Random matrices and applications

Anna Lytova (University of Opole, Poland)

This will be an introductional lecture to the random matrix theory (RMT) which lies at the intersection of linear algebra, probability theory, and analysis. Random matrices were introduced in the rst half of the 20th century motivated by applications in statistics and nuclear physics, and now this is a very active research eld with various applications in dierent areas of mathematics, physics, numerical analysis, economics etc. Depending on the probability distributions of entries and on symmetry classes of matrices there arise many dierent classes (ensembles) of random matrices. We are mainly interested in the corresponding eigenvalues and eigenvectors and in the spectral properties of matrices as matrix-size tends to innity. In this lecture we will start with basic denitions and discuss the main questions and concepts of RMT. Then will we present some results and methods of proofs. In particular we will discuss analogs of the classical law of large numbers and central limit theorem in RMT.