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Graded Betti Numbers of Powers of Ideals

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Using the concept of vector partition functions, we investigate the asymptotic behavior of graded Betti numbers of powers of homogeneous ideals in a polynomial ring over a field. For a positive \mathbb{Z} -grading, our main result states that the Betti numbers of powers is encoded by finitely many polynomials. More precisely, \mathbb{Z}^2 can be splitted into a finite number of regions such that, in each of them, $\dim_k (\mathrm{Tor}_i^S(I^t, k)_\mu)$ is a quasi-polynomial in (μ, t) .