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An Effective Field Theory for Black Hole perturbations: testing extensions to GR with gravitational waves

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The recent observation of gravitational waves from merging black holes (BH) opens up the possibility of exploring the theory of gravity at an unprecedented level.
It is therefore important to understand if and which modifications of General Relativity (GR) could be observed. I will show how the most convenient approach to address this question is to resort to a maximally model-independent, effective field theory (EFT)-based treatment. I will describe how an EFT for perturbations around spherically symmetric backgrounds, like black holes, can be constructed, such that the details of the microphysics are efficiently and systematically encoded in a limited set of parameters.
These parameters control for example how the frequencies of BH quasi normal modes deviate from GR and therefore they can be tested observing the ringdown phase after the BH merger.

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