

Assistant Professor

Department of Physics

Indian Institute of Technology (IIT) Gandhinagar, Gujarat, INDIA

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**Research Interests**

- Colloidal Self-assembly
- Flow Behavior of Colloidal Suspensions (Microfluidics)
- Structural Glass Transition
- Particle Synthesis: Simple and Complex Colloids
- Dynamics of Complex Colloids
- Instrumentation

**Work Experience**

Joining- 01/2021	Assistant Professor, Department of Physics Indian Institute of Technology (IIT) Gandhinagar, Gujarat
08/2017 – 12/2020	Post-doctoral Researcher, Department of Physics and Astronomy University of Pennsylvania (UPenn), Philadelphia

**Education**

2013 – 2017	Ph.D.	Chemistry and Physics of Materials Unit, Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, INDIA Thesis Title: Exploiting Shape Sensitive Interactions in Colloidal Suspensions- From Directed Self-assembly to the Structural Glass Transition <b><u>Best Ph.D. Thesis Award (Physical Sciences)</u></b>
2010 – 2013	M.S.	Chemistry and Physics of Materials Unit, Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, INDIA Thesis Title: Reentrant Glass Transition in Suspensions of Colloidal Ellipsoids <b><u>Best M.S. Thesis Award (Material Science)</u></b>
2007 – 2010	B.Sc.	Hindu College, University of Delhi

**Awards and Grants**

2017	Best Ph.D. Thesis Award in Physical Science, JNCASR Bangalore
2016	Travel grant from CICS, Chennai to attend STATPHYS 26 Lyon, France
2013	Bapu Narayanaswamy Prize for the best M.S. Thesis, JNCASR Bangalore
2010	Placed among National top 25 students of National Graduate Physics Examinations

**Research Publications**

- X. Ma, **Chandan K. Mishra**, P. Habdas, M. Gratale, and A. G. Yodh, *Reentrant Glass Transition and Cooperative Dynamics in Quasi-Two-Dimensional Attractive Colloidal Suspensions*, [Manuscript in preparation, 2020](#).

- Manodeep Mondal, **Chandan K. Mishra**, R. Banerjee, S. Narasimhan A. K. Sood and Rajesh Ganapathy, *Self-organised Strain-relief Patterns as Templates for Guiding Crystal Growth in Colloidal Heteroepitaxy*, [Science Advances 6\(10\), eaay8418 \(2020\)](#).
- **Chandan K. Mishra**, X. Ma, P. Habdas, K. B. Aptowicz and A. G. Yodh, *Correlations Between Short- and Long-time Relaxation in Colloidal Supercooled Liquids and Glasses*, [Phys. Rev. E 100\(2\), 020603\(R\) \(2019\)](#).
- Y. Lia, **Chandan K. Mishra**, Z. Sun, K. Zhao, T. G. Mason, Rajesh Ganapathy, and M. P. Ciamarra, *Long-wavelength fluctuations and anomalous dynamics in two-dimensional liquids*, [Proc. Natl. Acad. Sci. U.S.A. 116\(46\), 22977 \(2019\)](#).

**\*\* Media Coverage (Popular Mechanics): Scientists Solve 50-Year-Old Mechanics Problem**

**\*\*Media Coverage (Featured in Science Daily, Nanowerk, Eureka Alert, PhysOrg) Physicists prove that 2D and 3D liquids are fundamentally different.**

- **Chandan K. Mishra**, P. Habdas and A. G. Yodh, *Dynamic Heterogeneities in Colloidal Supercooled Liquids: Experimental Tests of Inhomogeneous Mode Coupling Theory*, [J. Phys. Chem. B 123\(24\), 5181 \(2019\)](#).
- **Chandan K. Mishra**, A. K. Sood and Rajesh Ganapathy, *Site-Specific Colloidal Crystal Nucleation by Template-enhanced Particle Transport*, [Proc. Natl. Acad. Sci. U.S.A. 113\(43\), 12094 \(2016\)](#).

