

**Integration on large compact matrix groups:
exact formulas, convergence and fluctuations**

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Place **Campus Kirchberg, room B04**

The existence of a unique probability measure which is invariant by translations is a very fundamental fact of analysis on a compact matrix group. In order to make concrete use of this probability measure, it is useful to be able to actually integrate functions against it. Fourier analysis yields a basis of functions on our group in which integration is very easy, but which is ill adapted to multiplication. On the other hand, polynomial functions of the entries are easy to multiply, but less easy to integrate. We will discuss the combinatorial solution which B. Collins and P. Sniady gave to this problem and some of its consequences, in particular for the repartition of the eigenvalues of large matrices. Then, we will turn to the analogous problem of integration under the heat kernel measure at a fixed time. In this case also, a combinatorial formula exists, and can be used to study asymptotic properties of large Brownian matrices, and to recover results originally proved by P. Biane. In particular, a phase transition occurs in function of the time at which the heat kernel measure is taken. We will finally discuss a fluctuation result in this context, in relation with a theorem of P. Diaconis and S. Evans for uniform matrices.