



EDUCATION

2021 – **University of Maryland, Doctor of Philosophy (Physics)**, GPA 4.0/4.0
Advisors: Prof. Alexey Gorshkov and Prof. Victor Galitski
Selected courses: **Quantum Error Correction (Audit)**, **Quantum Algorithms (Audit)**, **Machine Learning for Physicists**, **Topological Quantum Phases of Matter**, **Quantum Many-Body Theory**.
Anticipated graduation date: December 2025 (flexible).

2016 – 2020 **Indian Institute of Science, Bangalore, Bachelor of Science in Physics (Research)**, GPA 9.7/10.0
Thesis Advisor: Prof. Subroto Mukerjee
Selected courses: Quantum Statistical Field Theory, Advanced Mathematical Methods, Condensed Matter Physics 1 & 2, Algorithms and Programming.

RESEARCH & TEACHING EXPERIENCE

2021 – **University of Maryland, Department of Physics, Research Assistant**
Affiliations:

- Joint Quantum Institute (JQI)
- Joint Center for Quantum Information and Computer Science (QIICS)

2021 **University of Maryland, Department of Physics, Teaching Assistant**
TA for General Physics: Electrodynamics, Light, Relativity and Modern Physics course.

2020 **Indian Institute of Science, Bangalore, Project Assistant**
Supervisor: Prof. Subroto Mukerjee. Worked on **quantum simulation** of strongly-correlated spin systems using **Trotter methods** on IBM's cloud quantum computers using **Qiskit**.

2019 **Technical University of Munich, Summer Researcher**, DAAD-WISE scholar
Supervisor: Prof. Sergej Moroz. Resulted in publication [2].

2017 - 2020 **Indian Institute of Science, Bangalore, Undergraduate researcher, KVPY fellow**
► (2019-2020) Supervisor: Prof. Subroto Mukerjee. Resulted in publication [1].
► (2018) Supervisor: Prof. Subroto Mukerjee. Numerical calculation of electromagnetic fields from the topological magneto-electric effect using **Python**.
► (2018) Supervisor: Prof. Manish Jain. **Monte Carlo** simulation of Ising model with long-range interactions using **Python**.
► (2017) Supervisor: Prof. H. R. Krishnamurthy. Implemented quantum algorithms such as Bernstein-Vazirani, Phase estimation, and Grover's algorithm on IBM's cloud quantum computers using **Qiskit**.

RESEARCH PROJECTS

[7] **Breakdown of the thermodynamic limit in quantum spin models** (Manuscript in preparation).

Authors: **Jeet Shah**, Laura Shou, Jeremy Shuler, and Victor Galitski.

Demonstrated that boundary modifications in certain exactly solvable quantum spin and quantum dimer models can induce a drastic phase change in the bulk.

