

Curriculum Vitae  
**Alec Kirkley**

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**Contact Information**

University of Michigan Department of Physics  
450 Church Street  
Ann Arbor, MI, 48109, USA

Email: akirkley@umich.edu  
Website: aleckirkley.com  
Google Scholar: link

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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*

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**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. S. Feng and **A. Kirkley**<sup>†,\*</sup>, Integrating online and offline data for crisis management: Online geolocalized emotion, policy response, and local mobility during the COVID crisis. *Preprint arXiv:2009.10461* (2020). In press at *Scientific Reports*.
3. **A. Kirkley**<sup>†,\*</sup>, 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**<sup>†,\*</sup>, 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**<sup>†,\*</sup>, Mixing patterns in interdisciplinary co-authorship networks at multiple scales. *Scientific Reports* **10**, 7731 (2020).
8. **A. Kirkley**<sup>†,\*</sup>, G. T. Cantwell, and M. E. J. Newman, Balance in signed networks. *Physical Review E* **99**, 012320 (2019).
9. **A. Kirkley**<sup>†</sup>, 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

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

## Awards and Honors

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

## Teaching Experience

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

## Technical Skills

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**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

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### Peer Reviewed Conference Contributions

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| “Probabilistic Models on Networks with Loops”<br>Talk, NetSci 2020, Online                        | September, 2020 |
| “Balance in Signed Networks”<br>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<br>Urban Data Science”<br>School of Data Science, City University of Hong Kong | February, 2021 |
| “Information theoretic network approach to socioeconomic correlations”<br>Network Science Institute, Northeastern University                    | December, 2020 |
| “Statistical Physics and Social Systems”<br>Faculty of Education, University of Hong Kong   | January, 2020  |

### Academic Workshops

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

### Project Team Member

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