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von Neumann dimension for lattices in PGL(2,F), F a local non-archimedean field

The von Neumann dimension of a II_1 factor associated to a lattice in a connected semisimple real Lie group without center — $PSL(2,\mathbb{Z})$ in $PSL(2,\mathbb{R})$, for example — is equal to the product of the formal dimension of a discrete series representation and the covolume of the lattice — in the previous example, the product of $\frac{m}{4\pi}$, m odd, and $\frac{\pi}{3}$. A proof of this result, due to Atiyah, is given in Goodman–de la Harpe–Jones (1989). We show that the proof carries over to lattices in $PGL(2,F)$, where F is a local non-archimedean field, and we compute examples using the Jacquet-Langlands correspondence and results of Ihara.