

# Francesco Sanna Passino — CV

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## Experience

- **Imperial College London** **London, UK**
  - Lecturer in Statistics, Department of Mathematics 2022–present
  - Research Associate, Department of Mathematics 2020–2021
  - Graduate Teaching Assistant, Department of Mathematics 2017–2020
- **Spotify** **London, UK**
  - Research Scientist Intern, Tech Research, Personalization Mission summer 2020
- **Microsoft Corporation** **Redmond, USA**
  - Data Science Intern, Microsoft Defender Advanced Threat Protection, Data Science Team summer 2019
- **Los Alamos National Laboratory** **Los Alamos, USA**
  - Graduate Research Intern, Advanced Research in Cyber Systems (A-4) summer 2018

## Education

- **Imperial College London** **London, UK**
  - PhD in Statistics 2017–2020
    - Funded by an EPSRC-EU Scholarship. Supervised by Professor Nick Heard.
    - Thesis title: “Latent factor representations of dynamic networks with applications in cyber-security”.
  - MSc in Statistics, Distinction 2016–2017
- **University of Glasgow** **Glasgow, UK**
  - BSc in Statistics, First Class Honours 2015–2016
- **University of Bologna** **Bologna, Italy**
  - Laurea in Scienze Statistiche (BSc in Statistical Sciences), 110/110 cum laude 2013–2016

## Publications

Links to published and submitted papers, code and presentations are available at <https://fraspas.github.io/publications/>.

- Sanna Passino, F.** and N. A. Heard (2023). “Mutually exciting point process graphs for modelling dynamic networks”. In: *Journal of Computational and Graphical Statistics* 32.1, pp. 116–130.
- Sanna Passino, F.** and N. A. Heard (2022). “Latent structure blockmodels for Bayesian spectral graph clustering”. In: *Statistics and Computing* 32.22.
- Sanna Passino, F.**, N. A. Heard, and P. Rubin-Delanchy (2022). “Spectral clustering on spherical coordinates under the degree-corrected stochastic blockmodel”. In: *Technometrics* 64.3, pp. 346–357.
- Sanna Passino, F.**, M. J. M. Turcotte, and N. A. Heard (2022). “Graph link prediction in computer networks using Poisson matrix factorisation”. In: *Annals of Applied Statistics* 16.3, pp. 1313–1332.
- Sanna Passino, F.**, A. S. Bertiger, J. C. Neil, and N. A. Heard (2021). “Link prediction in dynamic networks using random dot product graphs”. In: *Data Mining and Knowledge Discovery* 35.5, pp. 2168–2199.
- Sanna Passino, F.**, L. Maystre, D. Moor, A. Anderson, and M. Lalmas (2021). “Where To Next? A Dynamic Model of User Preferences”. In: *Proceedings of the Web Conference 2021. WWW '21*. Ljubljana, Slovenia: Association for Computing Machinery, pp. 3210–3220.
- Sanna Passino, F.** and N. A. Heard (2020). “Bayesian estimation of the latent dimension and communities in stochastic blockmodels”. In: *Statistics and Computing* 30.5, pp. 1291–1307.
- Sanna Passino, F.** and N. A. Heard (2020). “Classification of periodic arrivals in event time data for filtering computer network traffic”. In: *Statistics and Computing* 30.5, pp. 1241–1254.
- Sanna Passino, F.** and N. A. Heard (2019). “Modelling dynamic network evolution as a Pitman-Yor process”. In: *Foundations of Data Science* 1.3, pp. 293–306.

## Commentaries

- Sanna Passino, F.**, N. M. Adams, E. A. K. Cohen, M. Evangelou, and N. A. Heard (2023). “Statistical cybersecurity: a brief discussion on challenges, data structures and future directions”. In: *Harvard Data Science Review* 5.1.

## Submitted

- Sanna Passino, F.**, A. Mantziou, D. Ghani, P. Thiede, R. Bevington, and N. A. Heard (2023). “Unsupervised attack pattern detection in honeypot data using Bayesian topic modelling”. In: *arXiv e-prints*. arXiv: 2301.02505.

