Yi-Ting Tu (涂懿庭)

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EDUCATION

University of Maryland, College Park, MD, USA Aug. 2021 – Present

Ph.D. candidate in Physics

- Advisor: Sankar Das Sarma

National Tsing Hua University, Hsinchu, Taiwan Sep. 2015 – Jun. 2020

Bachelor of Science

- Double Major: Physics and Mathematics
- Graduated with Honors in Physics

RESEARCH EXPERIENCE

Graduate Research Assistant Apr. 2022 – Present

Condensed Matter Theory Center, University of Maryland *Advisor: Sankar Das Sarma*

- Quantum dynamics and many-body localization
  - Numerically simulated the bath-coupled dynamics of quasiperiodic many-body localized systems to study its avalanche instability [4] (see the list of publications) and to differentiate the non-ergodic extended regime from other regimes [6].
  - Proposed an explanation of the non-ergodic extended behavior in the prethermal regime, supported by numerical and perturbative arguments [10].
  - Mentored a first year graduate student to study the many-body localization in a slowly varying potential [12].
- Transport and phases of electron gases
  - Calculated the Lorenz ratio of graphene using Boltzmann transport theory with the bipolar diffusion effect [5], offering an alternative explanation for the experimental paper [Crossno *et al.*, 2016]. Also studied its magnetotransport [7].
  - Determined the phases in a two-dimensional electron-hole bilayer system by calculating ground state energies of exciton gas and electron-hole plasma [8].
  - Investigated the linear-in-T electronic resistivity due to phonon scattering, discussing the role of many phonon modes [9] and the apparent negative intercept [11].
  - Investigate the attractive regime of screened Coulomb interaction for possible plasmon-induced superconductivity [14].
- Lattice anomalies
  Studied the lattice analogs of 't Hooft anomalies of global symmetries using quantum cellular automata, extracted their cohomological invariants, and explored the implications for symmetric commuting projector models [13] (a collaboration independent of my advisor).
- Moiré and related materials
  (ongoing project).

Full-time Research Assistant Jul. 2020 – Aug. 2021
Condensed Matter Theory Group, National Tsing Hua University *Advisor: Po-Yao Chang*

- Fracton systems
  Developed a generalized gauging procedure for a mixture of global and subsystem symmetries, and used it to construct models that host non-Abelian fractons [1].
- Non-Hermitian quantum systems
  Generalized the entanglement entropy to non-Hermitian quantum systems, preserving conformal field theory scaling properties at quantum critical points [2]. Also analyzed the behavior of the fidelity susceptibility near such critical points [3].

Undergraduate Research Assistant Feb. 2018 – Mar. 2019
Quantum Optics Group, National Tsing Hua University *Advisor: Ray-Kuang Lee*

- Quantum information theory
  Formulated the positive partial transpose criterion in the phase space using symplectic geometry, and analyzed the entanglement properties of selected quantum optical states using this formulation.

AWARDS & SCHOLARSHIPS

Academic Achievement Award, seven semesters (top 5% in class) 2016 – 2019

2019 NTHU College of Science Elite Student Award Spring 2019

Undergraduate Research Scholarship, Ministry of Science and Technology, Taiwan Fall 2018

The Zhu Shun Yi He Qin Scholarship Spring 2018
- NT$100,000 awarded to top one junior student in College of Science, NTHU for outstanding performance in research and coursework

PROGRAMMING LANGUAGES & SOFTWARE

- Mathematica (Advanced)
- Julia (Advanced)
- Python (Intermediate)
- C (Intermediate)
- MATLAB (Basic)

PUBLICATIONS & PREPRINTS

[1] Yi-Ting Tu and Po-Yao Chang, "Non-Abelian fracton order from gauging a mixture of subsystem and global symmetries," arXiv: 2103.08603, Phys. Rev. Research **3**, 043084 (2021).

[2] Yi-Ting Tu, Yu-Chin Tzeng, and Po-Yao Chang, "Rényi entropies and negative central charges in non-Hermitian quantum systems," arXiv: 2107.13006, SciPost Phys. **12**, 194 (2022).

[3] Yi-Ting Tu, Iksu Jang, Po-Yao Chang, and Yu-Chin Tzeng, "General properties of fidelity in non-Hermitian quantum systems with PT symmetry," arXiv: 2203.01834, Quantum **7**, 960 (2023).

[4] Yi-Ting Tu, DinhDuy Vu, and Sankar Das Sarma, "Avalanche stability transition in interacting quasiperiodic systems," arXiv: 2207.05051, Phys. Rev. B **107**, 014203 (2023).

[5] Yi-Ting Tu and Sankar Das Sarma, "Wiedemann-Franz law in graphene," arXiv: 2211.05192, Phys. Rev. B **107**, 085401 (2023).

[6] Yi-Ting Tu, DinhDuy Vu, and Sankar Das Sarma, "Localization spectrum of a bath-coupled generalized Aubry-André model in the presence of interactions," arXiv: 2305.15471, Phys. Rev. B **108**, 064313 (2023).

[7] Yi-Ting Tu and Sankar Das Sarma, "Wiedemann-Franz law in graphene in the presence of a weak magnetic field," arXiv: 2307.05477, Phys. Rev. B **108**, 245415 (2023).

[8] Yi-Ting Tu, Seth M. Davis, and Sankar Das Sarma, "Energetic comparison of exciton gas versus electron-hole plasma in a bilayer two-dimensional electron-hole system," arXiv: 2402.00866, Phys. Rev. B **109**, 165307 (2024).

[9] Sankar Das Sarma and Yi-Ting Tu, "Role of many phonon modes on the high-temperature linear-in-T electronic resistivity," arXiv: 2403.09890, Phys. Rev. B **109**, 235118 (2024).

[10] Yi-Ting Tu, David M. Long, and Sankar Das Sarma, "Interacting quasiperiodic spin chains in the prethermal regime," arXiv: 2405.01622, Phys. Rev. B **109**, 214309 (2024).

[11] Yi-Ting Tu and Sankar Das Sarma, "Negative intercept of the apparent zero-temperature extrapolated linear-in-T metallic resistivity," arXiv: 2407.01664, Phys. Rev. B **110**, 075151 (2024).

[12] Zi-Jian Li, Yi-Ting Tu, and Sankar Das Sarma, "Many-body Localization in a Slowly Varying Potential," arXiv: 2503.22096, Phys. Rev. B **112**, 014203 (2025).

[13] Yi-Ting Tu, David M. Long, and Dominic V. Else, "Anomalies of global symmetries on the lattice," arXiv: 2507.21209 (2025).

[14] Sankar Das Sarma, Jay D. Sau, and Yi-Ting Tu, "Conventional and practical metallic superconductivity arising from repulsive Coulomb coupling," arXiv: 2511.00625 (2025).

Note: This CV lists only items related to physics research.