- [6] **Renormalization Group (RG) scheme for field theories on loops** (Manuscript in preparation).
 Authors: **Jeet Shah**^{*}, Gautam Nambiar^{*}, Alexey V. Gorshkov, and Victor Galitski.
 Developed a coarse-graining and rescaling procedure for theories where degrees of freedom reside on extended loops rather than points. Applied this for the $U(1)$ gauge theory in $3 + 1$ dimensions, recovering the confinement-deconfinement transition.
^{*}Equal contribution
- [5] **A quantum monomer-dimer model on Penrose tilings** [[arxiv:2503.15588](#)].
 Authors: **Jeet Shah**, Gautam Nambiar, Alexey V. Gorshkov, and Victor Galitski.
 Investigated monomer confinement and deconfinement in a quantum monomer-dimer model on quasicrystalline Penrose tilings. Computed phase-characterizing correlators at an exactly solvable point using Markov Chain Monte Carlo (in Julia).
- [4] **Quantum spin ice in three-dimensional Rydberg atom arrays** [[PRX 15, 011025 \(2025\)](#)].
 Authors: **Jeet Shah**, Gautam Nambiar, Alexey V. Gorshkov, and Victor Galitski.
 Proposed quantum simulation of a $U(1)$ quantum spin liquid in 3D Rydberg atom arrays. Also proposed correlators to distinguish the spin liquid from ordered phases and developed measurement protocols.
- [3] **Instability of steady-state mixed SPT order to strong-to-weak spontaneous symmetry breaking (SSB)** [[arXiv:2410.12900](#)].
 Authors: **Jeet Shah**, Christopher Fechisin, Yu-Xin Wang, Joseph T. Josue, James D. Watson, Yan-Qi Wang, Brayden Ware, Alexey V. Gorshkov, and Cheng-Ju Lin.
 Analyzed the stability of the mixed-cluster state Symmetry Protected Topological (SPT) phase in open quantum systems under symmetric perturbations. Employed Tensor Network methods with the ITensors library in Julia and used the stim library in Python for Clifford simulations.
- [2] **Gauging the Kitaev Chain** [[SciPost Phys. 10, 148 \(2021\)](#)].
 Authors: Umberto Borla, Ruben Verresen, **Jeet Shah**, and Sergej Moroz.
 Gauged the fermion parity of the Kitaev chain and analyzed the resulting model using Tensor Network methods (TenPy library in Python). Demonstrated that the Higgs phase hosts fermionic Symmetry-Protected Topological (SPT) order distinct from the Kitaev chain.
- [1] **Renormalization Group study of systems with quadratic band touching** [[PRB 103, 195118 \(2021\)](#)].
 Authors: **Jeet Shah**, and Subroto Mukerjee.
 Analyzed perturbative interaction effects in two 2D systems with quadratic band touchings using one-loop renormalization group (RG). Demonstrated an instability towards exciton condensation for repulsive interactions.

POSTERS & TALKS

- **Instability of steady-state mixed SPT order to strong-to-weak spontaneous symmetry breaking**, based on [3]
 2025 – Poster at Quantum Information Processing Conference, Raleigh, North Carolina
 2024 – Poster at the Quantum Leap Career Nexus, UMD
 2024 – Talk at the Friday Quantum Seminar, UMD
 2024 – Poster at the QSim conference, Rhode Island
- **A quantum monomer-dimer model on Penrose tilings**, based on [5].
 2024 – Talk at the Friday Quantum Seminar, UMD.
 2024 – Poster at the Princeton Summer School on Condensed Matter Physics.

- **Quantum spin ice in three-dimensional Rydberg atom arrays**, based on [4].
 2024 – Talk at the Robust Quantum Simulation (RQS) Journal Club.
 2024 – Poster at the Ultra Quantum Matter Annual Meeting at Flatiron institute, New York.
 2023 – Poster at the Conference on Fractionalization and Emergent Gauge Fields in Quantum Matter at ICTP, Italy.
 2023 – Poster and a talk at the APS March meeting.
 2023 – Poster at the RQS Institute Workshop at UMD.
 2022 – Talk at the Friday Quantum Seminar, UMD.

HONORS AND OTHER ACTIVITIES

- 2023 – 2025 Member of the Graduate Student Colloquium Committee
 Every semester the committee invites and hosts a speaker for a colloquium at UMD.
- 2021 Dean's Fellowship (\$5000). Awarded by the Graduate School, UMD.
- 2019 DAAD-WISE scholarship. Awarded by the German Government.
- 2016 – 2020 KVPY scholarship. Awarded by the Indian Government.
- 2016 All India Rank of 149 out of approximately 1,200,000 who appeared for the Joint Entrance Examination (JEE) (Mains) in India.

SKILLS

- Programming Julia, Python, C, C++, Mathematica, Git, Qiskit, Computing on clusters.
- Soft-skills Completed the "Leaders Training Program", "Self-Expression & Leadership Program", "Communication: Access to Power", and "Communication: Power to Create" courses offered by Landmark Education.