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OKINAWA INSTITUTE OF SCIENCE AND TECHNOLOGY  
沖縄科学技術大学院大学

THEORETICAL SCIENCES VISITING PROGRAM

# TSVP TALK

## Spectra of Complex Networks

2024  
THU. **Apr. 11**

**15:00–16:00**

**HYBRID** **L4E48, ZOOM**



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Graphs are used to represent complex systems. Examples are food webs representing the trophic interactions between species in large ecosystems, synaptic interactions between neurons in neural systems, or networks depicting the supply of goods between firms in financial systems. A question of interest is how graph topology affects the dynamics of a complex system. In addition, we would like to understand how interaction properties, such as their sign pattern, affect system dynamics. This seminar introduces an avenue of approach in solving this question, which is based on the spectral properties of large random graphs. These latter serve as null models for complex systems, and a description of their eigenvalues and eigenvectors fully determines the dynamics of corresponding linear systems.

**King's College London**

## Izaak Neri

Izaak is a Senior Lecturer in Disordered Systems within the Mathematics Department at King's College London. Izaak engages in two research domains. Firstly, he develops mathematical techniques for analysing complex systems, such as, neural networks, ecosystems, and complex fluids, with a specific focus on understanding the role of network structure and heterogeneity in their dynamics. In this context, he extends methods used for studying systems with all-to-all interactions to those within networked systems. Secondly, Izaak uses stochastic processes to explore nonequilibrium fluctuations in small systems, such as molecular motors, or decision-making processes in noisy environments.

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