

## Workshop on Localisation and Ergodicity

*Eugene Bogomolny***Spectral properties of low-complexity random matrices**

## Abstract

A typical  $N \times N$  matrix requires  $\mathcal{O}(N^3)$  operations to find, e.g., its inverse. In spite of that, it is known that there exist special matrices with internal structures for which such task can be performed in  $\mathcal{O}(N^2)$  operations or less. Widely known Cauchy, Toeplitz, Hankel matrices are just a few examples of such matrices. When their matrix elements are considered as random variables they form low-complexity random matrix ensembles. The main message of the talk is that statistical properties of eigenvalues and eigenvectors of such matrices are drastically different from standard random matrix ensembles and belong to the so-called intermediate statistics characterised by (i) level repulsion at small distances, (ii) exponential decrease of nearest-neighbour distributions at large distances, (iii) non-trivial value of the spectral compressibility, and (iv) non-trivial fractal dimensions of eigenvectors.