

# eXtreme gravity with X-rays: a study into the nature of compact objects using X-ray reflection spectroscopy

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Einstein's theory of gravity is the prevailing theory to describe the gravitational effects in our universe. Although largely successful, there are some important deficiencies which have led to several alternative theories. These alternative theories differ from Einstein's theory primarily in the strong field regime. X-ray spectroscopy of energetic black holes is an established technique for studies in the strong gravity regime. It is mostly used to study Kerr black holes in astrophysical environments. We have developed a framework to analyze black holes from alternative theories with X-ray reflection spectroscopy. [1, 2] I shall present the latest results and discuss the systematic uncertainties which dominate the current capabilities of the technique. I will also compare this technique with other possible ways of testing Einstein's gravity like gravitational wave astronomy and black hole imaging.

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- [1] C. Bambi, A. Cardenas-Avendano, T. Dauser, J. A. Garcia and S. Nampalliwar, *Astrophys. J.* **842**, no. 2, 76 (2017) doi:10.3847/1538-4357/aa74c0 [arXiv:1607.00596 [gr-qc]].
- [2] A. B. Abdikamalov, D. Ayzenberg, C. Bambi, T. Dauser, J. A. Garcia and S. Nampalliwar, arXiv:1902.09665 [gr-qc].

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