

# Freeness to all orders

*jeudi 20 juin 2024 10:00 (1 heure)*

I will describe a theory of free cumulants to all orders  $(g,n)$ , both at the level of combinatorics (surfaced permutations) and generating series (higher R-transform machinery). Freeness up to order  $(g,n)$  is then defined by the additivity of free cumulants up to order  $(g,n)$ .  $(0,1)$  is the usual freeness,  $(1/2,1)$  is infinitesimal freeness,  $(0,n)$  is the  $n$ -order freeness of Collins-Mingo-Speicher-Sniady. This theory is adapted to address all-order (in particular, beyond leading order) asymptotic expansions in unitarily invariant ensembles of random hermitian matrices. I will discuss its application to GUE + deterministic.

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