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Type: **Invited talk in the parallel session**

Shift-Symmetric Theories for Consistent Black-Hole Hair

Thursday, 8 July 2021 18:40 (25 minutes)

Scalar-tensor theories enjoying a shift symmetry can describe black holes with scalar hair. I will discuss which of these theories can give rise to acceptable black holes with hair, based on three requirements. These are stability under generic perturbations, consistency from the point of view of effective field theory, and the existence of a standard UV completion.

I will argue that in the most symmetric case, these requirements leave only one acceptable source of hair. This is the linear coupling of the scalar field to the Gauss-Bonnet invariant.

However, I will show that other shift symmetric scalar interactions must be included alongside the Gauss-Bonnet coupling when this can affect astrophysical black holes. If this were not the case, the effective theory would break down around the shortest length-scales currently probed by gravitational table-top experiments.

Primary author: SERRA, Francesco (Scuola Normale Superiore, Pisa)

Presenter: SERRA, Francesco (Scuola Normale Superiore, Pisa)

Session Classification: Ghost-Free Models of Modified Gravity: Massive Gravity, Horndeski and DHOST Theories, Other Related Models; Their Properties and Solutions.

Track Classification: Alternative Theories: Ghost-free models of modified gravity: massive gravity, Horndeski and DHOST theories, other related models; their properties and solutions.