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*Bollobas-Nikiforov conjecture and triangle counting*

Let  $G$  be a graph with  $n$  vertices. Let  $A(G)$  be its adjacency matrix. Let  $\lambda_1(G), \lambda_2(G)$  denote the largest and second largest eigenvalues of the adjacency matrix. Bollobás and Nikiforov (2007) conjectured that for any graph  $G \neq K_n$  with  $m$  edges

$$\lambda_1^2 + \lambda_2^2 \leq \left(1 - \frac{1}{\omega(G)}\right) 2m$$

where  $\omega(G)$  denotes the clique number of  $G$ . In this talk, we prove this conjecture for graphs with not so many triangles, using the method of triangle counting. This is a joint work with Hitesh Kumar.