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Title: Two new settings for examples of von Neumann dimension

Abstract: The von Neumann dimension of a discrete series representation $(\pi, \mathcal{H})$ of a real connected semisimple Lie group G with trivial center as a module over the II_1 factor $R\Gamma$, where Γ is a lattice in G, is equal to the product of the formal dimension of $(\pi, \mathcal{H})$ and the covolume of Γ in G. A proof of this theorem, which has its roots in Atiyah's work on L^2-index, is given in [Goodman - de la Harpe - Jones '89]. First, we give a version of this theorem involving two lattices instead of one: Using theorems from the study of automorphic forms, we find a representation of $R\Gamma_2$ on a subspace of $L^2(\Gamma_1 \backslash G)$ of finite von Neumann dimension.* Second, we calculate von Neumann dimension of certain discrete series representations of $PGL(2, F)$, where F is a nonarchimedean local field of characteristic 0 and residue field of order not divisible by 2, as modules over free group factors.

* where $G = PSL(2, \mathbb{R})$ and Γ_1 and Γ_2 are arbitrary lattices in G.