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Support of Closed Walks and Second Eigenvalue Multiplicity of Graphs

In this talk, we bound the multiplicity of the second eigenvalue of the normalized adjacency matrix, assuming the graph is connected. The main ingredient is a lower bound on the typical support of a random walk that is conditioned to be "closed" (namely, the walk ends where it starts). This, in turn, is shown by proving that the spectral radius of principal submatrices of the normalized adjacency matrix must satisfy certain bounds. Throughout the talk, we also give examples showing the tightness of our results.

This is joint work with Peter Rasmussen and Nikhil Srivastava