

# Products of Ginibre Matrices

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(joint work with O. Arizmendi), arXiv:1911.00158



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March 29, 2022

## Abstract:

A complex Ginibre matrix is a  $N \times N$  square matrix with independent complex Gaussian entries. In the large  $N$  limit we get a circular operator in the sense of Voiculescu. Because circular operators are  $R$ -diagonal one can compute  $*$ -moments of products using some simple rules of Nica and Speicher. The limits  $\lim_N \text{cov}(\text{Tr}(X_N^m), \text{Tr}(X_N^n))$  are the fluctuation moments of an ensemble  $\{X_n\}_N$ . We show how to give a similar rule when  $X_N$  is a product of Ginibre matrices. Our method relies second order cumulants and second order freeness.