

# Probability Seminar

Organizer: Tai Melcher & George Kordzakhia

Wednesday, 3:10–4:00pm, 330 Evans

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Apr 5      **Matthias Winkel**, Oxford

*Continuum tree asymptotics of discrete fragmentations and applications to phylogenetic models*

At the beginning of this talk I will discuss simple discrete Markovian models of successive fragmentation of masses of integer sizes and fragmentations of the set  $\{1, \dots, n\}$ . We express the transition probabilities in the form of a splitting rule. The branching structure of the fragmentations is naturally encoded in a tree. Motivating examples are due to Aldous (beta-splitting models) and Ford (alpha models). These authors also introduce and study a notion of sampling consistency as  $n$  varies. We will provide an integral representation for (exchangeable) sampling consistent splitting rules.

The main part of the talk will then turn to the continuous-time continuous-mass analogues of these discrete fragmentation processes, mainly due to Bertoin, and establish strong convergence results in the Gromov-Hausdorff sense of rescaled discrete fragmentation trees to certain continuum random trees called self-similar fragmentation trees – these trees were studied before by Haas and Miermont, the notion of convergence was developed for probabilistic applications by Evans, Pitman and Winter.

As an application we obtain continuum random tree limits for Aldous's beta-splitting models and Ford's alpha models confirming in a strong way that the whole discrete tree grows at the same speed as the mean height of a randomly chosen leaf – such quantities were studied by Aldous and Ford. Aldous conjectured weak convergence of leaf-height functions for his beta-splitting models, which we can now prove as a slight variation of our first convergence result – a full convergence result was known previously only for approximations of Aldous's Brownian continuum random tree.

This is joint work with Benedicte Haas (Paris Dauphine), Gregory Miermont (Orsay), and Jim Pitman (Berkeley).