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# HIGH ENERGY PHYSICS COLLOQUIA

7 dicembre 2016 · ore 15:00 · aula C

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## SYMMETRY INHERITANCE, BLACK HOLES AND NO-HAIR THEOREMS

### Abstract

Matter fields do not necessarily have to share the symmetries with the spacetime they live in. When this happens, we speak of the symmetry inheritance of fields. Symmetry inheritance is not only used as a convenient assumption in a choice of the ansatz, but is also an important ingredient of the various gravitational uniqueness theorems. Its breaking may point to some novel, potentially interesting physical phenomena, such as the recently discovered rotating black hole solutions with complex scalar hair.

In this talk I shall present an overview of the known results on symmetry inheritance, with an emphasis on more recent ones related to the scalar and the electromagnetic fields. Also, I will discuss the ramifications of these theorems on the classification of the black hole hair, and present a survey of various open problems.

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