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(G*) Formalism for Finding Marginally Outer Trapped Surfaces (MOTSs) in Kerr and its Friends

Monday 19 June 2023 17:00 (15 minutes)

In recent years, with the progress in gravitational wave astronomy and subsequent importance of binary black hole mergers, there has been an increased focus on numerical simulations of these events. However, the most common surface of interest in black holes—the event horizon—is difficult to track numerically, as it is defined teleologically from future boundary conditions. Instead, the focus is on the quasi-local alternative to the event horizon, marginally outer trapped surfaces (MOTSs)—the apparent horizon being the outermost of these (in most cases). Our group has previously discussed the self-intersecting MOTSs we have found inside the apparent horizons of various black hole spacetimes. However (and unsurprisingly given how rotation often complicates analysis), the formalism used to calculate these MOTS for static black hole geometries does not hold when considering rotating black holes. This talk will focus on a formalism we have developed which generalizes the previous methods to rotating black holes (of arbitrary dimension) and provide an example of using this formalism to calculate the "MOTSodesic"equations—an analogue of the geodesic equations for MOTSs—in the Kerr spacetime. Applications of this method will be discussed in the talk by Kam To Billy Chan.

Keyword-1

trapped surfaces

Keyword-2

black holes

Keyword-3

kerr

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