CCSU

DEPARTMENT OF MATHEMATICAL SCIENCES

COLLOQUIUM

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2:00 – 3:00 PM
Maria Sanford, Room 101

LOWER BOUNDS FOR THE FIRST EIGENVALUE OF THE LAPLACIAN, WITH DIRICHLET BOUNDARY CONDITIONS

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Abstract: The spectrum of the Laplacian was studied since the time the Lapalcian was introduced in mathematics. In particular, obtaining the lower bound for the first eigenvalue in a hyperbolic space was a matter of interest in many publications. For example, Henry Mckean, back in 1970 proved that for the simply connected complete Riemannian n-dimensional manifold M with a sectional curvature κ, $\kappa \leq k < 0$, the lowest Dirichlet eigenvalue has to be no less than $\frac{-k(n-1)^2}{4}$. Later, in 2004, Jun Ling found that if Ricci curvature is bounded below by $(n-1)p$ for some negative number p, then the lowest Dirichlet eigenvalue $\lambda \geq \frac{1}{2}(n-1)p + \frac{\pi^2}{d^2}$, where d is the diameter of the largest interior ball in M. In this presentation we consider a manifold of a negative CONSTANT sectional curvature, where Ricci curvature is just equal to sectional curvature $\kappa = -1/\rho^2$ and then, Jun Ling inequality turns into the trivial, for large d, inequality $\lambda \geq \frac{1}{2}\kappa + \frac{\pi^2}{d^2}$, since κ is negative. Of course, we can combine H. Mckean and J. Ling and write $\lambda \geq \max\left\{ \frac{-\kappa(n-1)^2}{4}, \frac{1}{2}\kappa + \frac{\pi^2}{d^2} \right\}$. Our main goal is to see that the technique, alternative to H. Mckean and J. Ling, applied in the space of the constant sectional curvature, allows us to improve this combined inequality to $\lambda \geq \frac{-\kappa(n-1)^2}{4} + \frac{\pi^2}{(d/2)^2}$.

For further information:

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