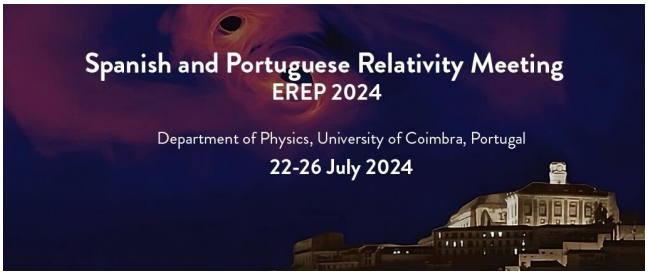

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Toward regular black holes in sixth-derivative gravity

Tuesday 23 July 2024 15:00 (15 minutes)

Higher-derivative terms are relevant in several approaches to quantum gravity. For instance, they occur in the perturbative quantization of Einstein gravity, and they can be used to construct (super-)renormalizable quantum gravity models. In this talk, we discuss the problem of whether higher derivatives could already resolve black hole singularities at classical level. To this end, we present spherically symmetric static solutions of the most general sixth-derivative gravity using series expansions. We prove that the only solutions of the complete theory, i.e., with generic coupling constants, that possess a Frobenius expansion around the origin ($r = 0$) are necessarily regular. Moreover, by expanding around $r = r_0 \neq 0$ we identify solutions with black-hole horizons. Families of singular solutions emerge only for specific branches of the theory (i.e., imposing particular constraints on the coupling constants). These results suggest that there is an important difference between higher-derivative gravity models with 4 and 6 derivatives in what concerns the space of spherically symmetric static solutions.

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