

Curriculum Vitae: Jalim Singh, Ph.D.

CONTACT INFORMATION Light Hall, Vanderbilt University Medical Center
Vanderbilt University, 2215 Garland Ave, Nashville
TN 37232, USA.
jalim.singh@vanderbilt.edu, singhjalohsu@gmail.com
Phone: +1-971-427-0967
Google Scholar, Personal Webpage, GitHub

RESEARCH INTERESTS

- Predictive modeling of cellular processes using machine learning algorithms.
- *De novo* protein design strategies using ML/AI.
- Liquid-liquid phase separation within living cells.

SOFTWARE SKILLS

- **Programming Languages:** Python, C, C++, MATLAB, LaTeX, BASH Scripting.
- OpenMP parallelization in C/C++.
- **Software tools:** Numpy, Pandas, UMAP, Matplotlib, Seaborn, TensorFlow, PyTorch, Scikit-learn, LAMMPS, GROMACS.
- **Data Analysis:** Multimodal data integration, Machine learning, Deep learning, Statistical Physics.
- **Technical skills:** Image processing.
- **Simulation Skills:** Molecular Dynamics, Monte Carlo, and Brownian Dynamics Simulations.

OTHER SKILLS

- High Performance Computing cluster management, Scientific collaborations, communications, and writing.
- Member of the inner organizing committee in a conference on “Recent Topics in Statistical Mechanics”, held at National Institute of Science Education and Research Bhubaneswar, India in December 2019.

EDUCATION

Ph.D., School of Basic Sciences, Indian Institute of Technology Mandi, Kamand, Himachal Pradesh, India, *Degree awarded:* March 19, 2018

- Thesis Topic: *Microscopic structure and dynamics of glass transition under phase separation in a model linear polymer melt*, [Web link](#)
- Advisor: Dr. Prasanth P. Jose, Ph.D.
- CGPA (During course work): 9.0

M.Sc., Department of Physics, Banaras Hindu University, Varanasi, Uttar Pradesh, India, June 2011

- Project Topic: *Theoretical and Experimental Status of Quark Gluon Plasma*
- Advisor: Prof. C. P. Singh, Ph.D.
- CGPA : 8.16

B.Sc., G. F. College, Shahjahanpur, affiliated to Mahatma Jyotiba Phule Rohilkhand University, Bareilly, Uttar Pradesh, India, May 2008

- Chemistry (Minor)
- Physics and Mathematics (Double Major)
- Percentage : 68 %

RESEARCH EXPERIENCE

Postdoctoral Fellow

October 2024 – present.

Department of Pharmacology and Center for Applied AI
in Protein Dynamics, Vanderbilt University, Nashville TN, USA.
Advisor: Benjamin P. Brown, Ph.D.

Postdoctoral Fellow October 2022 – September 2024.
Department of Biomedical Engineering, School of Medicine
Oregon Health & Science University, Portland
Oregon, USA.
Advisor: Daniel M. Zuckerman, Ph.D.

Visitor June 2022 – September 2022.
School of Physical Sciences
National Institute of Science Education and Research Bhubaneswar
Jatni 752050, Odisha, India
Advisor: A. V. Anil Kumar, Ph.D.

Postdoctoral Fellow January 2021 – April 2022
Central European Institute of Technology (CEITEC)
Masaryk University, Brno, Czech Republic
Advisor: Dr. Robert Vácha, Ph.D.

Postdoctoral Fellow December 2018 – December 2020
School of Physical Sciences
National Institute of Science Education and Research Bhubaneswar
Jatni 752050, Odisha, India
Advisor: A. V. Anil Kumar, Ph.D.

Assistant Professor December 2017 – December 2018
Department of Physics, School of Science
Sandip University, Nashik, Maharashtra, India

LIST OF
PUBLICATIONS

1. **J. Singh**, M. Mustakim and A. V. A. Kumar “Super-Arrhenius diffusion in a binary colloidal mixture at low volume fraction: an effect of depletion interaction due to an asymmetric barrier”, *J. Phys.: Condens. Matter* **33**, 125101 (2021).
2. **J. Singh** and P. P. Jose “Violation of Stokes-Einstein and Stokes-Einstein-Debye relations in polymers at the gas-supercooled liquid coexistence”, *J. Phys.: Condens. Matter* **33**, 055401 (2021).
3. **J. Singh** and A. V. A. Kumar “Phase separation in a two-dimensional binary colloidal mixture by quorum sensing activity”, *Phys. Rev. E* **101**, 022606 (2020).
4. **J. Singh**, D. C. Thakur, and P. P. Jose “Relation between density relaxation and density of the first coordination shell in a supercooled linear polymer melt”, *AIP Conference Proceedings*, **2265**, 030220 (2020).
5. D. C. Thakur, **J. Singh**, and P. P. Jose “Role of mean force field in dynamics of glass forming binary mixture with and without attractive interactions”, *AIP Conference Proceedings*, **2265**, 030224 (2020).
6. **J. Singh** and P. P. Jose “Density dependence of structural and dynamical heterogeneity in a linear polymer melt system”, *AIP Conference Proceedings* **2115**, 030236 (2019).
7. **J. Singh** and P. P. Jose “Heterogeneous dynamics in linear polymer melts near glass transition temperature”. *J. Phys.: Conf. Ser.* **759**, 012018 (2016).

