodynamic mechanisms for crystallization in active colloidal suspensions  
Rajesh Singh and R. Adhikari.  
*Phys. Rev. Lett.* 117, 228002 (2016)
- 2016 Traction relations for active colloids and their application  
Rajesh Singh and R. Adhikari.  
*arXiv preprint arXiv:1603.05735*
- 2016 Fast Bayesian inference of optical trap stiffness and particle diffusion  
S. Bera, S. Paul, Rajesh Singh, D. Ghosh, A. Kundu, A. Banerjee, R. Adhikari  
*arXiv preprint arXiv:1610.00315*
- 2015 Many-body microhydrodynamics of colloidal particles with active boundary layers  
Rajesh Singh, Somdeb Ghose, and R. Adhikari.  
*J. Stat. Mech.* (2015) P06017
- 2012 Phase-plane analysis of driven multi-lane exclusion models  
Vandana Yadav, Rajesh Singh and Sutapa Mukherji.  
*J. Stat. Mech.* (2012) P04004

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## Software

- PyStokes PyStokes is a Cython library for computing Stokes flows produced by spheres in unbounded, wall-bounded and periodic geometries. Read more on <https://github.com/rajeshrinet/pystokes>.
- PyBISP PyBISP is a pure Python package for Bayesian Inference of Stochastic Processes. Read more on <https://github.com/ronojoy/pybisp>.

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## Work experience

- 2016 Teaching assistant: Statistical physics - I
- 2015 Teaching assistant: Statistical physics - II
- 2015 Teaching assistant: Statistical physics - I
- 2015 Volunteer as student organiser in Soft Matter Young Investigators Meetings - III
- 2015 Volunteer as student organiser in Soft Matter Young Investigators Meetings - I and II
- 2014 Teaching assistant: Classical field theory, Jan-May
- 2014 Organised students seminars - Soft condensed matter physics : Jul 2013 - Dec 2014
- 2014 Organised students seminars - Python programming for sciences : Jan-May

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## Other qualifications

- 2012 JEST (Joint entrance screening test for PhD in India): All India Rank - 6
- 2011 CSIR Scholarship in Physics, JOINT CSIR-UGC: All India Rank - 25.
- 2010 JAM - 2010 for admissions in IITs for M.Sc. (Physics): All India Rank - 20.
- 2010 National top 1% candidate at National Graduate Physics Examination
- 2009 First prize in "Kabaad se juggad" event in National Science Fest, St. Stephens College, University of Delhi

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## Computer skills

- Operating systems Linux, Microsoft Windows, Mac OS X
- Programming Python, Cython, C/C++, Matlab, Mathematica, Julia, Fortran

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## Talks Presented

- 2016 Universal hydrodynamic mechanisms for crystallization in active colloidal suspensions, 25 May 2016, IASBS-ICTP School on Active Matter and Chemotaxis, Zanzan, Iran
- 2016 Motility-induced phase separation, 12 Jul 2016 The Institute of Mathematical Sciences, Chennai
- 2016 High performance computing, 5 Feb 2016, The Institute of Mathematical Sciences, Chennai
- 2015 Many-body microhydrodynamics of colloidal particles with active boundary layers, International Conference on Discrete Simulation of Fluid Dynamics, DSFD-2015, Edinburgh, 13-17 July 2015

- 2015 Many-body microhydrodynamics of colloidal particles with active boundary layers, 9 July 2015, University of Oxford.
- 2015 Many-body microhydrodynamics of colloidal particles with active boundary layers, 6 July 2015, University of Durham
- 2015 PyStokes, 31 January 2015, Chennai Python Users Group

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## Conferences and Workshops

- 2016 IASBS-ICTP School on Active Matter and Chemotaxis, Zanzan, Iran, 14-25 May 2016
- 2016 International Complex Fluids Conference (CompFlu-2016), Pune, India, 2-4 January 2016
- 2015 International Conference on Discrete Simulation of Fluid Dynamics, DSFD-2015, Edinburgh, UK, 13-17 July 2015
- 2015 Soft Matter Young Investigators Meeting, Puducherry, India, 17-20 December 2015
- 2014 Eighth Symposium on Complex Fluids - JNCASR Bangalore, India, 22-24 December 2014
- 2014 Soft Matter Young Investigators Meeting, Puducherry, India, 5-7 January 2014
- 2013 SERB School and Symposium on Rheology of Complex Fluids - IIT Delhi, India, 16-20 December 2013
- 2013 4th RRI school on Statistical Physics - RRI Bangalore, India. 01-13 April 2013

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## Reference

Dr. Ronojoy Adhikari  
Professor  
The Institute of Mathematical Sciences  
Chennai 600113, India  
Webpage: <https://www.imsc.res.in/users/rjoy>  
Email: [rjoy@imsc.res.in](mailto:rjoy@imsc.res.in)