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Edge Universality of Random Normal Matrices Generalizing to Higher Dimensions

As recently proved in generality by Hedenmalm and Wennman, it is a universal behavior of complex random normal matrix models that one finds a complementary error function behavior at the boundary (also called edge) of the droplet as the matrix size increases. Such behavior is seen both in the density, and in the off-diagonal case, where the Faddeeva plasma kernel emerges. These results are neatly expressed with the help of the outward unit normal vector on the edge. We prove that such universal behaviors transcend this class of random normal matrices, being also valid in higher dimensional determinantal point processes, defined on \mathbb{C}^d . The models under consideration concern higher dimensional generalizations of the determinantal point processes describing the eigenvalues of the complex Ginibre ensemble and the complex elliptic Ginibre ensemble. These models describe a system of particles with mutual repulsion, that are confined to the origin by an external field $V(z)=|z|^2 - \tau \operatorname{Re}(z_1^2 + \dots + z_d^2)$, where $0 \leq \tau < 1$. Their average density of particles converges to a uniform law on a $2d$ -dimensional ellipsoidal region. It is on the boundary of this region that we find a complementary error function behavior and the Faddeeva plasma kernel. To the best of my knowledge, this is the first instance of the Faddeeva plasma kernel emerging in a higher dimensional model. Based on arXiv:2208.12676

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