

# On asymptotics of exchangeable coalescents with multiple collisions

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## Abstract

Analytic techniques (singularity analysis) and probabilistic methods (coupling) are used to derive the asymptotics of the number of collisions,  $X_n$ , of an exchangeable coalescent with multiple collisions ( $\Lambda$ -coalescent) which starts with  $n$  particles.

The possible limiting laws of  $X_n$  include normal, stable with index  $1 \leq \alpha < 2$ , Mittag-Leffler, and distributions of exponential integrals of subordinators. The results are in particular applied to beta-coalescents. The type of the limiting law of  $X_n$  depends on the finiteness or infiniteness of the measures  $x^{-1}\Lambda(dx)$  and  $x^{-2}\Lambda(dx)$ .

The approaches allow to derive the asymptotics of other functionals of the coalescent, the absorption time, the length of an external branch chosen at random from the  $n$  external branches, and the number of collision events that occur before the randomly selected external branch coalesces with one of its neighbours.

Extensions to coalescents with simultaneous multiple collisions ( $\Xi$ -coalescents) are discussed.