

Title: Predicting the Unpredictable: Mathematical Models and the Covid 19 Pandemic

Abstract:

Predicting the future of the COVID-19 pandemic is a challenging task and cannot be done without mathematical models describing the progression of the epidemic. Despite large uncertainties about epidemiological relevant medical and social key parameters, mathematical models can provide deep insights into the dependency of the epidemic dynamics on those parameters. Epidemiological models can furthermore be used to develop and improve rational strategies for controlling the COVID-19 epidemics. We focus in the talk on fundamental mathematical features of individual based epidemic models and highlight the close relation to problems in percolation and random graph theory. We emphasize the special role of households and discuss some results and conjectures in first passage percolation and their impact on epidemic processes. Finally, we present some outcomes of the MOCOS microsimulation model for the COVID-19 epidemic in Poland and Germany and reflect on problems related to model-based policy advice for epidemic control.