

AN OVERVIEW OF RANDOM BAND MATRICES

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ABSTRACT. I'll describe the local eigenvalue statistics (LES) problem for random band matrices (RBM). RBM are real symmetric matrices with nonzero entries in a band about the diagonal. The entries are independent, identically distributed random variables. One studies properties in the large N limit when the width of the band increases like N^α , for $0 \leq \alpha \leq 1$. It is conjectured that for $0 \leq \alpha < \frac{1}{2}$, the LES is a Poisson point process whereas for $\frac{1}{2} < \alpha \leq 1$, the LES is the same as that for the Gaussian Orthogonal Ensemble. This corresponds to a phase transition from a localized to a delocalized state as α passes through $\frac{1}{2}$. In recent works with Ben Brodie and with M. Krishna, we have made progress in proving this conjecture for $0 \leq \alpha < \frac{1}{2}$. Results by others for $\frac{1}{2} < \alpha \leq 1$ will also be described.

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