Fredholm determinant for a Painlevé kernel

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In this talk, we study the Fredholm determinant for a Painlevé kernel. The kernel was first discovered by Its, Kuijlaars and Östensson and constructed out of functions associated with the Painlevé XXXIV equation. This Fredholm determinant describes the gap probability for the eigenvalues of a random Hermite matrix in the critical unitary ensemble with a Fisher-Hartwig singularity close to the soft edge. We give an explicit expression for the determinant as an integral of a special solution to a higher order generalization of the second Painlevé equation. We also compute the large gap asymptotics for the Fredholm determinant.