

# Moments of $L$ -functions

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**Abstract.** We present a precise conjecture for the full asymptotic expansion for the moments of zeta on the critical line and of families of  $L$ -functions at the central point.

We give evidence for this conjecture in several ways: one in terms of theorems about characteristic polynomials for random matrices which reveal completely analogous behavior; the other is by explicit numerical examples, both for integral moments as well as real and even complex moments. We also present a heuristic method via approximate functional equations which leads to the conjectures. Our conjectures agree with all the known theorems (and several number theoretical conjectures) about moments of families of  $L$ -functions.

