Michael Phillips

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EDUCATION

Ph.D. Physics
University of California, Riverside; Riverside, CA; December 2016
Thesis Title: "Topological Phases and Phenomena: A Case Study of Nodal Semimetals and 2D Materials"
Advisor: Vivek Aji

B.S. Physics & Applied Mathematics (cum laude)
University of New Mexico; Albuquerque, NM; May 2011

PUBLICATIONS

Refereed Journal Articles

2024 "Physics-Based Machine Learning Trains Hamiltonians and Decodes the Sequence–Conformation Relation in the Disordered Proteome", Journal of Chemical Theory and Computation **20**, 10266.
DOI: 10.1021/acs.jctc.4c01114

2024 "Beyond monopole electrostatics in regulating conformations of intrinsically disordered proteins", PNAS Nexus **3**, pgae367.
DOI: 10.1093/pnasnexus/pgae367

2023 "A cyclin-dependent kinase-mediated phosphorylation switch of disordered protein condensation", Nature Communications **14**, 6316.
DOI: 10.1038/s41467-023-42049-0

2023 "MaxCal can infer models from coupled stochastic trajectories of gene expression and cell division", Biophysical Journal **122**, 13.
DOI: 10.1016/j.bpj.2023.05.017

2022 "Rules of Physical Mathematics Govern Intrinsically Disordered Proteins", Annual Review of Biophysics **51** 355-376.
DOI: 10.1146/annurev-biophys-120221-095357

2020 "Hysteresis Effects in Social Behavior with Parasitic Infection", Journal of Statistical Physics **181**, 293-304. DOI: 10.1007/s10955-020-02580-6

2017 "Kondo Screening in Two-Dimensional p-Type Transition-Metal Dichalcogenides", Physical Review B **95**, 075103. DOI: 10.1103/PhysRevB.95.075103

2014 "Tunable Line Node Semimetals", Physical Review B **90**, 115111.
DOI: 10.1103/PhysRevB.90.115111

Invited Discussions

2024 "Rules of selective condensation in cells", Nature Chemistry **16**, 1042.
DOI: 10.1038/s41557-024-01525-w

AWARDS & HONORS

2016 Outstanding Teaching Assistant Award, University of California, Riverside.

2014 Michael Devirian Award for Outstanding Second Year Graduate Student, University of California, Riverside.

CONFERENCES

Poster Sessions

2024 "Charge and Conformation Interdependence in Biopolymers: new insights of biological selection", Biophysical Origins of Life, October 13-15.

2024 "Sequence-Dependent Charge Regulation and Conformation for Intrinsically Disordered Proteins (IDPs)", Gordon Research Conference: Protein Folding Dynamics, January 6-12.

2023 "Theory of Counter-Ion Condensation for Intrinsically Disordered Proteins (IDPs)", NSF MPS Ascend Conference, February 7-10.

Oral Presentations

2024 "Using Physics to Extend Predictability of Machine Learning", NSF MPS Ascend Conference, October 10-12.

2016 "Spin Transport in Single Layer Transition Metal Dichalcogenides", APS March Meeting, March 14-18.

2015 "Kondo Effects in Single Layer Transition Metal Dichalcogenides", APS March Meeting, March 2-6.

2010 "Readout Electronics for the Forward Vertex Detector at PHENIX", APS Division of Nuclear Physics, November 3-6.

Judge - Student Posters

2024 Student E-Poster Competition (Physical Sciences), AAAS Annual Meeting, February 15-17.

TEACHING

Instructor
Central New Mexico Community College
Undergraduate Conceptual Physics (Spring 2019, Spring 2018)
Undergraduate Physics 1 / 2 (Summer 2021, Spring 2021, Fall 2020, Summer 2020, Spring 2020, Fall 2019, Summer 2019, Spring 2019, Fall 2018, Summer 2018, Spring 2018, Fall 2017)
Undergraduate Instructional Labs (Summer 2021, Spring 2021, Fall 2020, Spring 2020, Fall 2019, Fall 2017)

Teaching Assistant
University of California, Riverside
Graduate Classical Mechanics (Fall 2015, Fall 2014)
Graduate Electricity & Magnetism (Fall 2015, Winter 2015, Fall 2014)
Graduate Thermodynamics & Statistical Mechanics (Winter 2015)
Undergraduate Instructional Labs (Spring 2014, Winter 2014, Fall 2013, Spring 2013, Winter 2013)

A sample of student comments:

- "The teacher was so willing help me at any time. He was polite and responded so quickly to me. Very good"
  (Undergraduate Physics 2, Spring 2021)
- "He gives very good notes and a lot of examples of possible answers you will deal with on your homework. He is very approachable if you have questions or if you need help on something."
  (Undergraduate Physics 1, Fall 2019)
- "Attitude, Dedication"
  (Undergraduate Physics 1, Summer 2018)
- "The instructor covered a good amount of material for a shorter semester class. He was always very conscious of how the material was being absorbed by doing group work, quizzes, exams, in class problems and applying the material to different applications in the world. I have had many instructors in my life (I am not your average aged student) and Mr. Phillips is excellent."
  (Undergraduate Physics 2, Summer 2018)
- "Professor Phillips knows his stuff. there was never a question that he could not answer and explain. In the subject that is a great help seeing how complicated it can be. He did a great job simplifying the concepts."
  (Undergraduate Physics 1, Fall 2017)
- "Could not possibly ask for more from a TA. I am constantly impressed by his skill as an instructor and his commitment to the students."
  (Graduate E&M, Winter 2015)
- "Mike handled the labs well. He taught me to raise the quality of my lab reports to a higher level through keeping to a strict and consistent standard. He provided useful feedback that helped me improve. He was very helpful in office hours which lead to in depth discussions of the material. He was helpful in the labs as well and guided us to the right answer through language and concepts that made the physics applicable and understandable."
  (Undergraduate Lab, Spring 2014)

RESEARCH

Postdoctoral Fellow
University of Denver
2021- Explored questions in biological physics / physical biology using theoretical tools from thermodynamics, polymer physics, and Bayesian statistics. Topics range from ion condensation on intrinsically disordered proteins to inference of reaction rates in gene circuits.

Independent Research
Albuquerque, New Mexico
2017-2021 My interests grew into new areas, and I learned to apply familiar and unfamiliar methods to explore political behavior, social interactions, economic effects, and other topics where the tools of theoretical physics may be fruitfully employed.

Graduate Student Researcher
University of California, Riverside
2012-2016 Our group worked on many topics in condensed matter theory with common threads including: strong spin-orbit coupling, correlation/interaction effects like Kondo screening, nontrivial band topology, and interactions of light and matter.

COMPUTER SKILLS

Programming Languages / Software

Lots of experience: Python, Mathematica

* Key Python packages: NumPy, SciPy, MatPlotLib, Pandas

Some experience: C++, Java, R

Others

LaTeX, BibTeX, Microsoft Office (Word, Excel, Powerpoint), InkScape