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Allelic partitions for Galton–Watson processes

We consider a (sub) critical Galton–Watson process with neutral mutations (infinite alleles model), and decompose the entire population into clusters of individuals carrying the same allele. We specify the law of this allelic partition in terms of the distribution of the number of clone-children and the number of mutant-children of a typical individual. The approach combines an extension of Harris representation of Galton–Watson processes and a version of the ballot theorem.