

Title: **Linear Functionals of Eigenvalues of Random Matrices**

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Abstract:

Let M_n be a random $n \times n$ unitary matrix with distribution given by Haar measure on the unitary group. Using explicit moment calculations, a general criterion is given for linear combinations of traces of powers of M_n to converge to a Gaussian limit as $n \rightarrow \infty$. By Fourier analysis, this result leads to central limit theorems for the measure on the circle that places a unit mass at each of the eigenvalues of M_n . For example, the integral of this measure against a function with suitably decaying Fourier coefficients converges to a Gaussian limit without any normalisation. Known central limit theorems for the number of eigenvalues in a circular arc and the logarithm of the characteristic polynomial of M_n are also derived from the criterion.