

THOMAS G. KIELY

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ACADEMIC POSITIONS

To begin Sept. 2024	MOORE POSTDOCTORAL SCHOLAR Kavli Institute for Theoretical Physics, University of California, Santa Barbara Supervisors: Matthew Fisher & Leon Balents
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EDUCATION

Aug. 2018 – May 2024	PH.D. IN PHYSICS Cornell University Dissertation: <i>Phase Transitions and Transport Properties in Ultracold Atom Quantum Simulators</i> Thesis Advisor: Erich Mueller
Aug. 2018 – Mar. 2021	M.S. IN PHYSICS Cornell University A Exam: Q1 , Q2 , Q3
Aug. 2014 – May 2018	B.S. IN PHYSICS, B.A. IN ITALIAN, MINOR IN PHILOSOPHY Georgetown University Summa Cum Laude Senior Thesis: Quantum Simulators with Trapped Ions: Two Examples Thesis Advisor: James Freericks
Aug. 2016 – Dec. 2016	SEMESTER AT University of Bologna Direct Matriculation

HONORS AND AWARDS

May 2023	Douglas Fitch Memorial Award to enable international travel to study, pursue research, or partake in Physics-related events
April 2023	DAMOP Travel Award to attend the APS DAMOP 2023 meeting in Spokane, Washington
May 2018	Undergraduate Research Award for depth and impact of written and oral presentation of undergraduate senior thesis
May 2018	Kidwell Medal for excellence in undergraduate Physics coursework
May 2018	Dante Award for excellence in undergraduate Italian coursework
May 2018	Phi Beta Kappa
April 2013	National Merit Finalist

RESEARCH EXPERIENCE

Aug. 2018 – May 2024	Laboratory of Atomic and Solid State Physics, Cornell University Graduate Research Assistant with Erich Mueller <ul style="list-style-type: none">Studied a wide range of problems with applications to quantum simulation with ultracold atoms, including transport and superfluidity in low-dimensions, topology, frustration and long-range interactions. Utilized a combination of analytic and numerical techniques with a particular focus on infinite tensor network methods.Collaborated on problems relevant to strongly-correlated materials, namely Sr_2RuO_4 and van der Waals heterostructures.
Jan. 2015 – May 2018	Georgetown University

Undergraduate Research Assistant with James Freericks

- Studied two problems with direct relevance to quantum simulation with trapped ions.

PUBLICATIONS

6. *High-temperature transport in the one-dimensional mass-imbalanced Fermi-Hubbard model*
TGW and Erich J. Mueller
[Phys. Rev. A **109**, 063318 \(2024\)](#)
[arXiv:2404.08076](#)
5. *Role of conservation laws in the density matrix renormalization group*
TGW and Erich J. Mueller
[Phys. Rev. B **106**, 235126 \(2022\)](#)
[arXiv:2207.03465](#)
4. *Strong Increase in Ultrasound Attenuation Below T_c in Sr_2RuO_4 : Possible Evidence for Domains*
Sayak Ghosh, TGW, Arkady Shekhter, F. Jerzembeck, N. Kikugawa, Dmitry A. Sokolov, A. P. Mackenzie and B. J. Ramshaw
[Phys. Rev. B **106**, 024520 \(2022\)](#)
[arXiv:2109.00041](#)
3. *Superfluidity in the one-dimensional Bose-Hubbard model*
TGW and Erich J. Mueller
[Phys. Rev. B **105**, 134502 \(2022\)](#)
[arXiv:2202.0066](#)
2. *Transport in the 2D Fermi-Hubbard Model: Lessons from Weak Coupling*
TGW and Erich J. Mueller.
[Phys. Rev. B **104**, 165143 \(2021\) \[Editor's Suggestion\]](#)
[arXiv:2106.04479](#)
1. *Relationship between the transverse-field Ising model and the XY model via the rotating-wave approximation*
TGW and J. K. Freericks
[Phys. Rev. A **97**, 023611 \(2018\)](#)
[arXiv:1711.04386](#)

PRESS ON RESEARCH

[Phys. Rev. B **104**, 165143 \(2021\) \[Editor's Suggestion\]](#)

- ["Weak coupling shows flaw in strange metal model" \(Cornell Chronicle\)](#)
- ["Weak coupling shows flaw in strange metal model" \(Phys.org\)](#)

PREPRINTS

- *Continuous Wigner-Mott transition at $\nu = 1/5$*
TGW and Debanjan Chowdhury
[arXiv:2305.13355](#)

TALKS AND POSTERS

LASSP/AEP Student Seminar, Mar. 21, 2024, Ithaca, NY

- TGW and Erich J. Mueller. "Transport in Ultracold Atom Quantum Simulators." (Seminar Talk)

