

Random matrices and Gaussian multiplicative chaos

Nick Simm

University of Warwick

The Circular Unitary Ensemble is the group of $N \times N$ unitary matrices U_N with Haar (uniform) measure. Its set of N eigenvalues form one of the most well studied examples of a determinantal point process. We consider the random field (height function) defined by counting the number of eigenvalues of U_N in various sub-arcs of the unit circle. For large N , such processes are known to fall into the universality class of logarithmically correlated Gaussian fields, of which there has been significant research activity in the last few years (one can think of e.g. the Gaussian free field). I will describe recent work on establishing limit theorems for the exponential of such height functions. The relevant limiting object is a random measure called Gaussian multiplicative chaos. We believe our results are universal for a wide class of determinantal processes, including orthogonal polynomial ensembles; this belief is justified by establishing similar results for the sine process. This is joint work with Gaultier Lambert and Dmitry Ostrovsky. <https://arxiv.org/abs/1612.02367>