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Scattering theory and an index theorem on the radial part of $SL(2,\mathbb{R})$

In this talk, we present the spectral and scattering theory of the Casimir operator acting on the radial part of $SL(2,\mathbb{R})$. After a suitable decomposition, the initial problem consists in studying a family of differential operators acting on the half-line. For these operators, explicit expressions can be found for the resolvent, the spectral density, and the Moeller wave operators, in terms of hypergeometric functions. Finally, an index theorem is introduced and discussed. This presentation is based on a joint work with H. Inoue.