Abstract: In this talk we will study a problem motivated by a question related to quantum-error-correcting codes. Given a graph $G$ with $\pm 1$ signs on vertices, each vertex can perform at most one of the following three operations: flip all of its neighbors \textit{i.e.}, change their signs), flip itself, or flip itself and all of its neighbors. We want to start with all $+1$'s, execute some non-zero number of operations (as small as possible) and return to all $+1$'s. Combinatorially, it involves the following graph parameter:

$$f(G) = \min \{|A| + |\{x \in V \setminus A : d_A(x) \text{ is odd}\}| : A \neq \emptyset\}$$

where $V$ is the vertex set of $G$ and $d_A(x)$ is the number of neighbors of $x$ in $A$. We give asymptotically tight estimates of $f$ for the random graph $G_{n,p}$ when $p$ is constant. Also, if $f(n) = \max \{f(G) : |V(G)| = n\}$, then we show that $f(n) \leq (0.382 + o(1))n$.

This is joint work with Tom Bohman, Alan Frieze, and Oleg Pikhurko.

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