THE EXISTENCE AND THE PROFILE OF EIGENFUNCTIONS ASSOCIATED TO THE FIRST EIGENVALUE OF H^n IN SUBSETS OF H^n

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In this talk we study the existence and the behavior of positive solutions to the eigenvalue problem

$$\begin{cases} -\Delta u &= \lambda_n u \quad \text{in } \Omega \\ u &= 0 \quad \text{on } \partial\Omega, \end{cases}$$

where Ω is an unbounded domain of the hyperbolic space $\mathbb{H}^n$ and λ_n is some kind of first eigenvalue associated to $\mathbb{H}^n$. For instance, if a domain is contained in a horoball, we can prove that the problem does not have a bounded solution. However, in the case the domain is the complement of a compact, the problem is solvable. If Ω is a hyperball, then we present two kind of solutions. The first one converges to 0 at the infinity and can be extended continuously to the asymptotic boundary. This extension is not possible for the second family of solutions, that only exists provided there is some relation between the curvature of the hypershere and n. We get also some existence result for any domain that contains a hyperball.