**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*.

### Peer Reviewed Papers

2. 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*.

3. **A. Kirkley**†,*, G. T. Cantwell, and M. E. J. Newman, Belief propagation for networks with loops. *Science Advances* **7**, eabf1211 (2021).

4. S. Feng and **A. Kirkley**†,*, Integrating online and offline data for crisis management: Online geolocalized emotion, policy response, and local mobility during the COVID crisis. *Scientific Reports* **11**, 8514 (2021).

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. 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) Fellowship** 2019 –
2019-2022 Class of Fellows

**National Science Foundation Graduate Research Fellowship (NSF GRFP)** 2019 (declined)
Awarded 2019, but declined to accept NDSEG Fellowship

**University of Michigan Rackham Research Grant** 2019
$3,000 USD award for supporting research-related expenses

## Awards and Honors

**Summa cum laude, University of Rochester** 2017
Awarded to top 2% of students in the graduating class across all fields

**Phi Beta Kappa, University of Rochester** 2016
Awarded to top $\sim 1\%$ of students in the junior class across all fields

**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** 2018–
Teaching Assistant, Network Theory

**Department of Physics, University of Michigan** 2017–2018
Teaching Assistant, Mechanics

**Department of Physics, University of Rochester** 2014–2016
Teaching Assistant, Mechanics
Teaching Assistant, Introductory General Physics

**Department of Mathematics, University of Rochester** 2014–2015
Mathematics Tutor

## 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

"Probabilistic Models on Networks with Loops" — September, 2020
NetSci 2020, Online

"Balance in Signed Networks" — May, 2019
NetSci 2019, University of Vermont Complex Systems Center

### Invited Talks

"Complex Networks: From Theoretical Modelling to Applications in Urban Data Science" — February, 2021
School of Data Science, City University of Hong Kong

"Information theoretic network approach to socioeconomic correlations" — December, 2020
Network Science Institute, Northeastern University

"Statistical Physics and Social Systems" — January, 2020
Faculty of Education, University of Hong Kong

### Academic Workshops

Network Epidemiology in the Time of Coronavirus (Net-COVID) — April, 2020
University of Maryland COMBINE and University of Vermont (Online)

Complex Networks Winter Workshop — December, 2019
University of Laval and University of Vermont

Complex Systems Summer School — June, 2019
Santa Fe Institute

### Project Team Member

**Michigan Data Informed Cities for Everyone (M-DICE)** — 2020 –
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

**Michigan Data Science Team** — 2019 –
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

### Refereed Journals

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