

Curriculum Vitae
Alec Kirkley

Contact Information

University of Michigan Department of Physics
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Education

University of Michigan, Department of Physics 2017 –
Ph.D Candidate in Physics. Advisor: Mark Newman
Research areas: Network Theory, Urban Science, Statistical Physics

University of Rochester, Departments of Physics & Astronomy and Mathematics 2017
B.S. in Physics and B.A. in Mathematics, *summa cum laude*

Publications

† first/co-first authorship, * corresponding authorship

Papers Under Review

1. J. Aguilar, A. Bassolas, G. Ghoshal, S. Hazarie, **A. Kirkley**, M. Mazzoli, S. Meloni, S. Mimar, V. Nicosia, J. J. Ramasco, and A. Sadilek, Impact of urban structure on COVID-19 spread. *Preprint arXiv:2007.15367* (2020). In revision at *Nature Communications*.
2. S. Feng and **A. Kirkley**^{†,*}, Online geolocalized emotion across US cities during the COVID crisis: Universality, policy response, and connection with local mobility. *Preprint arXiv:2009.10461* (2020). In revision at *Scientific Reports*.

Peer Reviewed Papers

3. **A. Kirkley**^{†,*}, G. T. Cantwell, and M. E. J. Newman, Belief propagation for networks with loops. *Preprint arXiv:2009.12246* (2021). In press at *Science Advances*.
4. G. T. Cantwell, **A. Kirkley**, and M. E. J. Newman, The friendship paradox in real and model networks. *Preprint arXiv:2012.03991* (2021). In press at *Journal of Complex Networks*.
5. **A. Kirkley**^{†,*}, Information theoretic network approach to socioeconomic correlations. *Physical Review Research* **2**, 043212 (2020).
6. A. A. Klishin, **A. Kirkley**, D. J. Singer, and G. van Anders, Robust design from systems physics. *Scientific Reports* **10**, 14334 (2020).
7. S. Feng and **A. Kirkley**^{†,*}, Mixing patterns in interdisciplinary co-authorship networks at multiple scales. *Scientific Reports* **10**, 7731 (2020).
8. **A. Kirkley**^{†,*}, G. T. Cantwell, and M. E. J. Newman, Balance in signed networks. *Physical Review E* **99**, 012320 (2019).
9. **A. Kirkley**[†], H. Barbosa, M. Barthélemy, and G. Ghoshal, From the betweenness centrality in street networks to structural invariants in random planar graphs. *Nature Communications* **9**, 2501 (2018).

Funding

National Defense Science and Engineering Graduate (NDSEG) Fellowship 2019-2022 Class of Fellows	2019 –
National Science Foundation Graduate Research Fellowship (NSF GRFP) Awarded 2019, but declined to accept NDSEG Fellowship	2019 (declined)
University of Michigan Rackham Research Grant \$3,000 USD award for supporting research-related expenses	2019

Awards and Honors

Summa cum laude, University of Rochester Awarded to top 2% of students in the graduating class across all fields	2017
Phi Beta Kappa, University of Rochester Awarded to top $\sim 1\%$ of students in the junior class across all fields	2016
University of Rochester Physics Honors Prize Awarded to top performing junior undergraduate in physics	2016

Teaching Experience

Center for the Study of Complex Systems, University of Michigan Teaching Assistant, Network Theory	2018–
Department of Physics, University of Michigan Teaching Assistant, Mechanics	2017–2018
Department of Physics, University of Rochester Teaching Assistant, Mechanics Teaching Assistant, Introductory General Physics	2014–2016
Department of Mathematics, University of Rochester Mathematics Tutor	2014–2015

Technical Skills

Programming Languages: Python, C++, Cython, Bash, Stan

Skills and Coursework:

Data science: network analysis, Bayesian inference, geospatial analysis, time series modelling, data mining, algorithms, deep learning, optimization, high performance computing

Pure mathematics: probability and statistics, linear algebra, discrete math, algebra, analysis, differential equations

Physics: statistical physics, computational physics, thermodynamics, quantum theory, mechanics, electromagnetism

Other Academic Activities

Peer Reviewed Conference Contributions

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| “Probabilistic Models on Networks with Loops”
Talk, NetSci 2020, Online | September, 2020 |
| “Balance in Signed Networks”
Poster, NetSci 2019, University of Vermont Complex Systems Center | May, 2019 |

Invited Talks

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| “Complex Networks: From Theoretical Modelling to Applications in
Urban Data Science”
School of Data Science, City University of Hong Kong | February, 2021 |
| “Information theoretic network approach to socioeconomic correlations”
Network Science Institute, Northeastern University | December, 2020 |
| “Statistical Physics and Social Systems”
Faculty of Education, University of Hong Kong | January, 2020 |

Academic Workshops

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| Network Epidemiology in the Time of Coronavirus (Net-COVID)
University of Maryland COMBINE and University of Vermont (Online) | April, 2020 |
| Complex Networks Winter Workshop
University of Laval and University of Vermont | December, 2019 |
| Complex Systems Summer School
Santa Fe Institute | June, 2019 |

Project Team Member

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| Michigan Data Informed Cities for Everyone (M-DICE)
Utilized methods in network science and statistical inference
to assist in identification of regions for effective scooter geo-fencing
and bike lane construction
Communicated results regularly with city of Detroit to impact local policy | 2020 – |
| Michigan Data Science Team
Implemented time series models to predict future development indicator data
for the United Nations Development Goals Challenge
Placed 18th out of over 2000 competitors by the challenge deadline
Implemented Natural Language Processing models to predict drug ratings
given customer reviews | 2019 – |

Refereed Journals

- Journal of Complex Networks
- Scientific Reports
- ACM Transactions on Knowledge Discovery from Data
- Knowledge and Information Systems
- Humanities and Social Sciences Communications