JOHANNES ALT, IST Austria

Correlated random matrices: Dyson equation and edge universality

The eigenvalue density of many large Hermitian random matrices is well-approximated by a deterministic measure on $\mathbb{R}$, the *self-consistent density of states*. In the case of an $N \times N$ random matrix with nontrivial expectations of its entries or a nontrivial correlation among them, this measure is obtained from the matrix Dyson equation on $N \times N$ matrices. The matrix Dyson equation generalizes scalar- or vector-valued Dyson equations that have been studied previously. In this talk, we will show that the self-consistent density of states is real-analytic apart from finitely many square root edges and cubic root cusps. We will also explain how detailed information about these singularities can be used to prove Tracy-Widom fluctuation for the eigenvalues close to the square root edges of the associated self-consistent density of states. This is joint work with László Erdős, Torben Krüger and Dominik Schröder.