Eigenvalue estimates using Barta's Lemma

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Abstract.

In this talk I will discuss various estimates for the first eigenvalue of the Laplacian using Barta's Lemma. We will (didactically) highlight the following topics.

- First eigenvalue estimates for rotationally symmetric balls. In particular,

  - Eigenvalue estimates for geodesic balls of the sphere $\mathbb{S}^n$;
  - Eigenvalue estimates for stochastically incomplete rotationally sym- metric manifolds.

- Fundamental tone of submanifolds in highly negatively curved spaces in terms of isoperimetric quotients.

- Fundamental tone of submanifolds with tamed second fundamental form.

- Eigenvalue estimates for foliated open sets and applications to Makai-Hyamann- Osserman eigenvalue inequality for tubes in $\mathbb{R}^n$.

- Spectrum of submersions with compact minimal fibers. In particular, description of the Laplacian spectrum of $SL(2, \mathbb{R})$.

- Fundamental tone of submanifolds of warped product manifolds.

- Spectrum of Bounded submanifolds with small limit set.

- Spectrum of the examples of Jorge-Xavier and Rosenberg-Toubiana minimal surfaces in the slab.

In the end I will propose few open questions.