Andy **Tanjaroon Ly**

Graduate Research Assistant · Theoretical Condensed Matter Physics

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Current expertise

Strongly correlated systems

Metal-to-insulator transitions, superconductivity, electron-boson interactions, spin-liquid behavior, topological phases

Numerical methods

Quantum Monte Carlo, dynamical cluster approximation, exact diagonalization, density functional theory

Education

University of Tennessee-Knoxville — *Knoxville, TN, United States*

Ph.D. Physics — *August 2019 - May 2026 (expected)*

- **Advisor:** Steven Johnston
- **Dissertation title:** "Variational and Quantum Monte Carlo simulations of competing orders in the Hubbard and electron-phonon models"

University of Florida — *Gainesville, FL United States*

B.S. Physics — *August 2015 - May 2018*

University of Florida — *Gainesville, FL United States*

B.A. Mathematics — *August 2015 - May 2018*

Experience

Research

University of Tennessee-Knoxville — *Knoxville, TN, United States*

Graduate Research Assistant — *August 2020 - Present*

- **Advisor:** Steven Johnston
- Studied strongly correlated phenomena in the Hubbard model and models of electron-phonon interaction.
- Used Monte Carlo methods including determinant quantum Monte Carlo and variational Monte Carlo.

Oak Ridge National Laboratory — *Oak Ridge, TN, United States*

DOE SCGSR Fellow — *August 2024 - June 2025*

- **Mentor:** Thomas Maier
- **Project title:** "Modeling exotic superconducting states using variational Monte Carlo"
- Continuing development of VariationalMC.jl, an all-new, flexible variational Monte Carlo code in Julia.
- Project utilizing the Dynamical Cluster Approximation method on FRONTIER.

University of Geneva — *Geneva, GE, Switzerland*

Visiting Ph.D. Student — *July 2023 - July 2024*

- **Mentor:** Louk Rademaker
- Worked on calculations related to twisted bilayer Graphene and TMDs.

University of Florida — *Gainesville, FL, United States*

Undergraduate Research Assistant — *August 2016 - May 2019*

- **Advisor:** David Tanner
- Performed optical spectroscopy experiments.

Teaching

University of Tennessee-Knoxville — *Knoxville, TN, United States*

Graduate Teaching Assistant — *August 2019 - May 2021, August 2025 - Present*

- PHYS 221: *Elements of Physics I*; PHYS 222: *Elements of Physics II*; PHYS 232: *Waves, Optics, and Modern Physics*; PHYS 611: *Quantum Field Theory*

University of Florida — *Gainesville, FL, United States*

Undergraduate Teaching Assistant — *August 2018 - May 2019*

- PHY 2054L: *Physics 2 Lab*; PHY 3101: *Introduction to Modern Physics*

Publications

Andy Tanjaroon Ly, Benjamin Cohen-Stead, Steven Johnston; "Antiferromagnetic and bond-order-wave phases in the two-dimensional optical Su-Schrieffer-Heeger-Hubbard model"; *Physical Review B* **111**, 245138 (2025) [DOI: 10.1103/2bnf-tmtc]

Benjamin Cohen-Stead, Sohan Malkaruge Costa, James Neuhaus, **Andy Tanjaroon Ly**, Yutan Zhang, Richard Scalettar, Steven Johnston; "SmoQyDQMC.jl: A flexible implementation of determinant quantum Monte Carlo for Hubbard and electron-phonon interactions"; *SciPost Physics Codebases* **29** (2024) [DOI: 10.21468/scipostphyscodeb.29]

Andy Tanjaroon Ly, Benjamin Cohen-Stead, Sohan Malkaruge Costa, Steven Johnston; "Comparative study of the superconductivity in the Holstein and optical Su-Schrieffer-Heeger models"; *Physical Review B* **108**, 184501 (2023) **Editor's Suggestion** [DOI: 10.1103/PhysRevB.108.184501]

