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Fourier Decay of GMC Measures

The Fourier coefficients of multiplicative chaos measures appear naturally in the study of random matrices, QFTs, and even number theory. The harmonic analysis of the canonical GMC measure on the unit circle allowed Garban and Vargas to show that the associated Fourier coefficients tend to 0. The next step is to ask how fast this decay occurs, which corresponds to the Fourier dimension studied in fractal analysis. We compute the exact Fourier dimension of the circle-GMC measure, thereby proving a conjecture of Garban-Vargas based on a fourth moment computation. Our arguments are elementary, relying on a construction of an auxiliary, scale-invariant Gaussian field.