

Title Higher order finite temperature Airy kernels and an integro-differential Painlevé II hierarchy.

Abstract In this talk we will study Fredholm determinants of integral operators acting through a finite temperature version of the higher order Airy kernels that recently appeared in statistical mechanics literature. The main result is an expression of these Fredholm determinants in terms of distinguished solutions of an integro-differential Painlevé II hierarchy. Our result generalizes the case $n = 1$, already studied by Amir Corwin and Quastel some years ago for a special choice of the weight function. This latter can be seen as a generalization of the well known formula connecting the Tracy-Widom distribution for GUE and the Hastings-McLeod solution of the Painlevé II equation. The proof of our result, for generic n , relies on the study of some operator-valued Riemann-Hilbert problem that builds up the bridge between the description of the Fredholm determinants and the derivation of a Lax pair for this new integro-differential hierarchy. The talk is based on a joint work with Thomas Bothner and Mattia Cafasso, available at <https://arxiv.org/pdf/2101.03557.pdf>.