

Lipschitz-Killing curvatures for arithmetic random waves

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Abstract. In this paper, we show that the Lipschitz-Killing curvatures for the excursion sets of arithmetic random waves (toral Gaussian eigenfunctions) are dominated, in the high-frequency regime, by a single chaotic component. The latter can be written as a simple explicit function of the threshold parameter times the centered norm of these random fields; as a consequence, these geometric functionals are fully correlated in the high-energy limit. The derived formulae show a clear analogy with related results on the round unit sphere and suggest the existence of a general formula for geometric functionals of random eigenfunctions on Riemannian manifolds.

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