

Abstract: "Rank-based Markov chains, self-organized criticality,
and order book dynamics."

In this talk, we will take a look at some systems of interacting particles on the real line, where the only spatial structure that is relevant for the dynamics is the relative order of the particles. Examples of such systems are the modified Bak-Sneppen model, introduced (as a variation of the original 1993 model) by Meester and Sarkar (2012), Barabási's (2005) queueing system and a variation on the latter due to Gabrielli and Caldarelli (2009), a model for the evolution of the state of an order book on a stock market, introduced by Stigler (1964) and independently by Luckock (2003), and a two models for canyon formation introduced by me (2014). All these systems employ a version of the rule "kill the lowest particle" and seem to exhibit self-organized criticality at a critical point that marks the boundary between an interval where all particles are eventually removed and an interval where particles stay in the system forever.