

# Limit theorem for trees of alleles with rare mutations

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This subject is based on two papers of J. Bertoin available on ArXiv:

- “*The structure of the allelic partition of the total population for Galton-Watson processes with neutral mutations*” <http://arxiv.org/abs/0711.3852>
- “*A limit theorem for trees of alleles in branching processes with rare neutral mutations*” <http://arxiv.org/abs/0904.0581>

We consider a population that evolves as a Galton-Watson process: each individual gives birth to a random number of children independently from each others and the offsprings distribution is the same for all individuals. We suppose moreover that this population undergoes some neutral mutations (that do not change the offsprings distribution). We decompose the entire population into clusters of individuals having the same type. In a first step, we study the law of the sizes of each clusters.

In a second step, we consider a large initial population and suppose that the mutation rate is small. For some appropriate regime, the sizes of each cluster converges in distribution, when the initial population tends to  $+\infty$  whereas the mutation rate tends to 0, to a continuous-state branching process. We want to study this convergence. Moreover, a natural question is to study the convergence of the whole tree (and not only the sizes of the clusters) which should yields to multitype continuum trees.