Sohan Malkaruge Costa, Benjamin Cohen-Stead, **Andy Tanjaroon Ly**, James Neuhaus, Steven Johnston; "Comparative determinant quantum Monte Carlo study of the acoustic and optical variants of the Su-Schrieffer-Heeger model"; *Physical Review B* **108**, 165138 (2023) [DOI: 10.1103/PhysRevB.108.165138]

Seher Karakuzu, **Andy Tanjaroon Ly**, Peizhi Mai, James Neuhaus, Thomas A. Maier, Steven Johnston; "Stripe correlations in the two-dimensional Hubbard-Holstein model"; *Communications Physics* **5**, 311 (2022) [DOI: 10.1038/s42005-022-01092-x]

Conferences & Presentations

APS Global Physics Summit
Anaheim, CA, United States

CONTRIBUTED TALK PRESENTER — *March 2025*

- **Title:** "Antiferromagnetic and bond-order-wave phases in the 2D SSH-Hubbard model"

University of Geneva DQMP seminar
Geneva, GE, Switzerland

PRESENTER — *September 2023*

- **Title:** "A comparative study of the superconductivity in the Holstein and optical SSH models"

APS March Meeting
Las Vegas, NV, United States

CONTRIBUTED TALK PRESENTER — *March 2023*

- **Title:** "A comparative study of the superconductivity in the Holstein and optical SSH models"

APS March Meeting
Chicago, IL, United States

CONTRIBUTED TALK PRESENTER — *March 2022*

- **Title:** "Static and fluctuating stripes in the two-dimensional Hubbard-Holstein model"

University of Tennessee-Knoxville condensed matter seminar
Knoxville, TN, United States

PRESENTER — *September 2021*

- **Title:** "Static stripes in the two-dimensional Hubbard-Holstein model"

Honors & Awards

2025 **Robert Birkhoff fellowship**, University of Tennessee-Knoxville, Department of Physics
2025 **DCOMP travel award**, American Physical Society
2025 **GSS travel award**, Graduate Student Senate (GSS), University of Tennessee-Knoxville
2024 **DOE SCGSR fellowship**, U.S. Department of Energy (DOE), SCGSR program
2018 **Ruth and Earl Sawyer leadership award**, University of Florida, Department of Physics
2016 **Dean's list**, University of Florida, College of Liberal Arts and Sciences

Leadership & Service

Graduate Physics Society
Knoxville, TN, United States

SECRETARY — *December 2019 - December 2021*

Maintained meeting minutes and assisted in event planning.

Society of Physics Students
Gainesville, FL, United States

PROPAGANDIST — *August 2017 - May 2018*

Created materials advertising meetings and maintained email list. Assisted in event planning.

Society of Physics Students
Gainesville, FL, United States

SECRETARY — *August 2016 - August 2017*

Maintained meeting minutes and assisted in event planning.

Professional Affiliations

Sigma Pi Sigma ($\Sigma\Pi\Sigma$)
American Physical Society (APS)
Division of Condensed Matter Physics (DCMP), Division of Computational Physics (DCOMP), Southeastern Section of APS (SESAPS)

Skills

Programming Languages	Julia, Python, C++, FORTRAN, MATLAB, LaTeX
Software	SmoQyDQMC, SmoQyDEAC, VariationalMC, DCA++, Keras, SLURM, PBS
Languages	English, Thai (spoken), French (A2 level)

References

Steven Johnston, Bains Professor and Director of Graduate Program
University of Tennessee-Knoxville
Email: sjohn145@utk.edu
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Thomas Maier, Distinguished Research Staff and Section Head, Advanced Computing Methods for Physical Sciences
Oak Ridge National Laboratory
Email: maierta@ornl.gov
Phone: +1 (865) 576-3597

Louk Rademaker, SNSF Professor in Quantum Matter Physics
University of Geneva
Email: louk.rademaker@unige.ch
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Benjamin Cohen-Stead, Research Assistant Professor
University of Tennessee-Knoxville
Email: bcohenst@utk.edu
Phone: +1 (650) 868-5693