

SPIELE

Stochastic Processes in EvoLution and Ecology

Bath - Berlin - Frankfurt - Mainz - Warwick

Likai Jiao, Humboldt University Berlin

„Continuum seed-bank model“

In this talk, we introduce the continuum seed-bank model which is a natural generalization of Blath et al. (2016) and Greven, den Hollander, et al. (2022) to accommodate more general dormancy time distributions, such as a type of Pareto distribution. To this end, we first formulate an infinite-dimensional SDE and show that it has a unique strong solution, referred to as the continuum seed-bank diffusion. This diffusion process serves as a Markovian lift of a non-Markovian Volterra process. We construct a discrete-time Wright-Fisher type model with finitely many seed-banks, and demonstrate that the continuum seed-bank diffusion, under the weak* topology, is the scaling limit of the allele frequency process in a suitable sequence of such models. Furthermore, we establish a duality relation between the continuum seed-bank diffusion and a continuous-time and -state Markov jump process. The latter is the block counting process of a partition-valued Markov jump process, referred to as the continuum seed-bank coalescent. We discuss some basic properties of the coalescent process such as scaling limit interpretation, exchangeability, limiting distribution of the ancestral line, and comparisons of $E[T_{\text{MRCA}}]$. We prove that $E[T_{\text{MRCA}}]$ is finite if and only if the expected dormancy time is finite. As a byproduct, we also derive the limiting distribution of the continuum seed-bank diffusion. Additionally, we show that the continuum seed-bank coalescent does not come down from infinity, and provide asymptotic bounds of $E[T_{\text{MRCA}}]$ in certain special cases.

Time: Monday, 29.04.24 – 4 P.M. CET

The lecture will be held online. Interested? Link available from Jochen Blath
blath@math.uni-frankfurt.de