**\*\* Media Coverage (The Hindu): Bengaluru researchers mimic nature to produce richer colour.**

- **Chandan K. Mishra** and Rajesh Ganapathy, *Shape of Dynamical Heterogeneities and Fractional Stokes-Einstein and Stokes-Einstein-Debye Relations in Quasi-Two-Dimensional Suspensions of Colloidal Ellipsoids*, [Phys. Rev. Lett. 114, 198302 \(2015\)](#).
- **Chandan K. Mishra**, Hima K. Nagamanasa, Rajesh Ganapathy, A. K. Sood and Shreyas Gokhale, *Dynamical Facilitation Governs Glassy Dynamics in Suspensions of Colloidal Ellipsoids*, [Proc. Natl. Acad. Sci. U.S.A. 111\(43\), 15362 \(2014\)](#).

**\*\* Media Coverage (Deccan Herald): Inside the obscure world of glass.**

**\*\* Media Coverage (The Telegraph): 'Rugby ball' peep into glass.**

- **Chandan K. Mishra**, Amritha Rangarajan and Rajesh Ganapathy, *Two-Step Glass Transition Induced by Attractive Interactions in Quasi-two-dimensional Suspensions of Ellipsoidal Particles*, [Phys. Rev. Lett. 110, 188301 \(2013\)](#).

## **Experimental Skills**

- Optical microscopy, Confocal microscopy, and Holographic optical tweezers
- Soft Lithography: Fabrication of templates with complex surface topography
- Colloid Synthesis- temperature tuneable colloids (PNIPAM), Complex Colloids- Ellipsoids, colloidal clusters: dimers, trimers, tetramers etc.
- Photolithography
- Microfluidics
- Intensive Programming in Matlab and image processing using MATLAB and ImageJ
- Basic working knowledge in Python and Layout Editor

## **Talks and Posters**

- 36<sup>th</sup> American Society for Gravitational and Space Research (ASGSR) Meeting 2020, Virtual. (Talk)
- Interdisciplinary Research Group 1, Laboratory for Research on Structure of Matter (LRSM), University of Pennsylvania, USA, 2020. (Talk)
- Invited Talk, Department of Physics, Indian Institute Technology Gandhinagar, India, 2020.
- Invited Talk, Department of Physics, Indian Institute Technology Madras Chennai, India, 2020.
- Invited Talk, Department of Chemical Engineering, Indian Institute Technology Guwahati, India, 2020.
- Invited Talk, Department of Physics, Indian Institute Technology, Guwahati, India, 2020.
- Invited Talk, Centre for Nano and Soft Matter Sciences, Bengaluru, India, 2019.
- Invited Talk, School of Physical Sciences, National Institute of Science Education and Research (NISER), Bhubaneswar, India, 2019.
- International Complex Fluids Conference (COMPFLU), 2019, IISER Bhopal, India. (Talk)
- Invited Talk, Department of Physics and Astronomy, University of Delhi, Delhi, India, 2019.
- 35<sup>th</sup> American Society for Gravitational and Space Research (ASGSR) Meeting 2019, Denver, USA. (Talk)
- American Physics Society, APS March Meeting 2019, Boston, USA. (Talk)
- Invited Talk JNCASR Bengaluru, 2019.
- International Complex Fluids Conference (COMPFLU), 2018, IIT Roorkee, India. (Talk)
- 45<sup>th</sup> Annual NATAS Conference, 2018, University of Pennsylvania, Philadelphia, USA. (Talk)
- American Physics Society, APS March Meeting 2018, Los Angeles, USA. (Talk)
- Interdisciplinary Research Group 1, Laboratory for Research on Structure of Matter (LRSM), University of Pennsylvania, USA, 2018. (Talk)
- Twelfth JNC Research Conference on Chemistry of Materials, 2016, Trivandrum, India. (Talk)
- 26<sup>th</sup> IUPAP International Conference on Statistical Physics, STATPHYS 26, 2016, Lyon, France. (Talk)
- Discussion Meeting on Emergent Phenomenon in Soft and Active Matter (EPSAM), 2016, JNCASR, Bangalore, India. (Talk)
- International Complex Fluids Conference (COMPFLU), 2016, IISER Pune, India. (Poster)
- Conference on Growing Length Scale Phenomena in condensed matter physics, 2015, JNCASR, Bangalore, India. (Poster)
- Eleventh JNC Research Conference on Chemistry of Materials, 2016, Alleppey, India. (Poster)
- New Colloids, Discussion Meeting, 2015, RRI, Bangalore, India. (Poster)
- Discussion Meeting on Glass Formers and Glasses, 2015, JNCASR, Bangalore, India. (Poster)
- Annual Faculty Meet, 2015, JNCASR, Bangalore India. (Talk)
- Tenth JNC Research Conference on Chemistry of Materials, 2014, Trivandrum, India. (Poster)
- Eighth JNC Research Conference on Chemistry of Materials, 2012, Trivandrum, India. (Poster)