MANUSCRIPT(S)
UNDER REVIEW

1. J. Copperman, I. C. Mclean, S. M. Gross, **J. Singh**, Y. Hwan Chang, D. M. Zuckerman, and L. M. Heiser, “Single-cell morphodynamical trajectories enable prediction of gene expression accompanying cell state change”, [bioRxiv 2024](#).
2. D. C. Thakur, **J. Singh**, A. Varughese, and P. P. Jose, “Relation between local density and density relaxation near glass transition in a glass forming binary mixture”, [arXiv 2021](#).
3. D. C. Thakur, **J. Singh**, and A. V. Anil Kumar, “Phase separation in a binary mixture of sticky spheres”, [arXiv 2024](#)

MANUSCRIPTS IN
PREPARATION

1. **J. Singh**, J. Copperman, and D. M. Zuckerman, “Validations at single-cell level: cell-cycle state predictions from morphodynamic cellular features using machine learning”.
2. **J. Singh**, D. C. Thakur, and A. V. A. Kumar, “Non-monotonic density relaxations and defect dynamics in a two-dimensional glassy active matter”.

PRESENTATIONS

Conferences/Workshops

- Poster & Oral presentation in “Biophysical Society (BPS)” meeting, Philadelphia, Pennsylvania, USA February 2024.
- Oral presentation in “Recent Topics in Statistical Mechanics”, National Institute of Science Education and Research, Bhubaneswar, India December 2019
- Oral and poster presentation in “Department of Atomic Energy Solid State Physics Symposium-2019”, organized by Bhabha Atomic Research Center (BARC) Mumbai at Indian Institute of Technology, Jodhpur, India December 2019
- Poster presentation in “Recent Advances in Dynamics at the Interface of Chemistry and Biology”, Indian Institute of Science Bangalore, India February 2019
- Poster presentation in “Department of Atomic Energy Solid State Physics Symposium-2018”, organized by Bhabha Atomic Research Center (BARC) Mumbai at Guru Jambheshwar University of Science and Technology, Hisar, India December 2018
- Attended a two week faculty development programme on ”Entrepreneurship Development”, Sandip Institute of Technology and Research Center, Nashik, India December 2017
- Poster presentation in “Dynamics of glass forming liquids: will theory and experiment ever meet?”, Glass and Time Research, Roskilde University, Roskilde, Denmark April 2017
- Poster and Oral presentation in “Complex Fluids2016”, Indian Institute of Information Technology, Hyderabad, India December 2016
- Poster presentation in “Complex Fluids2016”, Indian Institute of Science Education and Research, Pune, India January 2016
- Poster presentation in “Conference on Computational Physics”, Indian Institute of Technology Guwahati, India December 2015
- Attended “School on Statistical Physics”, Raman Research Institute, Bangalore, India April 2013
- Attended “Basic Training Program in Mathematics”, Christ Church College Kanpur and Indian Institute of Technology Kanpur, India September 2007

Indian Institute of Technology Mandi, India

- Oral presentation in “Research Fair” March 2017
- Poster presentation in “Research Fair” 2016, 2015, 2014, 2013

TEACHING
EXPERIENCE

Assistant Professor

December 2017 – December 2018

Department of Physics, School of Science
Sandip University, Nashik, Maharashtra, India

Courses taught, August - December 2018

Theory: Classical Mechanics - M.Sc.

Theory: Nuclear Physics - M.Sc.

Theory: Thermodynamics and Statistical Mechanics - B.Sc.

U.G. Lab: Solid State Physics and Thermodynamics - B.Sc.

P.G. Lab: Mathematical Physics and Electrodynamics - M.Sc.

Courses taught, January - May 2018

Theory: Statistical Mechanics - M.Sc.

Computational Lab: Classical and Quantum Mechanics using SciLab - B.Sc.

Teaching Assistant

Summer 2011–2014

Indian Institute of Technology Mandi, India

- Foundations of Electrodynamics
- Introduction to Molecular Simulations
- Advanced Statistical Mechanics
- Computation for Engineers

AWARDS/HONOURS • Best oral presentation in “Research Fair 2017” held at Indian Institute of Technology Mandi, India.