Elizaveta Rebrova* (erebrova@umich.edu) and Konstantin Tikhomirov. Coverings of random ellipsoids, and invertibility of matrices with i.i.d. heavy-tailed entries.

I will talk about a generalization of Rudelson-Vershynin theorem, showing that the smallest singular value of an $n \times n$ random matrix with i.i.d. subgaussian entries is at least of order $n^{-1/2}$ with high probability ($\mathbb{P}\{s_n < \varepsilon n^{-1/2}\} \leq C\varepsilon + c^n$ for some $C > 0$, $c \in (0, 1)$ and all $\varepsilon \geq 0$). It turns out that the same bound holds for heavy-tailed matrices, namely, all random matrices having i.i.d. entries with zero mean and bounded variance.

This generalization was obtained as an application of the following geometric result: we’ve shown that with the probability exponentially close to one there is enough to take $\exp(\delta n)$ translates of a Euclidean ball $C\sqrt{n}\delta^{-1}B_2^n$ in order to cover the random ellipsoid $A(B_2^n)$ (where $A$ is a heavy-tailed matrix described above, and $C$ is a universal constant). (Received January 14, 2016)