

LARGE COMPLEX CORRELATED WISHART MATRICES: FLUCTUATIONS AND ASYMPTOTIC
INDEPENDENCE AT THE EDGES

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We study the asymptotic behavior of eigenvalues of large complex correlated Wishart matrices at the edges of the limiting spectrum. For this matrix model, the support of the limiting eigenvalue distribution may have several connected components. Under mild conditions, we will show that the extremal eigenvalue which converge almost surely towards the edges of the support fluctuate according to the Tracy-Widom law at the scale $N^{2/3}$. Moreover, given several generic positive edges, we establish that the associated extremal eigenvalue fluctuations are asymptotically independent. Finally, when the leftmost edge is the origin, we prove that the smallest eigenvalue fluctuates according to the hard-edge Tracy-Widom law at the scale N^2 (Bessel kernel). As an application, an asymptotic study of the condition number of large correlated Wishart matrices is provided.

Joint work with Walid Hachem (Telecom Paristech and CNRS, France) and Adrien Hardy (KTH - Royal Institute of Technology, Sweden).