# YU TIAN

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#### **RESEARCH INTEREST**

Network Science, Network Dynamics and Optimisation, Mathematical Statistics and Data Science.

### ACADEMIC POSITIONS

Nordita, Stockholm University and KTH Royal Institute of Technology Stockholm, Sweden Research Fellow Oct. 2022-

- Funding: Wallenberg Initiative on Networks and Quantum information (WINQ).
- PIs: Prof. Frank Wilczek (MIT) and Prof. John Wettlaufer (Yale University).

#### EDUCATION

University of OxfordOxford, UKPh.D. MathematicsSep. 2018 - Oct. 2022EPSRC Centre for Doctoral Training for Industrially Focused Mathematical Modelling (InFoMM CDT)• Thesis: Role Extraction, Dynamics, and Optimisation on Networks; supervised by Prof. Renaud

• Thesis: Role Extraction, Dynamics, and Optimisation on Networks; supervised by Prof. Renaud Lambiotte (Oxford), and industrial collaborators Dr. Alisdair Wallis, Dr. Sebastian Lautz (Tesco).

#### HONOURS AND AWARDS

- EPSRC InFoMM CDT Studentship (fully-funded PhD studentship, 2018 2022)
- First Prize in China Undergraduate Mathematical Contest in Modelling (Beijing, 09/2016 & 09/2015)
- First-Class People's Scholarship (5% in academia, 2014-2016)
- National Scholarship (5% in academic, research and other activities, 2014-2015)

#### PUBLICATIONS AND PREPRINTS

#### Preprints

- 8. L. Gyllingberg<sup>\*</sup>, **Y. Tian**<sup>\*</sup>, and D. Sumpter. A minimal model of cognition based on oscillatory and reinforcement processes. preprint, arXiv:2402.02520, 2024. (Submitted to J. R. Soc. Interface)
- 7. Y. Tian<sup>\*</sup>, Z. Lubberts<sup>\*</sup> and M. Weber. *Curvature-based clustering on graphs*. preprint, arXiv:2307.10155, 2023. (Under Review at JMLR)
- 6. Y. Tian and R. Lambiotte. Structural balance and random walks on complex networks with complex weights. preprint, arXiv:2307.01813, 2023. (Accepted by SIAM J. Math. Data Sci.)

#### Peer-reviewed Publication in Mathematics and Physics

- 5. Y. Tian and R. Lambiotte. Spreading and structural balance on signed networks. SIAM J. Appl. Dyn. Syst., 23(1), 50 80, 2024.
- X. Meng, X. Hu, Y. Tian, G. Dong, R. Lambiotte, J. Gao, and S. Havlin. Percolation theories for quantum networks, Entropy, 25(11), 1564, 2023.
- 3. Y. Tian, Z. Lubberts and M. Weber. *Mixed-membership community detection via line graph curvature*. NeurIPS Symmetry and Geometry in Neural Representations, 2023.
- 2. Y. Tian and R. Lambiotte. Unifying information propagation models on networks and influence maximization. Phys. Rev. E, 106, 034316, 2022.

#### Peer-reviewed Publication in Interdisciplinary Research

1. Y. Tian, S. Lautz, A. Wallis and R. Lambiotte. *Extracting complements and substitutes from sales data: a network perspective.* EPJ Data Sci., 10:45, 2021.

#### SELECTED COMMUNICATIONS

#### Invited talks

- Seminar at NEtwoRks, Data, and Society (NERDS), IT University of Denmark, Copenhagen, Denmark. (Apr. 2024)
- Seminar at Technical University of Denmark, Copenhagen, Denmark. (Apr. 2024)
- Seminar at Niels Bohr Institute, Copenhagen, Denmark. (Apr. 2024)
- Nordic Workshop on Statistical Physics: Biological, Complex and Non-equilibrium Systems, Stockholm, Sweden. (Mar. 2024)
- Seminar at Vermont Complex Systems Center (Virtual), Vermont, US. (Mar. 2024)
- Seminar at Binghamton Center of Complex Systems (Virtual), New York, US. (Feb. 2024)
- Applied and Interdisciplinary Seminar at University of Bath, Bath, UK. (Feb. 2024)
- NetPLACE Seminar (Virtual). (Feb. 2024)
- Seminar at Imperial College London, London, UK. (Feb. 2024)
- CASA Seminar at University Colleague London, London, UK. (Feb. 2024)
- Seminar at Queen Mary, University of London, London, UK. (Jan. 2024)
- Seminar at Linköping University, Linköping, Sweden. (Sep. 2023)
- Seminar at Indiana University (Virtual), Bloomington, US. (Sep. 2023)
- Seminar at Northwestern University (Virtual), Chicago, US. (Aug. 2023)
- BrainNet workshop at KTH, Stockholm, Sweden. (May, 2023)
- SIAM Conference on Applications of Dynamical System, Portland, US. (May 2023)
- Seminar at Uppsala University, Uppsala, Sweden. (May 2023)
- Soft Matter Seminar at Nordita, Stockholm, Sweden. (Oct. 2022)
- Seminar at Technical University of Munich (Virtual), Munich, Germany. (May 2022)
- Seminar at Dartmouth College (Virtual), Hanover, US. (Jan. 2022)
- Oxford Networks Seminar (Virtual), University of Oxford, UK. (May 2021)

