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Extremal spacings of random unitary matrices

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Extremal spacings between unimodular eigenvalues of random unitary matrices of size N pertaining to circular ensembles are investigated. Probability distributions for the minimal spacing for various ensembles are derived for N=4. We show that for large matrices the average minimal spacing s_{min} of a random unitary matrix behaves as $N^{-1/(1+B)}$ for B equal to 0,1 and 2 for circular Poisson, orthogonal and unitary ensembles, respectively. For these ensembles also asymptotic probability distributions $P(s_{min})$ are obtained and the statistics of the largest spacing s_{max} are investigated.

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