

Approximating the covariance matrix with heavy tailed columns and RIP
Alexander Litvak

Let A be a matrix whose columns X_1, \dots, X_N are independent random vectors in \mathbf{R}^n . Assume that p -th moments of $\langle X_i, a \rangle$, $a \in S^{n-1}$, $i \leq N$, are uniformly bounded. For $p > 4$ we prove that with high probability A has the Restricted Isometry Property (RIP) provided that Euclidean norms $|X_i|$ are concentrated around \sqrt{n} and that the covariance matrix is well approximated by the empirical covariance matrix provided that $\max_i |X_i| \leq C(nN)^{1/4}$. We also provide estimates for RIP when $\mathbb{E} \phi(|\langle X_i, a \rangle|) \leq 1$ for $\phi(t) = (1/2) \exp(t^\alpha)$, with $\alpha \in (0, 2]$.

Joint work with O. Guédon, A. Pajor, N. Tomczak-Jaegermann