

---

THE WEIZMANN INSTITUTE OF SCIENCE  
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE  
Geometric Functional Analysis and Probability Seminar

Room 155 ,Ziskind Building  
on Thursday, Jun 20, 2019at 13:30

Mark Rudelson (UMich) & Serguei Popov (IMECC).

Double seminar

Abstract:

Speaker 1: Mark Rudelson (UMich)

Title: Circular law for sparse random matrices.

Abstract: Consider a sequence of  $n$  by  $n$  random matrices  $A_n$  whose entries are independent identically distributed random variables. The circular law asserts that the distribution of the eigenvalues of properly normalized matrices  $A_n$  converges to the uniform measure on the unit disc as  $n$  tends to infinity. We prove this law for sparse random matrices under the optimal sparsity assumption. Joint work with Konstantin Tikhomirov.

Speaker 2: Serguei Popov (IMECC)

Title: On the range of a two-dimensional conditioned random walk

Abstract: We consider the two-dimensional simple random walk conditioned on never hitting the origin. This process is a Markov chain, namely, it is the Doob  $h$ -transform of the simple random walk with respect to the potential kernel. It is known to be transient and we show that it is "almost recurrent" in the sense that each infinite set is visited infinitely often, almost surely. We prove that, for a "typical large set", the proportion of its sites visited by the conditioned walk is approximately a Uniform $[0,1]$  random variable. Also, given a set  $G \subset \mathbb{R}^2$  that does not "surround" the origin, we prove that a.s. there is an infinite number of  $k$ 's such that  $G \cap \mathbb{Z}^2$  is unvisited. These results suggest that the range of the conditioned walk has "fractal" behavior. This is a joint work with Nina Gantert and Marina Vachkovskaia, see [arxiv.org/abs/1804.00291](https://arxiv.org/abs/1804.00291). Also, there is much more about conditioned walks in my new book ([www.ime.unicamp.br/~popov/2srw.pdf](http://www.ime.unicamp.br/~popov/2srw.pdf), work in progress). Comments and suggestions on the latter are very welcome!