Contributed talks

- WINQ Mini-Workshop at Nordita, Stockholm, Sweden. (Feb. 2023)
- The 4th IMA Conference on The Mathematical Challenges of Big Data, University of Oxford, UK. (Sep. 2022)
- SIAM Workshop on Network Science (Virtual). (Sep. 2022)
- Conference on Network Sciences (NetSci) (Virtual), Shanghai, China. (July. 2022)
- Industrial Mathematics in the 21st Century: A cornucopia of unsolved problems, University of Oxford, UK. (June 2022)
- InFoMM Annual Meeting, University of Oxford, UK. (June 2022)
- SIAM UKIE National Student Chapter Conference, Edinburgh, UK. (June 2022)
- The 13th International Conference on Complex Networks (CompleNet) (Virtual), Exeter, UK. (May June 2022)
- The 10th International Conference on Complex Networks and their Applications (CNA), Madrid, Spain. (Nov. 2021)
- Conference on Complex Systems (CCS), Lyon, France. (Oct. 2021)
- InFoMM Annual Meeting (Virtual), University of Oxford, UK. (July 2021)

### **SUPERVISION**

• Linnéa Gyllingberg (PhD student at Uppsala University, mentored since 2022)

### TEACHING EXPERIENCE

University of Oxford Tutor

**Oxford, UK** Oct. 2021 - Dec. 2021

• Introduction to Statistics, Michaelmas Term 2021

Teaching Assistant

#### PROFESSIONAL EXPERIENCE

#### **Invited Participant**

- ELLIIT Focused Period on Network Dynamics and Control, Linköping, Sweden. (Sep. 2023) - Oct. 2023)
- WINQ Workshop on Complex Dynamical Networks, Stockholm, Sweden. (Jun. 2022)

#### Reviewers

- Journals: Science Advances, Scientific Reports, PNAS Nexus, Physica A: Statistical Mechanics and its Applications, Advances in Complex Systems.
- **Conference**: International AAAI Conference on Web and Social Media.

#### **Organisers**

• WINQ Programme on Complex Dynamical Networks, Nordita	Apr. 2024 - May 2024
• Session at INFORMS 2023 Annual Meeting, Phoenix	Oct. 2023
Session Title: Networks in Machine Learning and Data Science	
• WINQ Mini-Workshop, Nordita	Feb. 2023
• WINQ Seminar, Nordita	Oct. 2022 - Present
• Oxford Networks Seminar, University of Oxford	Oct. 2021 - June 2022
Sorvige and Outroach	

• Equity, Diversity and Inclusion (EDI) Committee, Nordita, Member Oct. 2023 - Present

### INDUSTRIAL EXPERIENCE

#### University of Oxford Oxford, UK InFoMM CDT Mini-Project: Inter-District Packaged Gas Optimisation. Jul. - Sep. 2019

Supervisors: Prof. Raphael Hauser (Oxford), Dr. Peter Connard, Dr. Harsida Jenkins (Air Products)

- Formulated the problem of both inventory management and transshipment of products as a mixed integer programming, and reviewed state-of-the-art techniques.
- Proposed several relaxation methods based on Lagrangian relaxation to improve solving efficiency.

InFoMM CDT Mini-Project: Halo Effect and Demand Transfer on Products. Apr. - Jun. 2019 Supervisors: Prof. Renaud Lambiotte (Oxford), Dr. Alisdair Wallis (Tesco).

- Devised a method combining Poisson processes with time series analysis to identify the product relationships from aggregated sales data quantitatively.
- Applied regression techniques, and proposed several validation methods with real data.

### **TECHNOLOGY SKILLS**

- Programming: Proficiency in Python (pandas, numpy, scipy, networkx, statsmodels, scikit-learn etc), MATLAB; Familiarity with R Language, C Language.
- Optimisation: MOSEK, Lingo.

## **MEMBERSHIPS**

- The Institute for Operations Research and the Management Sciences (INFORMS), Member
- Society for Industrial and Applied Mathematics (SIAM), Early Career Member
- Institute of Mathematics and its Applications (IMA), Associate Member