A phase transition in zero count of stationary Gaussian processes

Abstract:

Let \( f \) be a stationary Gaussian process on \( \mathbb{R} \) with compactly supported spectral measure. The expected number of zeroes is computed by the celebrated Kac-Rice formula, and much is known about their typical behavior. In this talk we are interested in their large deviations: What is the probability to see many more zeroes (overcrowding) or many less zeroes (undercrowding) than expected in a long interval? We show that overcrowding and undercrowding probabilities exhibit a phase transition between exponential and Gaussian behavior. The critical points of the transition are determined by the support of the spectrum. This result complements previous bounds given by Basu-Dembo-F.-Zeitouni and by Priya. Based on ongoing joint work with Ohad Feldheim and Lakshmi Priya.