

COMBINATORICS
SEMINAR

The Li-Yau Inequality and the Geometry of Graphs

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Abstract: Understanding how local graph parameters, such as degree, are related to global graph properties, such as diameter and the containment of certain subgraphs, is a key aim of extremal graph theory. In the continuous setting of Riemannian manifolds, curvature serves as such a local parameter which is known to provide strong control of global structure. In this talk, we describe a new notion of curvature for graphs which, similar to in the continuous setting, strongly controls global geometric properties of a graph. In particular, it allows us to prove a discrete analogue of the Li-Yau inequality which, in this setting, controls the rate of diffusion of the continuous time random walk on a graph and which can be used to understand many further graph properties.

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