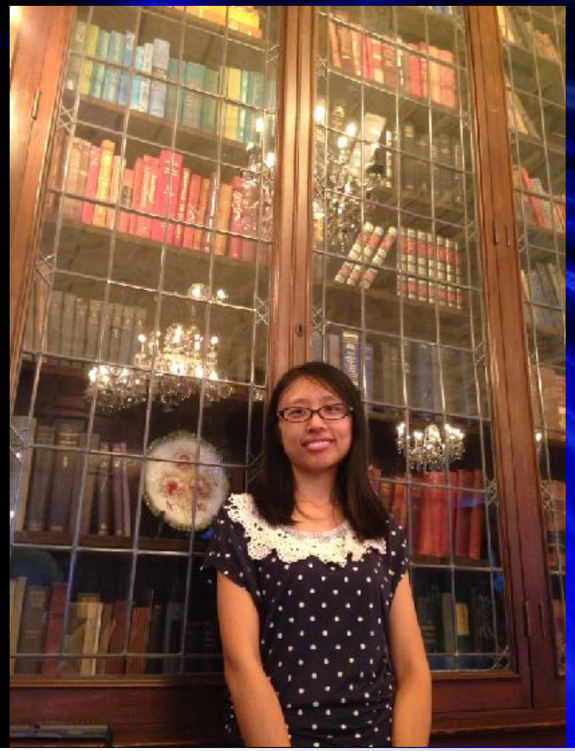
Center for Future High Energy Physics

高能物理前沿研究中心

Not quite a Blackhole: from quadratic gravity to gravitational wave echoes

Seminar Talk (Jan 12th, 2018, 15:00, Room 319, Library Building)



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Astrophysical black hole candidates might be horizonless exotic compact objects. Of particular interest is the plausible fundamental connection with quantum gravity. The puzzle is then why we shall expect Planck scale corrections around the horizon of a macroscopic black hole. Taking asymptotically free quadratic gravity as a possible candidate of UV completion of general relativity, I will show how the would-be horizon can be naturally replaced by a tiny interior as dictated by the dynamics. The new horizonless 2-2-hole, as a quite generic static solution sourced by sufficiently dense matter, may then be the nearly black endpoint of gravitational collapse. In the era of gravitational wave astronomy, echoes in the post-merger phase provide a great opportunity to probe such scenario. Given the uncertainties associated with the waveform of echoes, I will discuss using simple windowing methods to extract a signal from noise, where the time delay between echoes is the primary observable. Applying these methods to the LIGO data, evidence for echoes in the form of tentative signals are found for multiple LIGO black hole merger events.

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