

# SAMI HAKANI

Ph.D. Candidate, School of Physics, Georgia Institute of Technology

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## Research Interests

Low-dimensional quantum systems, spin dynamics of strongly correlated electronic systems, topological and entangled phases of matter in model systems (frustrated quantum magnets, ultracold atoms and molecules, topological semimetals, etc.)

## Education

2024 (expected)	Ph.D. in Physics Advisor: Itamar Kimchi	Georgia Institute of Technology
2018	B.S. in Physics, Electrical Engineering Advisor: Nir Navon	Yale University

## Positions

2019-present	Graduate Student Researcher	Georgia Tech
2019-present	Graduate Teaching Assistant	Georgia Tech
2018-2019	Postgraduate Research Associate	Yale University

## Publications

1. **Hakani, S.** & Kimchi, I. "Crystalline topological defects within response theory" (arXiv:2311.00698). arXiv. <https://doi.org/10.48550/arXiv.2311.00698>
2. Zhang, Y., Ni, Y., Zhao, H., **Hakani, S.**, Ye, F., DeLong, L., Kimchi, I., & Cao, G. (2022). Control of chiral orbital currents in a colossal magnetoresistance material. *Nature*, 1–6. <https://doi.org/10.1038/s41586-022-05262-3>
3. Sokolik, A., **Hakani, S.**, Roy, S., Pellatz, N., Zhao, H., Cao, G., Kimchi, I., & Reznik, D. (2022). Spinons and damped phonons in the spin-1/2 quantum liquid Ba<sub>4</sub>Ir<sub>3</sub>O<sub>10</sub> observed by Raman scattering. *Physical Review B*, 106(7), 075108. <https://doi.org/10.1103/PhysRevB.106.075108>

## Fellowships and Awards

2023	<sup>1</sup> Amelio Travel Grant (\$500)	Georgia Tech
2022	<sup>1</sup> Amelio Travel Grant (\$1000)	Georgia Tech
2022	<sup>2</sup> Rice Fellowship (\$2500)	Georgia Tech
2022	<sup>1</sup> Amelio Travel Grant (\$500)	Georgia Tech
2018	Distinction in the Major	Yale University
2017	<sup>3</sup> PFCU Academic Scholarship (\$2500)	
2015	<sup>3</sup> PFCU Academic Scholarship (\$2500)	
2014-2018	<sup>4</sup> H. G. Bessent Scholarship	Yale University
2014-2018	QuestBridge Scholar	Yale University

## Press and Media Coverage

[“New Quantum State Discovered in Trimer-Honeycomb Material”](#) *GaTech News Center*. Feb. 23, 2023.

## Presentations

### Oral Presentations

Dec 2022	A Quantum Many-Body Handshake Weizmann Institute of Science, Rehovot, Israel <i>“Raman Responses with and without Topological Defects”</i>
July 2022	Yale Young Global Scholars Research Showcase, New Haven CT (Virtual)
May 2022	Georgia Tech Quantum Alliance Workshop Georgia Institute of Technology, Atlanta, GA <i>“Optical Signatures for Fractional Excitations in Quantum Liquid Candidate <math>Ba_4Ir_3O_{10}</math>”</i>
Mar 2022	APS March Meeting, Chicago, IL <i>“Raman Response via 4-Spinon Continuum in Spin-1/2 Quantum Liquid <math>Ba_4Ir_3O_{10}</math>”</i>
July 2021	Yale Young Global Scholars Research Showcase, New Haven CT (Virtual)
Jun 2019	Yale Young Global Scholars Research Showcase, New Haven, CT

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<sup>1</sup> Amelio Endowment and the Weatherly Fund Graduate Student Travel Grant

<sup>2</sup> Bonnie B. and Charles K. Rice Jr. Fellowship

<sup>3</sup> External scholarship awarded by Platinum Federal Credit Union

<sup>4</sup> Funded by Mr. Scott K. H. Bessent and the Bessent Foundation

### *Poster Presentations*

- Aug 2023      Dynamical Response and Transport in Quantum Magnets  
Kavli Institute for Theoretical Physics (KITP), UC Santa Barbara  
*“Topological Defects in a Response Theory”*
- June 2023      Dynamics and Quantum Information in Many-body Systems  
University of Minnesota, Minneapolis, MN  
*“Topological Defects in a Response Theory”*
- May 2023      Topology and Fractionalization in Magnetic Materials (TopoMag23)  
The Ohio State University, Columbus, OH  
*“Topological Defects in a Response Theory”*
- Jan 2022      MagLab Winter Theory School  
National High Magnetic Field Laboratory, Tallahassee, FL (Virtual)  
*“Spinons and damped phonons in spin-1/2 quantum-liquid Ba<sub>4</sub>Ir<sub>3</sub>O<sub>10</sub> observed by Raman scattering”*

