Subgaussian processes are well-balanced

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A discrepancy of a set $T \subset R^n$ is defined by $\inf_{\epsilon_i} \sup_{t \in T} |\sum_{i=1}^{n} \epsilon_i t_i|$, where the infimum is taken over all choices of sign ϵ_i. In other words, this parameter measures how 'balanced' T is.

We will present a discrepancy type result for a typical coordinate projection of a centered subgaussian process. Namely, we show that with high probability, the infimum over signs $\inf_{(\epsilon_i)} \sup_{f \in F} |\sum \epsilon_i f(X_i)|$ is asymptotically smaller than the expectation over signs. Our aim is to discuss the main ideas in the proof.

The first is a general bound on the discrepancy of an arbitrary subset of R^n using the modulus of continuity of the Gaussian process it indexes. The second is that natural complexity parameters - the so-called $\gamma_{2,s}$ functionals associated with (subgaussian) coordinate projections of a class of functions F display a sharp shrinking phenomenon with respect to the dimension.