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How do black hole horizons interact with the rest of the universe?

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During simulations of a binary black hole collision, the final (post-merger) black hole horizon exhibits a decaying oscillation. There is also an observable gravitational wave signal from this black hole ringdown. Then it is natural to think that the oscillation generates the gravitational wave signal. However, this is not the case. By definition the black hole horizon (either event or apparent) cannot send signals to infinity. Instead, both the ringdown and signal must correlate with evolving, near-horizon gravitational fields which send signals both out to infinity as well as into the black hole. What then can an evolving horizon geometry tell us about the surrounding spacetime? Quantifying an answer to this question requires not only the Einstein equations but also a careful consideration of “physically reasonable” initial and boundary conditions. In this talk I will discuss recent progress that we have made on this problem.

Keyword-1

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Keyword-2

gravitational waves

Keyword-3

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