Curriculum Vitae

Alec Kirkley

Contact Information

University of Michigan Department of Physics 450 Church Street Ann Arbor, MI, 48109, USA Website: aleckirkley.com Google Scholar: link

Education

University of Michigan, Department of Physics	2018 -
Ph.D Candidate in Physics. Advisor: Mark Newman	
Research areas: Network Theory, Urban Science, Statistical Physics	
University of Michigan, Department of Physics M.S. in Physics	2018
University of Rochester, Department of Physics & Astronomy B.S. in Physics and B.A. in Mathematics, <i>summa cum laude</i>	2017

Publications

Working Papers

- 1. A. Kirkley and M. E. J. Newman, Identifying representative community structures in networks.
- 2. S. Mimar, A. Kirkley, D. Soriano-Panos and G. Ghoshal, Modeling the success of cities through human mobility flows.
- 3. A. Kirkley and P. S. Chodrow, Urban segregation through the lens of network diffusion.
- 4. G. Li, A. Kirkley, D. Krofcheck, and B. Klein, Entropy in mountainous river networks.

Papers Under Review

- 5. **A. Kirkley**^{†,*}, G. T. Cantwell, and M. E. J. Newman, Message passing for probabilistic models on networks with loops. *Preprint arXiv:2009.12246* (2020). Accepted with minor revision at *Science Advances*.
- 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.
- 7. 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 review at *Scientific Reports*.
- 8. G. T. Cantwell, **A. Kirkley**, and M. E. J. Newman, The friendship paradox in real and model networks. *Preprint arXiv:2012.03991* (2020). Submitted to *Journal of Complex Networks*.

[†] first/co-first authorship, * corresponding authorship

Peer Reviewed Papers

- 9. **A. Kirkley**^{†,*}, Information theoretic network approach to socioeconomic correlations. *Physical Review Research* **2**, 043212 (2020).
- 10. A. A. Klishin, **A. Kirkley**, D. J. Singer, and G. van Anders, Robust design from systems physics. *Scientific Reports* **10**, 14334 (2020).
- 11. S. Feng and **A. Kirkley**^{†,*}, Mixing patterns in interdisciplinary co-authorship networks at multiple scales. *Scientific Reports* **10**, 7731 (2020).
- 12. **A. Kirkley**^{†,*}, G. T. Cantwell, and M. E. J. Newman, Balance in signed networks. *Physical Review E* **99**, 012320 (2019).
- 13. A. Kirkley[†], H. Barbosa, M. Barthelemy, 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) For 2019-2022 Class of Fellows	ellowship	2019 –
National Science Foundation Graduate Research Fellowship (NSF Awarded 2019, but declined to accept NDSEG Fellowship	F GRFP)	2019 (declined)
University of Michigan Rackham Research Grant		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	2016	

Awarded to top performing junior undergraduate in physics

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 and Coursework

Languages/frameworks

• Python, C++, Cython, Bash, Stan, Git

Methods

• Graph algorithms, combinatorial and continuous optimization, statistical physics, bayesian inference, high performance computing, deep learning, data mining, time series analysis, geospatial analysis, natural language processing, web scraping

Courses at University of Michigan

- Statistical Inference, Estimation, and Learning
- Mining of Large Scale Graph Data
- Theory of Social and Technological Networks
- Advanced Condensed Matter Physics: Statistical Field Theory and Critical Phenomena
- Statistical Physics
- Quantum Theory

Courses at University of Rochester

- Network Science Analytics (graduate level)
- Data Science I: Modern Statistics (graduate level)
- Data Science II: Complexity (graduate level)
- Computational Physics
- Physics and Finance
- Partial Differential Equations and Fourier Analysis
- Real Analysis
- Abstract Algebra
- Advanced Linear Algebra
- Game Theory
- Intermediate Microeconomics
- Intermediate Macroeconomics

Other Academic Activities

Peer Reviewed Conference Contributions "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 "Information theoretic network approach to socioeconomic correlations" Network Science Institute, Northeastern University	December, 2020
"Statistical Physics and Social Systems" Foundations of Social Data Science course, University of Hong Kong	January, 2020
Academic Workshops 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
Refereed Journals Scientific Reports Journal of Complex Networks Humanities and Social Sciences Communications	
Clubs and Organizations	
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 –