## Patents

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- Bertiger, A. S., **F. Sanna Passino**, and J. C. Neil (2022). *Detecting anomalous network activity*. International Pub. No. WO/2021/126489; US Patent Office Patent No. US 11,418,526 B2.
- Turcotte, M. J. M., **F. Sanna Passino**, and N. A. Heard (2020). *Real-world network link analysis and prediction using extended probabilistic matrix factorization models with labeled nodes*. International Pub. No. WO/2020/191001.

## Teaching

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- Imperial College London
  - 2022/23-present – MATH70072 - *Big Data* – MSc Statistics;
  - 2021/22-present – MATH70099 - *Big Data: Statistical scalability with PySpark* – MSc Machine Learning and Data Science;
  - 2021/22-present – Introduction to Python – MSc Statistics.

## Funding and awards

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### Research funding

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- **Cecilia Tanner Research Funding – Research Impact (RI) Scheme 2021 & 2023**  
*Funding in support of the research strategy of the Department of Mathematics at Imperial College London.*
- **Microsoft Security Research AI RFP 2020/21**  
*Named PDRA in Professor Nick Heard's proposal "Host-based event prediction for automatic defence in cyber-security".*
- **EPSRC-EU Scholarship – Imperial College London, Department of Mathematics**  
*Contribution for PhD studies and research at Imperial College London.*

### Teaching awards

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- **Faculty of Natural Sciences Prize for Excellence in the Support of Teaching and Learning 2018**  
*Prize awarded to recognise major contributions to learning and teaching at Imperial College London.*

### Travel funding

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- **SAS Junior Travel Support – ISBA 2022 World Meeting, Montreal (Canada)**  
*Travel support for junior researchers to attend the ISBA 2022 World Meeting.*

### Poster prizes

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- **Microsoft Prize – BAYSM22 – Centre de Recherches Mathématiques, University of Montréal**  
*Poster title: "Latent structure blockmodels for Bayesian spectral graph clustering".*
- **Best Poster Prize – Postgraduate Forum 2018, Statistics section – Imperial College London**  
*Poster title: "Statistical methods for separating human and automated activity in computer network traffic".*
- **Best Poster Prize – Data Science for Cyber-Security Conference 2017 – Imperial College London**  
*Poster title: "Modelling new edge formation in large computer networks".*

### Student prizes

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- **Distinguished Dissertation Award 2022 – The Classification Society**  
*Award for an outstanding PhD dissertation on the theme of clustering, classification, or related areas of data analysis.*
- **Doris Chen Merit Award 2019 – Department of Mathematics, Imperial College London**  
*Prize awarded to recognise exceptional early promise and achievement in PhD studies.*
- **Winton Prize for Best MSc in Statistics Student 2017 – Imperial College London**  
*Prize awarded to the best student in the MSc in Statistics at Imperial College London – Class of 2017.*
- **Santander Master Scholarship 2016 – Imperial College London**  
*Awarded to 10 exceptional offer holders for a Master course at Imperial College London in 2016.*
- **Shell Prize 2016 – University of Glasgow**  
*Prize awarded to the best fourth year student in Statistics (awarded in the third year of studies).*
- **University of Bologna Study Grant – 2016**  
*Scholarship awarded to the best students at the university. Ranked 1st in the School of Economics, Management and Statistics.*

## Memberships

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- Member, Academic Centre of Excellence in Cyber Security Research, Imperial College London;
- Affiliate, Institute of Security Science and Technology (ISST), Imperial College London;
- *International Society for Bayesian Analysis; Royal Statistical Society.*

## Talks, poster presentations and study groups

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### Invited talks and seminars

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- December, 2023 – 16<sup>th</sup> Conference on Computational and Methodological Statistics (CMStatistics 2023), Berlin (Germany)  
*Bayesian nonparametric projected normal mixture models for spectral graph clustering with degree heterogeneity*

