Spectral expansion can be used to bound the expected support of a walk of a given length in a graph. However, no such bound is known when conditioning on the walk being closed. We prove such a result by proving a new bound on the minimum entry of the eigenvector corresponding to the top eigenvalue of the adjacency matrix of a graph. We then use our result to improve the multiplicity of a given eigenvalue to $\frac{n}{\log^{O(1)} n}$. (Received August 25, 2020)