## **Workshops, Schools & Conferences Attended**

- Recent Topics in Statistical Mechanics, School of Physical Sciences, National Institute of Science Education and Research (NISER), Bhubaneswar, 2019, India.
- Course in College Teaching, Fall 2019, Centre for Teaching and Learning (CTL), University of Pennsylvania, USA.
- Introduction to Microfluidics Technology, Brandeis MRSEC Summer Course 2018, Brandeis University, Massachusetts, USA.
- Commonwealth Science Conference, 2014, Bangalore, India.

- Winter school on Frontiers of Materials Science, 2012, JNCASR, Bangalore, India.
- Workshop for Undergraduate Student of Delhi University on Solid State Material and Devices, 2009, Solid State Physics Laboratory (SSPL), Delhi.

### **Academic Achievements**

- Part of NASA science team, Advanced Colloid Experiment (ACE) T-4, to explore the order-to-disorder transition in microgravity (<https://www.grc.nasa.gov/space/iss-research/iss-fcf/fir/lmm/ace/#acet4>).
- Best Ph.D. Thesis Award in Physical Science, JNCASR 2017.
- Bapu Narayanaswamy Prize for the best M.S. Thesis, JNCASR 2013.
- Travel grant from CICS, Chennai to attend 26<sup>th</sup> IUPAP International Conference on Statistical Physics, STATPHYS 26, 2016, Lyon, France.
- Best Poster award at the Eighth JNC Research Conference on Chemistry of Materials, 2012, Trivandrum, India.
- Qualified Joint Admissions to M.Sc. (JAM), 2010, Organized by IIT, Madras.
- Qualified Joint Entrance Screening Test (JEST), 2010.
- Placed among National top 25 students of National Graduate Physics Examinations, 2010, Organized by Indian Association of Physics Teachers (IAPT).
- Qualified Integrated PhD Entrance Examinations, 2010, of leading Universities like IISc, Bangalore, JNCASR, Bangalore, IIA, Bangalore, IISERs etc.
- Placed in Top 10 Students in Physics (Honors), 2010, in Under Graduation by University of Delhi, India.
- Meritorious Student Grant (Science Stream) in the academic years of 2007-08 and 2008-09 by University of Delhi, India.

### **Student Mentored**

- William Marshall- REU Summer Student (2019) at University of Pennsylvania (Investigating Colloidal Crystals and Glass Dynamics)
- Michio Tanaka- Graduate Student, Yodh Group (2018 - ), University of Pennsylvania (Buckling of thin bilayer films)

### **Science Outreach**

- Philly Materials Science and Engineering Day (Exhibitor: Surprising Behaviour of Soft Matter), 2018, 2019, and 2020.
- Philadelphia Science Festival 2018 (Exhibitor: Surprising Behaviour of Soft Matter).

### **Academic References**

1. Prof. Arjun Yodh (Post-doc Advisor)  
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International Centre for Materials Science &  
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3. Prof. A. K. Sood, FRS (Collaborator)  
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