



北京理工大学

数学与统计学院学术报告

Stability of (sub)critical spatial branching processes with and without immigration

报告人: Emma Horton, University of Warwick

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地点: 文萃楼E 708

摘要: Branching processes and superprocesses provide fundamental models for evolving populations in which individuals reproduce, move through space, and interact with a changing environment. A central question is to understand the long-time behaviour of such systems: when do they become extinct, when do they admit a stable equilibrium, and what universal structures emerge near criticality? In this talk, I will discuss recent results on the limiting behaviour of general non-local branching particle systems and superprocesses, both with and without immigration. Under Perron Frobenius type assumptions on the associated mean semigroup and suitable second moment conditions, we establish asymptotic descriptions of the population. In the critical setting without immigration, we obtain the Kolmogorov survival asymptotics and the corresponding Yaglom limit, identifying the distributional behaviour of the process conditioned on long-term survival. We then turn to systems with immigration and investigate when the continuous arrival of new mass leads to a stable limiting regime. At criticality, we show that the appropriately rescaled process converges to a Gamma distribution, while in the subcritical case we establish convergence to a stationary distribution. In both regimes, stability is characterised by natural necessary and sufficient integral criteria. Together, these results provide a unified framework for understanding the transition between extinction, persistence, and equilibrium in a broad class of spatial branching models. This is based on joint work with Andreas Kyprianou, Pedro Martin-Chavez, Ellen Powell and Victor Rivero.

报告人简介:

Emma completed her PhD at the University of Bath in 2019 under the supervision of Prof. Andreas Kyprianou, Dr Simon Harris and Prof Alex Cox. After this, she spent one year as a postdoc in Nancy, France working with Denis Villemonais before obtaining a research position as chargée de recherche with Inria in Bordeaux. During her time in Bordeaux she also completed a secondment at the University of Melbourne, Australia. Since September 2023 she has held the position of Assistant Professor in the Statistics Department at the University of Warwick. A large part of Emma's research focusses on branching processes and their applications. She is also interested in quasi-stationary distributions, Feynman Kac formulae, semigroup stability and sequential Monte Carlo methods