

# CU Physics Department Particle Seminar

Wednesday, October 22, 2008 705 Pupin Hall 1:15 PM

## Gravitational waves from scattering of stellar-mass black holes in galactic nuclei

We will discuss a new and interesting source of gravitational waves for ground-based observatories such as LIGO. In the nuclei of most galaxies, stellar mass black holes segregate from the stars and form a steep density cusp around the supermassive black hole in the center.

During two-body encounters between the BHs, occasionally enough gravitational waves are emitted to form a binary, which rapidly coalesces in less than one year. The BH-BH mergers are predominately eccentric during their merger in the LIGO band. This distinguishes them from other binary inspiral events, which circularize before becoming detectable, and allows us to use future ground-based detectors to actually probe the astrophysics inside of galactic nuclei. We also show that eccentric mergers extend the observable range of LIGO to larger masses than thought possible before, even up to  $700 M_{\text{sun}}$ .



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Meet the Speaker at 12:30 PM