### **Conferences and Schools Attended**

- Oct 2023      Artificial Intelligence and Machine Learning in Physics 2023  
Georgia Institute of Technology, Atlanta, GA
- Aug 2023      Dynamical Response and Transport in Quantum Magnets  
Kavli Institute for Theoretical Physics (KITP), UC Santa Barbara
- July 2023      Princeton Summer School on Condensed Matter Physics  
Princeton University, Princeton, NJ (Virtual)
- June 2023      Dynamics and Quantum Information in Many-body Systems  
University of Minnesota, Minneapolis, MN
- May 2023      Topology and Fractionalization in Magnetic Materials (TopoMag23)  
The Ohio State University, Columbus, OH
- Dec 2022      A Quantum Many-Body Handshake  
Weizmann Institute of Science, Rehovot, Israel
- Mar 2022      APS March Meeting, Chicago, IL
- Jan 2022      MagLab Winter Theory School

National High Magnetic Field Laboratory, Tallahassee, FL (Virtual)

Aug 2021 International conference on theoretical physics  
Landau Institute for Theoretical Physics (Virtual)  
*“From quasi-classics to Bose condensation and everything in between”  
dedicated to Valery Pokrovsky's 90th anniversary*

Aug 2021 Bad Honnef School on Ultracold Quantum Gases  
German Physical Society, Bad Honnef, Germany (Virtual)

Mar 2021 APS March Meeting (Virtual)

June 2020 APS DAMOP (Virtual)

### Teaching Experience

#### *Guest Lectures*

Spring 2023 PHYS 6106 Graduate Quantum Mechanics II Georgia Tech

#### *Graduate Teaching Assistantships*

Spring 2024 PHYS 6211 Graduate Condensed Matter II Georgia Tech

Fall 2023 PHYS 6210 Graduate Condensed Matter I Georgia Tech

Summer 2023 PHYS 2211 Intro Physics I Georgia Tech

Spring 2023 PHYS 6106 Graduate Quantum Mechanics II Georgia Tech

Fall 2021 PHYS 6105 Graduate Quantum Mechanics I Georgia Tech

Summer 2021 PHYS 2211 Intro Physics I Georgia Tech

Spring 2021 PHYS 6106 Graduate Quantum Mechanics II Georgia Tech

Fall 2020 PHYS 6101 Graduate Classical Mechanics Georgia Tech

Summer 2020 PHYS 2211 Intro Physics I Georgia Tech

Fall 2019 PHYS 2211 Intro Physics I Georgia Tech

#### *Undergraduate Teaching Assistantships*

Spring 2018 MATH 222 Linear Algebra with Applications Yale University

Fall 2017 MATH 118 Intro to Functions of Several Variables Yale University

Spring 2017 MATH 222 Linear Algebra with Applications Yale University

#### *Other Teaching Positions*

Summer 2018 Yale Young Global Scholars Yale University

Summer 2017 Yale Young Global Scholars Yale University

### Leadership and Service

2022-2023	President, Graduate Association of Physicists (GAP)	Georgia Tech
2022-2023	Member, School of Physics Graduate Committee	Georgia Tech
2022	Organizer, GAP Graduate Student Panel	Georgia Tech
2022-2023	College of Sciences Dean's Advisory Council	Georgia Tech
2022-2023	Equity in Graduate Education Consortium	Georgia Tech
2021-2023	Organizer, weekly Quantum Café	Georgia Tech
2021	Organizer, weekly Quantum Journal Club	Georgia Tech

## **Students Supervised**

### *High School Students*

2020-2021	Samad Hakani Won Regional and National Junior Science and Humanities Symposium Subsequently: Undergraduate Student, Yale University
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## **Professional Memberships**

2020-present	American Physical Society
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## **Skills Summary**

### *Languages*

English (native), Urdu (native), Spanish (conversational)

### *Programming Languages*

Python (proficient), MATLAB, Mathematica, C++ (novice), LaTeX

### *Python Frameworks*

TeNPy, Scikit-learn, Tensorflow, NumPy, Pandas, Matplotlib, Seaborn, Beautifulsoup

### *Platforms*

Linux, Windows, Arduino