1163-05-1482 **Ashwin Sah*** (asah@mit.edu) and **Mehtaab Sawhney** (msawhney@mit.edu). *Local limit theorems for subgraph counts.*

We introduce a general framework for studying anticoncentration and local limit theorems for random variables, including graph statistics. Our methods involve an interplay between Fourier analysis, decoupling, hypercontractivity of Boolean functions, and transference between "fixed-size" and "independent" models. We also adapt a notion of "graph factors" due to Janson.

As a consequence, we derive a local central limit theorem for connected subgraph counts in the Erdős-Rényi random graph $G(n,p)$, building on work of Gilmer and Kopparty and of Berkowitz. These results improve an anticoncentration result of Fox, Kwan, and Sauermann. We also derive a local limit central limit theorem for induced subgraph counts, as long as p is bounded away from a set of "problematic" densities. We then prove these restrictions are necessary, resolving anticoncentration conjectures of Fox, Kwan, and Sauermann in the negative.

Finally, we also examine the behavior of counts of k-term arithmetic progressions in subsets of $\mathbb{Z}/n\mathbb{Z}$ and deduce a local limit theorem wherein the behavior is Gaussian at a global scale but has nontrivial local oscillations (according to a Ramanujan theta function). (Received September 15, 2020)