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.