

**Title:** Applications of the Spectral Theory of Graphs and (Polarized) Metrized Graphs

**Abstract:**

In this talk, we first give an overview of spectral graph theory and some of its applications including our recent work on certain graph index of ladder and cylinder graphs. Secondly, we talk about the spectral theoretical results obtained within last 10 years for (polarized) metrized graphs. We focus on the discrete Laplacian matrix  $L$  of graphs, which is the discrete analogue of the Laplace-Beltrami operator on manifolds, and the measure valued Laplacian operator  $\Delta$  on (polarized) metrized graphs. The latter one has discrete and continuous parts, so in a sense it combines the discrete Laplacian and the Laplace-Beltrami operator. Finally, we mention some of important applications of these results to Zeta functions and height inequalities in arithmetic geometry.

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