Gaussian beta ensembles and associated Hermite polynomials

Gaussian beta ensembles are generalizations of the GOE, GUE and GSE in terms of the joint density of the eigenvalues. When the parameter $\beta$ is fixed, their empirical distribution converges weakly to the semicircle distribution, almost surely, which is called Wigner’s semicircle law. Gaussian fluctuations around the semicircle distribution are also well-studied: see Johansson (1998) for an approach based on analyzing the joint density, Dumitriu and Edelman (2006) for an approach using a random tridiagonal matrix model, and Cabanal-Duvillard (2001) for a dynamical approach. What happens when the parameter $\beta$ varies as the system size $N$ tends to infinity? It turns out that Wigner’s semicircle law holds as long as $\beta N$ tends to infinity. In this regime, Gaussian fluctuations are almost the same as those in the case $\beta$ is fixed. When $\beta N$ stays bounded, referred to as a high temperature regime, the limiting distribution belongs to a family of probability measures of associated Hermite polynomials, see Allez et al. (2012) and Duy and Shirai (2015). In a high temperature regime, Gaussian fluctuations around the limit were established by using a random tridiagonal matrix model; see Nakano and Trinh (2016) or Trinh (2019). This talk introduces a dynamical approach to study Gaussian fluctuations with further relations with associated Hermite polynomials.

Wednesday, 17 November 2021, 0900 hrs CET

Zoom Conference Call— Please contact Anas Rahman (anas.rahman@live.com.au) for details regarding access