

# Ian Leifer

3050 Edwin Ave, Apt. 3H, Fort Lee, NJ, 07024

+1(929)257-6715 ★ [ianleifer93@gmail.com](mailto:ianleifer93@gmail.com) ★ <https://ianleifer.github.io/>

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PhD candidate in complex networks. Experienced in working with biological data on every level from scraping and wrangling to machine learning, statistical analysis and visualization. Seeking a data scientist position in the wellness industry, which will allow me to apply my skills of data analysis and communication with my passion for health and wellness while being of service to society.

## EDUCATION

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### PhD Physics (Complex networks)

Expected graduation Mar. 2022

*The Graduate Center, City University of New York (New York, NY)*

Scientific Advisor: Dr. Hernan Makse.

**Thesis: "Symmetry-inspired analysis of biological networks".**

- Analyzed biological data using data science, statistical analysis and machine learning.
- Created and led a highly cross-disciplinary collaboration between multiple research groups.

**Project: Analyzed biological data to uncover functional building blocks of directed networks.**

- Scraped more than 450 networks across 37 databases and wrangled them into the same format.
- Formulated an algorithm and implemented it in an R package with C insertions.
- Parallelized the R package above to analyze data on 100,000 networks.
- Developed a framework visualizing outputs based on the analysis of over 450 networks up to 30,000 nodes.

**Project: Performed statistical analysis of biological data to prove graph theoretical hypothesis.**

- Formulated and applied a statistical hypothesis testing framework to look for cross-correlations in the subsets of data based on 4000 signals measured 1500 times.
- Developed a framework to visualize the cross-correlation data on 4000 signals.

**Project: Created optimization models for symmetry-driven repairs of graphs.**

- Using the API scraped 170,000 data files and compiled them into a few interpretable datasets.
- Built two optimization models based on integer programming and cluster analysis aimed at repairing directed and undirected graphs with missing edges.
- Developed a framework to visualize an abstract mathematical concept of the automorphism group to interpret outputs of the optimization model.

### MSc Solid State Physics

Fall 2014-Spring 2016

*VSHOPF UNN (Nizhny Novgorod, Russia)*

### BSc Physics

Fall 2010-Spring 2014

*VSHOPF UNN (Nizhny Novgorod, Russia)*

## PROFESSIONAL EXPERIENCE

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### Teaching Assistant

Sep 2017-present

*City College of New York and Graduate Center CUNY*

Teaching physics labs for undergraduate students

- Was an instructor in a pilot innovative physics teaching program using education research-based materials.
- Designed a semi-automated grading software improving objectivity and doubling the speed.
- Taught a workshop for PhD students "Introduction to Git".
- Presented a workshop for PhD students "Introduction to R for Network Analysis. Symmetries in networks".

### Software Engineer C/C++

Aug 2013-Apr 2015

*MERA. Software Services Company. Nizhny Novgorod, Russia.*

Developing the driver for Radio Base Stations.

- Implemented the support of IPv6 by our driver as a part of an agile team.
- Uncovered a major issue in the testing process and implemented a project to fix it.
- Led a team of 3 people for 3 months successfully implementing the project improving the testing process.

### Software Engineering Intern C/C++

Summer 2013

*MERA. Software Services Company. Nizhny Novgorod, Russia.*

## PUBLICATIONS

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9. **Ian Leifer**, David Phillips, Francesco Sorrentino and Hernán A. Makse. Symmetry-driven link prediction in networks through pseudobalanced coloring optimization. Under review **Journal of Statistical Mechanics: Theory and Experiment**, 2021.
8. Paolo Boldi, **Ian Leifer**, and Hernán A. Makse. Quasi-Fibrations of Graphs to Find Symmetries in Biological Networks. Under review **Chaos**, 2021.
7. Amirhossein Nazerian, Shirin Panahi, **Ian Leifer**, David Phillips, Hernán A. Makse, and Francesco Sorrentino. Matryoshka and Disjoint Cluster Synchronization of Networks. Under review **Chaos**, 2021.
6. Higor S. Monteiro, **Ian Leifer**, Saulo D. S. Reis, José S. Andrade Jr., and Hernán A. Makse. Efficient algorithmic paradigm to identify partial synchrony in information-processing networks using graph fibrations. In press **Chaos, Solitons & Fractals**, 2022.
5. **Ian Leifer**, Mishael Sánchez, Cecilia Ishida, and Hernán A. Makse. Predicting synchronized gene coexpression patterns from fibration symmetries in gene regulatory networks in bacteria. **BMC Bioinformatics** 22, 363 (2021).
4. **Ian Leifer**, Flaviano Morone, Saulo D. S. Reis, José S. Andrade Jr., Mariano Sigman, and Hernán A. Makse. Circuits with broken fibration symmetries perform core logic computations in biological networks. **PLoS Comput Biol**, 16(6): e1007776 (2020).
3. Flaviano Morone, **Ian Leifer**, and Hernán A. Makse. Fibration symmetries uncover the building blocks of biological networks. **PNAS USA**, 117 (15), 8306-8314 (2020).
2. **Ian Leifer**, and Lev Leifer. Small business valuation with use of cash flow stochastic modeling. **Proceedings of SMRLO'16**, pp. 511-516 (2016).
1. **Ian Leifer**, and Lev Leifer. Investigation of investments in foreign real estate effectiveness. **Proceedings of scientific-practical conference for high-schools**, 2009.

## TALKS AND AWARDS

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- **Award:** Doctoral Student Research Grant (Round 15, 2020).
- **Invited talk:** "Symmetry-inspired building blocks perform core logic computations in directed networks". DynaMo, a satellite meeting at Networks 2021.
- "Fibration symmetries uncover the building blocks of biological networks". APS March meeting 2021.
- "Fibration symmetries uncover the building blocks of biological networks". Complex2020.
- "Fibration symmetries uncover the building blocks that perform core logic computations in biological networks". Synthetic Biology Approaches to Improve Human and Environmental Health 2020.
- "Small Business Valuation with Use of Cash Flow Stochastic Modeling". SMRLO'16.
- "Development of statistical models for simulation of natural disasters on example of forest fires". Intel ISEF 2009 (local chapter).

## SKILLS

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<i>Programming languages</i>	<b>R</b> (Advanced), <b>C/C++</b> (Advanced), <b>Python</b> (Intermediate) Bash (Intermediate), Matlab (Intermediate), Perl (Intermediate)
<i>Human languages</i>	Russian (fluent), English (fluent)
<i>Software development</i>	<b>Linux</b> , <b>pandas</b> , <b>NumPy</b> , <b>tidyverse</b> , <b>Git</b> , <b>Agile Methodologies</b> TCP/IP stack, Rcpp, Selenium, Inkscape, Keras, Beautiful Soup

## OTHER ACTIVITIES

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- Played on Ultimate Frisbee college team.
- Underwent air force officer training.
- Other interests include hiking, yoga, mental and physical wellness and spirituality.