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Università di Cagliari
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HIGH ENERGY PHYSICS COLLOQUIA

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NO-HAIR THEOREMS AND HAIRY BLACK HOLES

Abstract

Black holes are very special objects: they can be described by few parameters and if those have the same values they are indistinguishable. This property is summarized by Wheeler's famous conjecture "black holes have no hair" by which he means that no exterior field can be found in the background of a black hole. Crucial in the formulation of black hole thermodynamics, this dictum has had a great influence in the development of black hole physics and still remains a hot research topic. Under some assumptions, Bekenstein and others were able to rule out a lot of classical fields and published the proof of early no-hair theorems. Moreover, uniqueness theorems proved that the only electro-vacuum stationary solution with horizon was described by the Kerr-Newman family, amplifying the beliefs that almost every black hole in our universe is Kerr. Throughout the years, however, several hairy black hole solutions were found, so early no-hair theorems were improved and some assumptions were reconsidered. In this talk I will present the evolution of no-hair theorems, with particular attention to which are the assumptions that rule out scalar fields and how one can circumvent them to find hairy black hole solutions.

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