Large deviations of subgraph counts for sparse random graphs

Abstract:
For fixed t>1 and L>3 we establish sharp asymptotic formula for the log-probability that the number of cycles of length L in the Erdos - Renyi random graph G(N,p) exceeds its expectation by a factor t, assuming only that p >> log N/sqrt(N). We obtain such sharp upper tail bounds also for the Schatten norms of the corresponding adjacency matrices, and in a narrower range of p=p(N), also for general subgraph counts. In this talk, based on a recent joint work with Nick Cook, I will explain our approach and in particular our quantitative refinement of Szemeredi's regularity lemma for sparse random graphs in the large deviations regime.