

Katherine Driscoll

Education

- 2018–2022 **Ph.D. in Theoretical Physics**,
Long-range interactions and charge frustration in strongly correlated quantum matter,
Université Grenoble Alpes, Grenoble, France.
- 2016–2018 **M.Sc. in Physics**,
Atomic scale modeling of physical, chemical, and biomolecular systems,
École Normale Supérieure de Lyon (France), La Sapienza - Università di Roma (Italy), Universiteit van Amsterdam (Netherlands), Vrije Universiteit (Netherlands).
- 2012–2016 **B.Sc. in Physics, B.Sc. in Mathematics**,
Cum laude,
University of South Carolina, Columbia, South Carolina, USA.

Publications

- K. Driscoll**, A. Ralko, S. Ciuchi, S. Fratini. Universal bad metallic behavior in the form of transient localization arising from long-range interactions. *In preparation*.
- K. Driscoll**, A. Ralko, S. Fratini. Pseudogap metal induced by long-range Coulomb interactions. *Phys. Rev. B* 103, L201106 (2021). doi:[10.1103/PhysRevB.103.L201106](https://doi.org/10.1103/PhysRevB.103.L201106)
- M. Kong, L. Liu, X. Chen, **K. Driscoll**, P. Mao, S. Bhm, N.M. Kad, S.C. Watkins, K.A. Bernstein, J.J. Wyrick, J.-H. Min, B. Van Houten. Single-Molecule Imaging Reveals that Rad4 Employs a Dynamic DNA Damage Recognition Process. *Mol. Cell* 64, 376–387 (2016). doi:[10.1016/j.molcel.2016.09.005](https://doi.org/10.1016/j.molcel.2016.09.005)

Research Experience

- 2018–2021 **Graduate Research Assistant**, Néel Institute Condensed Matter Theory Group, Grenoble, France.
Developed 2D lattice models of long-range interacting electronic systems
- Implemented an exact diagonalization code with Ewald summation and twisted boundary conditions to control finite-size errors.
 - Characterized the phase diagram and novel forms of electronic correlation in quarter-filled electronic systems, which led to a publication in *Physical Review B*.
 - Developed classical Monte Carlo codes to investigate role of long-range interactions in high temperature transport properties of bad metallic systems.
 - Supervised 3 internship projects involving the extension of ED codes to spinful systems and to finite temperature.
- 2018 **Master Student Research Intern**, Vrije Universiteit, Amsterdam, Netherlands.
Investigated the use of transportation theory to describe the behavior of strongly correlated systems in density functional theory (DFT).
- Utilized linear programming techniques in Mathematica to study the effects of interaction range, screening and convexity of cost functions on a 3 particle system.
- 2014–2016 **Undergraduate Research Assistant**, Univ. of SC, Columbia, SC, USA.
- Analyzed data from mean field theory (MFT) calculations on the effect of lipid composition on lipid packing structures in myelin sheaths.
 - Adapted MFT codes to determine the effect of salt environment on ssDNA structures attached to gold surfaces.
- 2015 **Undergraduate Summer Intern**, RWTH Aachen University, Aachen, Germany.
- Implemented molecular dynamics simulations to examine the preferential behavior of huntingtin protein interactions with membrane surfaces based upon curvature.

- 2014 **Undergraduate Summer Intern**, Univ. of Pittsburgh, Pittsburgh, PA, USA.
 ◦ Examined the role of the β -hairpin 3 from Rad-4 (nucleotide excision repair protein) in DNA damage recognition through fluorescence anisotropy and atomic force microscopy, leading to a publication in *Molecular Cell*.
- 2013 **Undergraduate Summer Intern**, Medical Univ. of SC Dept. of Surgery, Charleston, SC, USA.
 ◦ Learned cell culture techniques to grow tri-culture tissue spheroids and to test their 3D printing results using the Palmetto BioPrinter.

Conferences and Workshops

- Feb. 2020 **Gapless Fermions: from Fermi Liquids to Strange Metals International School**,
 Max Planck Institute for the Physics of Complex Systems, Dresden, Germany
 Poster: Charge frustration and long-range Coulomb interactions in two-dimensional organic metals.
- Nov. 2019 **Rencontres des Jeunes Physicien(ne)s (Early Career Physicists Meeting)**,
 Phelma-Minatec Grenoble INP, Grenoble, France
 Meeting organizer
- Aug. 2019 **Emergent Phenomena in Correlated Quantum Matter Summer School**,
 Cargese Institute for Scientific Studies, Cargese, France
 Poster: A possible strange metal at the melting of the Wigner-Mott crystal.
- Mar. 2016 **Biophysical Society 60th Annual Meeting**,
 Los Angeles, California, USA.
 Poster: Molecular Modeling of the Lamellar to Inverse Hexagonal Phase Transition in DOPE-DOPC Lipid Systems.
- Nov. 2014 **AIChE Annual Meeting**,
 Atlanta, Georgia, USA.
 Poster: Molecular Modeling of ssDNA–Salt Interactions via Mean Field Theory and Molecular Dynamics Simulations.

Teaching Experience

- 2021 Supervised 2 master's students (M1) internships (8 weeks and 12 weeks)
- 2020 Supervised 1 bachelor's student (L3) (8 weeks)
- 2014-2016 Tutored physics, math, chemistry, and biology at USC Success Center
- 2013-2014 Tutored student-athletes in physics, math, chemistry, statistics, and Spanish for USC Dept. of Athletics

Skills

- Programming Python, C/C++, Bash, Wolfram, Julia, Fortran, SQL
- Computing Numpy, SciPy, Matplotlib, Jupyter Notebook, Anaconda, LATEX, Vim, Mathematica, Git, TensorFlow,
 tools Google CoLab, Seaborn, HTML, CSS
- Languages English (native), French (advanced), Spanish (advanced), Italian (beginner), Russian (beginner)
- Soft skills Problem-solving, analytical reasoning, technical writing, public speaking, data visualization, teamwork, communication, organization, work ethic

Relevant Courses

- Ongoing **Intro to TensorFlow for Deep Learning**, Udacity
Deep Learning Specialization by DeepLearning.AI, Coursera:
 ◦ Neural Networks and Deep Learning
 ◦ Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization
 ◦ Structuring Machine Learning Projects
 ◦ Convolutional Neural Networks
- Completed Linear Algebra, Multivariable Calculus, Differential Equations, Biophysics, Fundamental Genetics, Cellular and Molecular Biology