Pranav V. Rao

PERSONAL INFORMATION

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EDUCATION

University of Illinois, Urbana-Champaign, **Expected Fall 2022**
PhD Candidate in Physics; 3.85 GPA; Advisor: Barry Bradlyn
Relevant Coursework: Quantum Mechanics II, Representation Learning (Algorithms and Models), Quantum Field Theory

University of Michigan, Ann Arbor **August 2012 - May 2016**
B.S. in Honors Physics and Mathematics; 3.82 GPA
Relevant Coursework: Graduate-level probability, Computational physics, Programming and Intro to Data Structures

RESEARCH EXPERIENCE

Institute for Condensed Matter Theory (ICMT) **Jan 2018 - Present**
Research Assistant to Barry Bradlyn

- Conducted original research in topological quantum matter, a potential platform for quantum computation, specifically looking at responses to strain.
- Wrote several articles for publication in competitive peer-reviewed journals.
- Used computational and analytic techniques to analyze theoretical models of topological materials, making experimentally verifiable predictions of novel effects.
- Presented and communicated research developments and current topics to the Bradlyn group on a frequent basis, and helped organize the ICMT Journal Club.

Institute for Genomic Biology (IGB) **Aug 2017 - Jan 2018**
Rotation with Song Lab

- Spent a rotation in the group of Professor Jun Song, using machine learning to analyze large and complex genomic datasets to study various cancers
- Took courses in modern machine learning and bioinformatics.
- Presented papers in neural network applications for genomics to the group journal club, and began working on a multi-view clustering project using neural networks to classify subjects based on several forms of genomic data.

Michigan Center for Theoretical Physics (MCTP) **2013 - 2016**
Research Asistant to James Liu

- Worked on non-relativistic extensions to AdS/CFT with a focus on potential condensed matter applications.

Fields Undergraduate Summer Research Program **Summer 2014**
Summer Research Student - Fields Institute (Toronto, ON)

- Participated in mathematics research in functional analysis at the Fields Institute.

PUBLICATIONS

1. Rao, P. & Bradlyn, B. Hall Viscosity in Quantum Systems with Discrete Symmetry: Point Group and Lattice Anisotropy. *Phys. Rev. X* **10,** 021005. https://link.aps.org/doi/10.1103/PhysRevX.10.021005 (2 Apr. 2020).

2. Robredo, I., Rao, P., *et al.* A new cubic Hall viscosity in three-dimensional topological semimetals. In review at Phys. Rev. Lett. arXiv: `2102.02226 [cond-mat.mes-hall]` (2021).
3. Rao, P. & Bradlyn, B. Boundary effects of Hall Viscosity (In preparation).
4. Bradlyn, B. & Rao, P. Hall Viscosity and Spin Density for Free Fermion Systems (In preparation).
5. Liu, J. T. & Rao, P. V. Seeing bulk perturbations in Lifshitz holography. arXiv: `1703.10676 [hep-th]` (2017).

Press

Illinois Quantum Information Science and Technology Center (IQUIST) Newsroom: `https://iquist.illinois.edu/17335`

Selected Talks & Posters

"Hall viscosity, anisotropy & internal angular momentum"
APS March Meeting
Virtual (March, 2021)

Poster: "Hall viscosity in 2D systems with anisotropy"
Aspen Conference Low Dimensional Solids in Hard and Soft Condensed Matter
Aspen, CO (February, 2020)

"Geometric transport and topology"
Institute for Condensed Matter Theory Journal Club
Urbana, IL (February, 2019)

"Tensor networks for simulating topological matter"
Bradlyn Group Journal Club
Virtual (July, 2021)

"Quasicrystals and topology"
Bradlyn Group Journal Club
Virtual (June, 2021)

Outreach: "An accesible introduction to gravity"
STEM Society Science Saturday
Ann Arbor Michigan (November, 2015)

Workshops, Schools, Conferences

Fourth Quantum Computing Tutorial – Argonne National Lab, Virtual, (14-19 June 2021)

Quantum Information and Quantum Entanglement, Urbana, IL (15-19 July 2019)

Illinois Quantum Information Science and Technology Center (IQUIST) Seminars and Young Researcher Seminars, Urbana, IL (Ongoing)

MagLab Winter Theory School 2019, Tallahassee, FL (7-11 January 2019)

The David Pines Symposium on Superconductivity Today and Tomorrow, Urbana, IL (29-30 March 2019)

AJL@80: Challenges in Quantum Foundations, Condensed Matter Physics and Beyond, Urbana, IL (29-31 March 2018)

Applications of AdS/CFT to QCD and condensed matter physics, Montreal, QC (19-23 October 2015)

Skills

Python (incl. Pandas), Qiskit, TensorFlow, Matlab, Mathematica, C++.

Selected Honors

NSF Graduate Research Fellow, **2017-2020**
$46,000/year in stipend and education allowance
Illinois Physics Graduate Travel Award, **2019 & 2020**
Phi Beta Kappa, Alpha of Michigan Chapter, **2016**
Ralph B. Bodine Scholarship, Michigan Physics, **2014-2016**
$10,000/year scholarship for demonstrated academic ability in Physics

Teaching

University of Illinois, Urbana-Champaign, IL

Teaching Assistant, Physics 211: Mechanics **Spring 2021**
Teaching Assistant, Physics 212: Electricity & Magnetism **Fall 2020**
Teaching Assistant, Physics 101: Mechanics & Heat **Spring 2020**
Teaching Assistant, Physics 100: Thinking About Physics **Fall 2020**

University of Michigan, Ann Arbor, MI

Grader, Physics 340: Waves, Heat & Light **Fall 2015**
Grader & Course Assistant, Physics 107: Space, Time & Matter **Fall 2014**
Grader & Course Assistant, Physics 107: Space, Time & Matter **Winter 2015**
Learning Assistant, Physics 140: Introductory Mechanics **Fall 2013**

Service

University of Illinois, Urbana-Champaign, IL

Organizer, ICMT Journal Club **2018 - 2019**
Peer Mentor, Guidance for Physics Students (GPS) **2017 - Present**

University of Michigan, Ann Arbor, MI

Member, STEM Society Science Saturday **2014 - 2016**
(science outreach to underrepresented youth)
Social Chair, Society for Physics Students **2015 - 2016**
Undergrad. Assistant, Problem Roulette **2015 - 2016**
(data-driven attempt to improve teaching of introductory physics classes)