

Gravitational wave radiation as a probe of dark sectors

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The detection of gravitational wave radiation by LIGO in 2015 opened a new window onto the cosmos, and we are just now beginning to peer out into the unknown. Since this radiation can propagate unhindered through even an optically-thick medium, gravitational waves will prove to be a powerful probe of the early universe, which currently remains shrouded behind the photon's surface of last scattering. This earliest epoch in our cosmic history is especially important to our understanding of the Universe, since it is the time at which the mysterious dark matter has its origin. In this talk, I will discuss cosmological first-order phase transitions as a source of both gravitational wave radiation as well as particle dark matter. I will describe how gravitational waves arise during such a phase transition, discuss the expected signal spectrum, and talk about some open questions in regard to the bubble wall dynamics. Next I will describe how dark matter may be produced during such a phase transition through the interactions of bubble walls and the ambient plasma.

Presenter: LONG, Andrew (Rice University)

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