

# HYPERGEOMETRIC FUNCTIONS OF MATRIX ARGUMENTS AND LINEAR STATISTICS OF MULTI-SPIKED HERMITIAN MATRIX MODELS

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This talk will present central limit theorems (CLTs) for linear statistics of three related “multi-spiked” Hermitian random matrix ensembles: (i) a spiked central Wishart ensemble; (ii) a non-central Wishart ensemble with fixed-rank non-centrality parameter; and (iii) a similarly defined non-central F ensemble. The analysis in each case is non-trivial, with the underlying joint eigenvalue densities involving hypergeometric functions of matrix arguments. For such functions, we first generalize a recent result of Onatski to present new exact multiple contour integral representations. Based on these, explicit CLT formulas are derived for each of the three spiked models of interest by employing Dyson’s Coulomb Fluid method along with saddlepoint techniques. We find that for each model, the individual spikes contribute additively to yield a  $O(1)$  correction term to the asymptotic mean of the linear statistic, whilst having no effect on the leading order terms of the mean or variance.

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