Abstract:

Phylogenetic comparative methods commonly assume that the evolutionary relationships between the studied species are known. With the current wealth of molecular information this most often can be the case but not always. Especially amongst the lower orders we are lacking phylogenies, we might be studying fossil data where the DNA signal has degraded and in fact we are still discovering new species (even among the higher orders). We consider a conditioned on the number of tip species birth-death process. The univariate trait evolving on top of it is modelled by a Brownian motion or Ornstein-Uhlenbeck process. We introduce the concept of the interspecies correlation coefficient which describes how quickly the tip species lose shared ancestral signal as we proceed from a Brownian motion (no drift) to OU processes with more and more drift. In the OU process with a pure birth tree we show a Central Limit Theorem for the contemporary sample average. A phase transition is observed when the drift equals half the speciation rate.
The study of such a model requires knowledge of the moments of times till speciation. This then also allows us to connect our work to moments of tree statistics leading to short derivations for them. The talk is joint work with Serik Sagitov.