POLITECNICO DI TORINO

DISMA Dipartimento di Scienze Matematiche G. L. Lagrange
ECCELLENZA 2018 · 2022

Tuesday the 25 September 2018 at 10:00
Politecnico di Torino, DISMA, Aula Buzano (third floor)

Alessandro ZOCCA

Postdoctoral Researcher at Caltech

Rare Events in Stochastic Networks
Theory and Applications

Prof. Giacomo Como introduces the seminar

Abstract

Complex large-scale networks are all around us: wireless networks and cloud services, power grids and electricity markets, transportation systems and the newly introduced ride-sharing mechanisms, and some.
Dr Zocca will give an overview of his current research, which aims to develop new mathematical tools to analyse complex networks and their performance in the presence of uncertainty. He will focus on rare events analysis and large deviations techniques, which in many instances are crucial to correctly assess the network performance and the risk of failures.
During the talk, Dr Zocca will touch upon two main application areas: random-access protocols for wireless networks and power grids with high penetration of renewables. He will first prove, combining results from Statistical Physics, Graph Theory, and Queueing Theory, that rare transitions between transmitting configurations are the cause for poor delay performance of these wireless networks and propose strategies to solve this issue. Then, he will present some novel insights into the interplay between renewable energy sources and power grid reliability. Rare stochastic fluctuations of the power injections, amplified by correlations and network effects, can cause failures and he will discuss various solutions we devised to mitigate their impact and non-local propagation.

Biography

After a Pure Mathematics education in Padova (BSc, 2010) and Cambridge (MSc, 2011), Alessandro Zocca obtained his PhD in Applied Mathematics in 2015 from Eindhoven University of Technology. He received the 2015 Applied Probability Trust Prize for his doctoral thesis, titled “Spatio-temporal dynamics of random-access networks: An interacting particle approach”. He then worked as postdoctoral researcher at CWI in Amsterdam on rare event modelling for power systems in collaboration with prof. Zwart. After having been awarded the NWO Rubicon grant, in September 2017, he joined the group of profs. Wierman and Low at Caltech as postdoctoral researcher to work on the topic “Renewables and uncertainty in future power systems: Mathematical challenges and solutions”.
His research is centred around the study of large-scale social networks where randomness plays a crucial role, in particular, communication networks and power systems. His work lies mostly in the area of Applied Probability but has profound ramifications in other areas, such as Pure Probability, Statistical Physics, Graph Theory, Operations Research, and Algorithm Design.