

General β -ensembles and Diffusion

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ABSTRACT: The β -ensembles of Random Matrix Theory are natural generalizations of the well-studied Gaussian Orthogonal, Unitary, and Symplectic Ensembles (corresponding to $\beta = 1, 2$ and 4). Based on the discovery of Edleman and Dumitriu of a tri-diagonal model for all $\beta > 0$, we show that the suitably scaled largest eigenvalues converge in distribution to the low lying spectral points of a certain Schrödinger operator with random potential. The operator had been previously identified by B. Sutton. An upshot of this is a new expression of the celebrated Tracy-Widom type laws in terms of the explosion probability of a simple one-dimensional diffusion.