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THE DIRAC OPERATOR ON HYPERBOLIC MANIFOLDS OF FINITE VOLUME

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Abstract

We study the spectrum of the Dirac operator on hyperbolic manifolds of finite volume. Depending on the spin structure it is either discrete or the whole real line. For link complements in S^3 we give a simple criterion in terms of linking numbers for when essential spectrum can occur. We compute the accumulation rate of the eigenvalues of a sequence of closed hyperbolic 2- or 3-manifolds degenerating into a noncompact hyperbolic manifold of finite volume. It turns out that in three dimensions there is no clustering at all.

0. Introduction

The aim of this paper is to study the spectrum of the Dirac operator on hyperbolic manifolds with finite volume. Since the corresponding problems for the Laplace-Beltrami operator acting on differential forms have already been examined, let us first briefly describe those results. The first natural thing to do is to look at the spectrum of the model space, n-dimensional hyperbolic space H^n. Donnelly [13] computed the spectrum of the Laplace operator Δ_q acting on q-forms on H^n. For the point spectrum he obtained

$$spec_p(\Delta_q) = \begin{cases} \{0\}, & q = n/2 \\ \emptyset, & \text{otherwise} \end{cases}$$

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