Upper tail large deviations of subgraph counts in sparse random graphs

Abstract:

For a $\Delta$-regular connected graph $\{sf H\}$ the problem of determining the upper tail large deviation for the number of copies of $\{sf H\}$ in an Erdős–Rényi graph on $n$ vertices with edge probability $p$ has generated significant interests. In the sparse regime, i.e. for $p \ll 1$, when $np^{\Delta/2} \gg (\log n)^{1/(v_{\{sf H\}}-2)}$, where $v_{\{sf H\}}$ is the number of vertices in $\{sf H\}$, the upper tail large deviation event is believed to occur due to the presence of localized structures. Whereas, for $p$ below the above threshold the large deviation is expected to be given by that of a Poisson random variable. In this talk, we will discuss some progress in resolving this conjecture.

This is based on joint work with Riddhipratim Basu.