

## Random and random-like matrices, and their applications

Bedlewo, July 6-12, 2008

*Stanislaw J. Szarek*

**Abstract** (updated June 9, 2008)

We start by presenting a selection of largely classical results about random matrices. This will involve various ensembles (classical groups, Gaussian, Wigner etc.) and various regimes (global and local). We will exemplify differences between limit results and fixed dimension results, as well as between large deviation, small ball, and concentration estimates.

Next, we will sketch proofs of some of those results. This will be mostly based on isoperimetric inequalities and the theory of Gaussian processes, but we may touch on free probability or transport of measures. We will also include some applications to functional analysis, mostly via Random Banach spaces.

Finally, we will discuss some topics concerning pseudo-random matrices, i.e., matrices that “look like” random ones, but are (in the appropriate sense) explicit. This will entail links to properties  $T$  and  $\tau$  for groups, and to expander graphs.

With time, more detailed versions of this summary should be (hopefully) available at the URL  
<http://www.cwru.edu/artsci/math/szarek/abstracts/Bedlewo.pdf>