NISQ Seminar, Feb. 16, 2024, Santa Barbara, CA (Virtual)

- Erich J. Mueller, TGW and Andre Petukhov. "Bose-Hubbard Physics using Google Quantum AI Hardware." (Seminar Talk)

KITP Seminar, Dec. 18, 2023, Santa Barbara, CA (Virtual)

- TGW and Erich J. Mueller. "High-Temperature Transport in Fermi-Hubbard systems." (Seminar Talk)

APS DAMOP Meeting, Jun. 5-9, 2023, Spokane, WA

- TGW and Erich J. Mueller. "Transport in the 2D Fermi-Hubbard Model: Lessons from Weak Coupling." (Contributed Talk)
- TGW and Erich J. Mueller. "Transport in the mass-imbalanced 1D Fermi-Hubbard model." (Poster)

International Conference on Atomic Physics, Jul. 18-22, 2022, Toronto, ON

- TKG and Erich J. Mueller. "Transport in the 2D Fermi-Hubbard Model: Lessons from Weak Coupling." (Poster)

APS March Meeting, Mar. 14-18, 2022, Chicago, IL

- TKG and Erich J. Mueller. "Superfluidity in the 1D Bose-Hubbard model." (Poster and Contributed Talk)

Boulder School for Condensed Matter and Materials Physics: Ultracold Matter, Jul. 5-30, 2021, Boulder, CO

- TKG and Erich J. Mueller. "Superfluidity in the 1D Bose-Hubbard model." (Poster)

ARO/AFOSR MURI Quantum Matter Grant Review, Oct. 15, 2019, Amherst, MA

- TKG and Erich J. Mueller. "Umklapp Scattering gives rise to T-Linear Resistivity in the Hubbard Model." (Poster)

TEACHING EXPERIENCE

Spring 2023	PHYS-2214: PHYSICS III: OSCILLATIONS, WAVES, AND QUANTUM PHYSICS Course Instructor: Glenn Case (Cornell) Lead two discussion sections and a lab section, created weekly quizzes, graded homework, proctored and graded exams
Fall 2023	PHYS-7653: STATISTICAL PHYSICS II Course Instructor: Chao-Ming Jian (Cornell) Graded and wrote solutions to problem sets
Spring 2022	PHYS-2213: PHYSICS II: ELECTROMAGNETISM Course Instructor: Alan Giambattista (Cornell) Lead three discussion sections and twice weekly office hours, graded homework, proctored and graded exams
Fall 2020	PHYS-2213: PHYSICS II: ELECTROMAGNETISM Course Instructor: Ivan Bazarov (Cornell) Course held entirely online; lead three discussion sections and twice weekly office hours, graded homework, proctored and graded exams
Spring 2020	PHYS-1102: GENERAL PHYSICS II Course Instructor: Nick Taylor (Cornell) Staffed a flipped, self-taught classroom for 15hrs per week, set up student-run labs, graded lab notebooks, proctored and graded exams. Taught extensively over Zoom due to COVID
Spring 2019	PHYS-2208: FUNDAMENTALS OF PHYSICS II Course Instructor: Glenn Case (Cornell) Lead two discussion sections and a lab section, created weekly quizzes, graded homework, proctored and graded exams
Fall 2018	PHYS-1101: GENERAL PHYSICS I Course Instructor: Nick Taylor (Cornell) Staffed a flipped, self-taught classroom for 15hrs per week, set up student-run labs, graded lab notebooks, proctored and graded exams
Fall 2017	PHYS-251: INTERMEDIATE MECHANICS Course Instructor: Peter Olmsted (Georgetown) Held office hours, lead a weekly tutorial, graded problem sets, proctored exams
Fall 2015	PHYS-153: RELATIVITY AND QUANTUM PHYSICS Course Instructor: Joseph Serene (Georgetown) Held office hours, graded problem sets

EXTRACURRICULARS AND OUTREACH

April 2020	CORNELL EXPANDING YOUR HORIZONS CONFERENCE Workshop Co-Leader: "Physics of Bubbles"
Jun. 2019 – May 2020	CORNELL GRADUATE PEER MENTOR
Aug. 2014 – May 2018	GEORGETOWN MEN'S VARSITY LIGHTWEIGHT ROWING
Aug. 2014 – May 2018	GEORGETOWN CIRCOLO ITALIANO Treasurer (2017-2018)
June 2015 – Dec. 2015	GEORGETOWN PHYSICS PEER ADVISOR

TECHNICAL SKILLS

Programming Languages	Python, C++, Julia, Java, Wolfram Language (Mathematica)
CAD	SolidWorks

LANGUAGES

English:	Native
Italian:	Fluent (non-Native)