

Scalar-tensor quantum field theory and method of calculating unique symmetries in the background of a black hole

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Abstract

In a spacetime of the form of a black hole, there is a class of scalar fields which can be described by the so-called Kaluza-Klein-Weil field theory. In this theory, the Schwarzschild black hole is the only possible black hole in the vicinity of the horizon. We study the effects of the Kaluza-Klein-Weil field theory on the geometry of the spacetime and show that, for large black holes, there is a group of scalar fields that can be represented as the extension of the background of a black hole. The method relies on the fact that the Kaluza-Klein-Weil fields admits unique symmetries. This allows us to calculate the unique symmetries of the Kaluza-Klein-Weil field theory in the presence of a black hole.