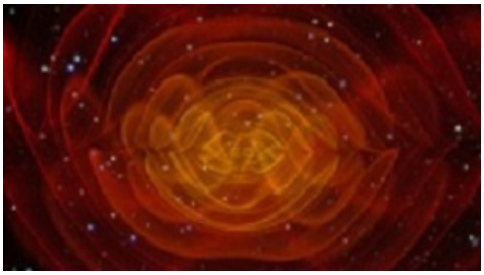

Contribution ID : **9** Type : **not specified**

Scattering events in Schwarzschild spacetime

Monday, 19 June 2017 14:00 (25)

The recent LIGO detections of merging black holes represent the culmination of decades of research into gravitational waves (GWs). One well-known seminal work by Peters and Mathews predicted the GW luminosity of eccentric binaries to leading post-Newtonian (PN) order. Driven largely by the desire to detect GWs from inspirals, the Peters-Mathews work has subsequently been extended through 3.5PN. Less well-known is work by Taylor, which is directly analogous to the Peters-Mathews result, except for scattering binaries. This work has only been extended by one PN order.

In this talk I present work exploring the overlap regime between PN and black hole perturbation theory (BHPT). The regime is particularly fertile for bound two-body motion wherein the viral theorem links the two PN parameters (speed squared and inverse separation). For scattering and plunging trajectories, however, both numerical BHPT and analytical PN techniques struggle. I will discuss a range of potential methods for analyzing unbound motion, and show some successes and failures. Finally, I will consider the potential for using BHPT to compute (unbound-motion) gauge invariants, which has been quite successful for calibrating effective-one-body models.

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