Probability Seminar

Title: Random Matrix Ensembles with an Edge Spectrum Singularity

Speaker: Toby Shepherd (University of Bristol)

Date: Wed 11th November 2026 at 2:00PM

Location: N0.20 - Science North

Abstract: It is well known that the fluctuations of the largest eigenvalue in the GUE are given by the Tracy-Widom law. This law can be expressed in terms of a specific solution of the Painlevé-II equation. The work of Deift et al in 1999 demonstrated that the GUE is actually part of a wider universality class of unitary invariant matrices with 'one-cut regular' potentials, whose largest eigenvalues all exhibited the same behaviour. The work of Forrester-Witte in the early 2000s derived a wide range of connections of solutions to other Painlevé equations to RMT ensembles - you can think of this as a generalisation of the Tracy-Widom law. In this talk, I will focus on the connection they derived from the general Painlevé-II equation to a modification of the GUE, and show how we can use the methods developed by Deift to produce a similar universality class for random matrix ensembles with this generalised Tracy-Widom law.