Arman Duha

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Ⓢ Google Scholar

Professional Summary

Computational condensed matter physicist specializing in numerical simulations of quantum dynamics in solid-state and atomic, molecular, and optical (AMO) physics. Proficient in leveraging high-performance computing (HPC) clusters and scientific computing tools (Python, Mathematica) to model 2D quantum systems and advance technologies in quantum materials and sensing.

Education

Ph.D. in Physics, Oklahoma State University, Stillwater, OK **Expected May 2025**
Master of Science in Physics, Oklahoma State University, Stillwater, OK May 2022
Bachelor of Science in Physics, University of Dhaka, Dhaka, Bangladesh September 2018

Technical Skills

- **Programming Languages:** Python, Mathematica, C++
- **Quantum Simulation:** Quantum spin systems, 2D Dirac fermions, van der Waals materials
- **Machine Learning:** Symbolic regression
- **Tools:** DFT (SIESTA) molecular dynamics, UCSF ChimeraX, Unix shell scripting, HPC cluster

Professional Experience

Graduate Research Assistant (Atomic, Molecular, and Optical Physics) May 2023 – Present
Co-advisor: Dr. Thomas Bilitewski, Oklahoma State University

- Numerically investigated non-equilibrium spin dynamics using Python for quantum simulation and quantum-enhanced sensing (1st project published in PRA, 2nd project ongoing)

Graduate Research Assistant (Solid-state Physics) June 2020 – Present
Co-advisor: Dr. Mario Borunda, Oklahoma State University

- Performed symbolic regression-based machine learning predictions of threshold displacement energy in materials (preparing manuscript)
- Utilized Mathematica and HPC clusters to simulate quantum transport in two-dimensional Dirac fermions for van der Waals material (published in PRB)
- Simulated efficient perovskite solar cell, funded by NASA Oklahoma EPSCoR (published in Optical Materials)
- Performed molecular dynamics of catalysts for Fischer-Tropsch synthesis using density functional theory (preparing manuscript)

Undergraduate Research (Quantum Mechanics) June 2018 – June 2019
Advisor: Dr. S. Hasibul Hassan Chowdhury, University of Dhaka, Bangladesh

- Calculated gauge-invariant energy spectra in 2-dimensional noncommutative quantum mechanics (published in Annals of Physics)

Publications & Presentations

Selected Journal Articles:

- **Arman Duha**, and Mario Borunda. "Effect of uncorrelated on-site scalar potential and mass disorder on transport of two-dimensional Dirac fermions." Physical Review B 110.9 (2024): 094205.
- **Arman Duha**, and Thomas Bilitewski. "Two-Mode Squeezing in Floquet-Engineered Power-Law Interacting Spin Models." Physical Review A 109, no. 6 (2024): L061304.
- **Arman Duha**, Mario Borunda. "Optimization of a Pb-free all-perovskite tandem solar cell with 30.85% efficiency." Optical Materials 123 (2022): 111891

Presentations: Presented oral talks and posters to represent the group's work on more than ten occasions at international and regional conferences including APS and DAMOP conferences.