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Conformal scattering and black holes

The conformal approach to scattering theory goes back to the 1960's and 1980's, essentially with the works of Penrose, Lax-Phillips and Friedlander. It is Friedlander who put together the ideas of Penrose and Lax-Phillips and presented the first conformal scattering theory in 1980. Others followed due to Baez-Segal-Zhou in the 1990's. Their constructions, just like Friedlander's, are on static spacetimes. The idea of replacing spectral analysis by conformal geometry is however the door open to the extension of scattering theories to general non stationary situations, which are completely inaccessible to spectral methods. A first work in collaboration with Lionel Mason explained these ideas and applied them to non stationary spacetimes without singularity. The first results for nonlinear equations on such backgrounds was then obtained by Jeremie Joudioux. The purpose is now to extend these theories to general black holes. A first crucial step, recently completed, is a conformal scattering construction on Schwarzschild's spacetime. This talk will present the history of the ideas, the principle of the constructions and the main ingredients that allow the extension of the results to black hole geometries.