

# GIOVANNY ESPITIA

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## EDUCATION

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### The University of Texas at Austin

2024 – Present

Ph.D. in Physics · Theoretical and Computational Condensed Matter Physics

Advisor: Mit H. Naik · Dean's Strategic Fellow — sole recipient in the Department of Physics

### Georgia Institute of Technology

2021 – 2024

B.S. in Physics · Highest Honors

Society of Physics Students · Quantum Computing Association

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## PUBLICATIONS

\* denotes papers where I had major contributions.

### Submitted

1. **G. Espitia**, Seung Hun Lee, et al., Taco flat bands at a magic twist angle in bilayer transition metal dichalcogenides. submitted to PRL, 2025 \*

### In Review

2. L. Frammolino, F.R. Chen, **G. Espitia**, et al., Visualizing electronic structures across 2D semiconductor-semimetal interfaces – on the nature of Schottky contact. Nature (in review), 2025

3. C. Shi, Y. Li, Y. Jiang, Y. Luo, **G. Espitia**, et al., Electron Ptychography Reveals Layer-Resolved Picometer-Scale Relaxation in Large-Angle Moiré. Science (in review), 2025 \*

4. Z. Liu, **G. Espitia**, et al., Giant intervalley exciton absorption in a large twist-angle semiconductor bilayer. Nature (in review), 2025 \*

### Preprints

6. **G. Espitia**, Y.T. Pang, J.C. Gumbart, Protein Structure Prediction Using Deep Reinforcement Learning in the 3D HP Model. arXiv:2412.20329, 2024 \*

7. **G. Espitia**, On the Role of Quantum Computing in Science and Cybersecurity. arXiv:2105.09942, 2021

### Published

8. Z. Liu, Q. Gao, Y. Li, **G. Espitia**, et al., Field-Tunable Valley Coupling in a Dodecagonal Semiconductor Quasicrystal. Nature Physics, 2025

9. M. Prates, I. Durr, J. Park, **G. Espitia**, B. Peterson, High Strain Rate Impact on Carbon Nanostructures Using Molecular Dynamics Simulations. ASME Journal, 2021

### In Preparation

10. M. Dandu, S. Sankar, **G. A. Espitia**, et al., Subnanoscale Visualization of Reconstruction-Driven Moiré Exciton Localization and Delocalization. In preparation, 2025 \*

11. D. S. Kim, H. Hou, **G. Espitia**, et al., Direct visualization of patterned emitters in twisted hexagonal boron nitride. In preparation \*

12. **G. Espitia**, C. Brown, A. Seese, Y. Zhang, PbS Quantum Dot Enabled Infrared Sensors. In preparation

13. **G. Espitia**, Forecasting Chaos in the 2D Kuramoto–Sivashinsky Equation Using Reservoir Convolutional Autoencoders. In preparation

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## AWARDS & FUNDING

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### Antoniewicz Endowed Presidential Fellowship in Condensed Matter Physics

2025

Department of Physics, The University of Texas at Austin

### Dean's Strategic Fellowship, UT Austin Department of Physics

2024–2025

Sole recipient awarded to the Department of Physics

<b>Faculty Honors Award</b> In recognition of academic excellence, Georgia Tech	2021, 2022, 2023, 2024
<b>National Conference of Undergraduate Research Acknowledgment</b> Outstanding undergraduate research	2021, 2022
<b>Accomplished Competitor, University Physics Competition</b>	2021
<b>First-Year Scholar Award</b> In recognition of outstanding undergraduate research	2021
<b>First-Year Research Scholarship, Kennesaw State University</b> One of twenty recipients, Department of Science and Mathematics	2020–2021

## RESEARCH EXPERIENCE

<b>Generative AI Specialist · HFC, Scale AI</b> Data generation for LLM fine-tuning. Advisor: Henry So	Mar – Aug 2025
<b>Research Engineering Intern · EOSL, Georgia Tech Research Institute</b> PbS Quantum Dot Enabled Infrared Sensors. Advisor: Yuelan Zhang	Jun – Aug 2024
<b>Undergraduate Researcher · REU Program, The University of Chicago</b> Multi-particle interactions in fluids. Advisor: Thomas Witten	Jun – Aug 2023
<b>Undergraduate Research Assistant · Kennesaw State University, Dept. of Physics</b> NNLO corrections for $W^+\gamma$ production at high energies. Advisor: Nikolaos Kidonakis	Jun 2022 – May 2023
<b>Research Engineering Intern · EOSL, Georgia Tech Research Institute</b> High throughput approach for hypersonic materials. Advisor: Zhitao Kang	Jun – Aug 2022
<b>Undergraduate Research Assistant · School of Physics, Georgia Institute of Technology</b> Predicting protein folding using transformer neural networks (Advisor: James C. Gumbart) Forecasting spatio-temporal chaos using reservoir computing (Advisor: Roman Grigoriev)	Dec 2021 – May 2024
<b>Undergraduate Research Assistant · Kennesaw State University, Dept. of Physics</b> Molecular dynamics simulations to study graphene. Advisor: Jungkyu Park	Aug 2020 – Jul 2021

## TEACHING

<b>Teaching Assistant, PHYS 302L · The University of Texas at Austin</b>	Spring 2026
<b>Teaching Assistant, PHYS 2211 · Georgia Institute of Technology</b>	Spring 2022

## CONFERENCES & PRESENTATIONS

Quasi-1D taco flat bands at a magic angle in transition metal dichalcogenide moiré structures Center for Dynamics and Control of Materials: an NSF MRSEC Industry Day	Feb 2026
Emergence of Taco Flat Bands at a Magic Angle in Transition Metal Dichalcogenide Moiré Structures Oden Institute, The University of Texas at Austin	Jan 2026
Defect Migrations in Hexagonal Boron Nitride Moiré Superlattices Global Physics Summit (APS)	Mar 2025
PbS Quantum Dot Enabled Infrared Sensors GRIP Symposium, Georgia Tech	Aug 2024
Multi-particle Interactions in Fluids REU Symposium, University of Chicago	Aug 2023
Transparent Halide Ceramic for Nuclear Threat Detection GRIP Symposium, Georgia Tech	Jul 2023
Predicting Spatiotemporal Chaos Using Reservoir Computing APS CUWiP, Auburn University	Jan 2023
High Throughput Approach for Hypersonic Material Discovery	

## SOFTWARE

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### **TwisterASE** [twisterase.vercel.app](https://twisterase.vercel.app)

A Python toolkit for generating twisted layered material structures (graphene, hBN, TMDs) and producing ready-to-run LAMMPS input files for molecular dynamics simulations.

## SKILLS & LANGUAGES

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**Programming:** Python, Julia, MATLAB, PyTorch, C++, CUDA, High-Performance Computing

**Languages:** English (native), Spanish (fluent)

## LEADERSHIP & SERVICE

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### **Co-founder, Paymo.Money**

Developed a financial tool for student organizations; 300 users acquired in one summer

### **Community Volunteer**

Assisted members in Mexico with applications to higher education and exam preparation