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Square energy of graphs

Let G be a graph of order n with eigenvalues $\lambda_1 \geq \cdots \geq \lambda_n$. Let

$$s^+(G) = \sum_{\lambda_i > 0} \lambda_i^2, \qquad s^-(G) = \sum_{\lambda_i < 0} \lambda_i^2.$$

The smaller value, $s(G) = \min\{s^+(G), s^-(G)\}$ is called the square energy of G. In 2016, Elphick, Farber, Goldberg, and Wocjan conjectured that for every connected graph G of order n, $s(G) \geq n - 1$. The bound is attained for any tree and also for every complete graph. No linear lower bound for $s(G)$ in terms of n is known. The speaker will prove that $s(G) \geq \frac{3n}{4}$ for every connected graph G of order $n \geq 4$. This is joint work with Saieed Akbari, Hitesh Kumar, and Shivaramakrishna Pragada.