- November, 2023 – Statistics Seminars, King’s College London (UK)  
*On robust filtering methods via score-driven models*
- August, 2023 – 6<sup>th</sup> International Conference in Econometrics and Statistics (EcoSta 2023), Tokyo (Japan)  
*Unsupervised attack pattern detection in cyber-security using Bayesian topic modelling*
- June, 2023 – Workshop in Approximation Methods in Bayesian Analysis, CIRM, Marseille (France)  
*Bayesian cluster-based variable-order Markov models*
- December, 2022 – 15<sup>th</sup> Conference on Computational and Methodological Statistics (CMStatistics 2022), London (UK)  
*Mutually exciting point process graphs for modelling dynamic networks*
- November, 2022 – Securonix Threat Research Academic Seminars, Securonix (Online)  
*Unsupervised attack pattern detection in cyber-security using topic modelling*
- June, 2022 – The Classification Society Annual Meeting, Waterloo (Canada)  
*Model selection in spectral graph clustering under the stochastic blockmodel*
- May, 2022 – Machine Learning & Cyber-Security Workshop, Imperial College London (UK)  
*Unsupervised attack pattern detection in cyber-security using topic modelling*
- April, 2022 – StatML Workshop, Amazon, Berlin (Germany)  
*Latent structure models for Bayesian spectral graph clustering*
- November, 2021 – StatScale Seminars, Lancaster University (UK)  
*Mutually exciting point process graphs for modelling dynamic networks*
- May, 2021 – Statistics Seminars, University of Bologna, Bologna (Italy)  
*Model selection and latent substructure inference in spectral graph clustering*
- May, 2020 – Statistics Seminars, Collegio Carlo Alberto, Turin (Italy)  
*Bayesian estimation of the latent dimension and communities in stochastic blockmodels*
- February, 2020 – Statistics Seminars, University of Kent, Canterbury (UK)  
*Bayesian estimation of the latent dimension and communities in stochastic blockmodels*
- July, 2019 – Machine Learning & Security Collaboration Meetings, Microsoft Corporation, Redmond (USA)  
*Some ideas on Bayesian modelling of networks for cyber-security applications*
- March, 2019 – Focussed Research Workshop, University of Bristol, Bristol (UK)  
*Some ideas on Bayesian modelling of networks for cyber-security applications*
- August, 2018 – TtO Seminar Series, CCS-6 Statistical Sciences, Los Alamos National Laboratory, Los Alamos (USA)  
*Separating human and automated activity in computer network traffic*

## Paper presentations.....

- April, 2021 – The Web Conference 2021 - WWW ’21, Virtual Event  
*Where To Next? A Dynamic Model of User Preferences*

## Contributed talks.....

- August, 2021 – Joint Statistical Meetings 2021 (JSM21), Virtual event  
*Mutually exciting point process graphs for modelling dynamic networks*
- December, 2020 – 13<sup>th</sup> Conference on Computational and Methodological Statistics (CMStatistics 2020), Virtual conference  
*Spectral clustering on spherical coordinates under the degree-corrected stochastic blockmodel*
- July, 2019 – Joint Statistical Meetings 2019 (JSM19), Denver (USA)  
*Bayesian estimation of the latent dimension and communities in stochastic blockmodels*

## Poster presentations.....

- June, 2022 – ISBA World Meeting 2022, Montréal (Canada)  
*Unsupervised attack pattern detection in cyber-security using Bayesian topic modelling*
- June, 2022 – BAYSM22, Centre de Recherches Mathématiques, University of Montréal, Montréal (Canada)  
*Latent structure blockmodels for Bayesian spectral graph clustering (awarded the **Microsoft prize**)*
- September, 2019 – Faculty of Natural Sciences Research Showcase, Imperial College London, London (UK)  
*Predicting links in large computer networks using Poisson matrix factorisation*
- September, 2018 – Faculty of Natural Sciences Research Showcase, Imperial College London, London (UK)  
*Statistical methods for separating human and automated activity in computer network traffic*
- July, 2018 – Student Symposium, Los Alamos National Laboratory, Los Alamos (USA)  
*Latent feature models for network link prediction with labelled nodes*
- March, 2018 – 54<sup>th</sup> Gregynog Statistical Conference, Tregynog (UK)  
*Separating human and automated activity in computer network traffic*
- September, 2017 – Data Science for Cyber-Security (DSCS) Conference, London (UK)  
*Modelling new edge formation in large computer networks (awarded the **best poster prize**)*

## Study groups.....

- December, 2018 – Data Study Group, The Alan Turing Institute  
Challenge: “Data science tools for enterprise cyber-security”
- May, 2017 – Data Study Group, The Alan Turing Institute  
Challenge: “What/Who/How of a Cyber Attack”