

Co-evolving Vertex and Edge Dynamics in Dense Graphs

Adrian Röllin
(NU Singapore)

21 May 2025, 17:15 – 18:15* Berlin time

IRTG 2544: "Stochastic Analysis in Interaction"
— Berlin Probability Colloquium —

FU Berlin
Arnimallee 6
14195 Berlin
SR 031

Abstract

Classical voter processes usually assume that individuals (vertices) change their state based on fixed connections (edges) to their neighbours. In reality, however, social ties or network connections often adapt over time, making the network itself dynamic and creating a two-way interaction between individuals and their links.

In this talk, I will introduce a model where each vertex can have one of two opinions, and edges can appear or vanish depending on whether the connected vertices share the same opinion. Despite this added complexity, we find that if we choose the right scaling and let the number of vertices become large, elegant limiting equations emerge. In particular, the fraction of vertices of each opinion follows a Fisher-Wright diffusion, while the network structure evolves through a stochastic flow influenced by the distribution of opinions. We describe this behaviour using a graphon-valued diffusion, revealing a rich mathematical framework for co-evolving dynamics in dense random graphs.

*Punctual, i.e. sine tempore!