

# THOMAS G. KIELY

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PUBLICATIONS: [Google Scholar](#), [ORCID](#)  
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## ACADEMIC POSITIONS

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To begin Sept. 2024 | MOORE POSTDOCTORAL FELLOW  
**Kavli Institute for Theoretical Physics**  
Supervisors: Leon Balents & Matthew Fisher

## EDUCATION

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Aug. 2018 – May 2024 | PH.D. IN PHYSICS  
**Cornell University**  
Dissertation | *Phase Transitions and Transport Properties in Ultracold Atom Quantum Simulators*  
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**  
Senior Thesis | *Quantum Simulators with Trapped Ions: Two Examples*  
*Summa Cum Laude*  
Thesis Advisor: James Freericks

Aug. 2016 – Dec. 2016 | SEMESTER AT **University of Bologna**  
Direct Matriculation

## HONORS AND AWARDS

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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

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Aug. 2018 – May 2024 | **Laboratory of Atomic and Solid State Physics, Cornell University**  
Graduate Research Assistant with Erich Mueller

- 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  $\text{Sr}_2\text{RuO}_4$  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

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6. *High-temperature transport in the one-dimensional mass-imbalanced Fermi-Hubbard model*  
T GK and Erich J. Mueller  
[Phys. Rev. A \*\*109\*\*, 063318 \(2024\)](#)  
[arXiv:2404.08076](#)
5. *Role of conservation laws in the density matrix renormalization group*  
T GK and Erich J. Mueller  
[Phys. Rev. B \*\*106\*\*, 235126 \(2022\)](#)  
[arXiv:2207.03465](#)
4. *Strong Increase in Ultrasound Attenuation Below  $T_c$  in  $\text{Sr}_2\text{RuO}_4$ : Possible Evidence for Domains*  
Sayak Ghosh, T GK, 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*  
T GK 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*  
T GK 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*  
T GK and J. K. Freericks  
[Phys. Rev. A \*\*97\*\*, 023611 \(2018\)](#)  
[arXiv:1711.04386](#)

## PRESS ON RESEARCH

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[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

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

## TALKS AND POSTERS

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

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

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

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

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

- T GK and Erich J. Mueller. "Transport in the 2D Fermi-Hubbard Model: Lessons from Weak Coupling." (Contributed Talk)
- T GK 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

- T GK 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

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Spring 2023	<b>PHYS-2214: PHYSICS III: OSCILLATIONS, WAVES, AND QUANTUM PHYSICS</b> Course Instructor: Glenn Case (Cornell) Lead two discussion sections and a lab section, created weekly quizzes, graded homework, proctored and graded exams
Fall 2023	<b>PHYS-7653: STATISTICAL PHYSICS II</b> Course Instructor: Chao-Ming Jian (Cornell) Graded and wrote solutions to problem sets
Spring 2022	<b>PHYS-2213: PHYSICS II: ELECTROMAGNETISM</b> Course Instructor: Alan Giambattista (Cornell) Lead three discussion sections and twice weekly office hours, graded homework, proctored and graded exams
Fall 2020	<b>PHYS-2213: PHYSICS II: ELECTROMAGNETISM</b> 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	<b>PHYS-1102: GENERAL PHYSICS II</b> 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	<b>PHYS-2208: FUNDAMENTALS OF PHYSICS II</b> Course Instructor: Glenn Case (Cornell) Lead two discussion sections and a lab section, created weekly quizzes, graded homework, proctored and graded exams
Fall 2018	<b>PHYS-1101: GENERAL PHYSICS I</b> 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	<b>PHYS-251: INTERMEDIATE MECHANICS</b> Course Instructor: Peter Olmsted (Georgetown) Held office hours, lead a weekly tutorial, graded problem sets, proctored exams
Fall 2015	<b>PHYS-153: RELATIVITY AND QUANTUM PHYSICS</b> Course Instructor: Joseph Serene (Georgetown) Held office hours, graded problem sets

## EXTRACURRICULARS AND OUTREACH

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

## TECHNICAL SKILLS

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

## LANGUAGES

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English: Native

Italian: Fluent (non-Native)