



GRAVITY: CHALLENGES BEYOND GENERAL RELATIVITY

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Mergers of black holes and exotic compact objects in the extreme mass ratio regime

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The collision of compact objects, such as black holes and neutron stars, is a spectacular cosmic event of great interest to gravitational wave astronomy. Since 2015 we have been gathering information about such binary systems through the observation of the gravitational waves they generate. Most of these detections—and the determination of the parameters of the binary that sourced the gravitational waves—typically rely on a combination of advanced methods in General Relativity and Numerical Relativity.

Nonetheless, in recent years elementary ray-tracing techniques have been shown to capture the main characteristics of black hole mergers by considering the extreme mass ratio limit in an unorthodox way. In this regime, the evolution of the event horizon, when a large black hole merges with a small compact object, can be computed (semi-)analytically.

In this talk, I will exploit this idea in the context of compact object mergers in modified gravities respecting the equivalence principle. Two specific cases will be discussed: the fusion between a large black hole and a small traversable wormhole, and the collision between two black holes in cubic gravity. Differences with respect to black hole mergers in General Relativity will be highlighted.

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