

CU Physics Department Colloquium

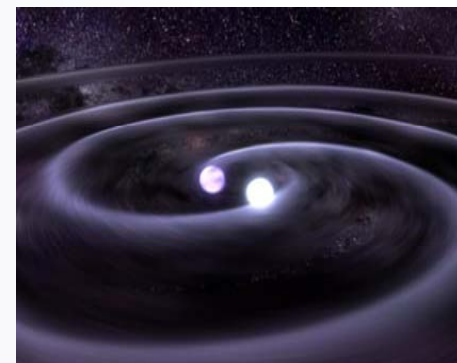
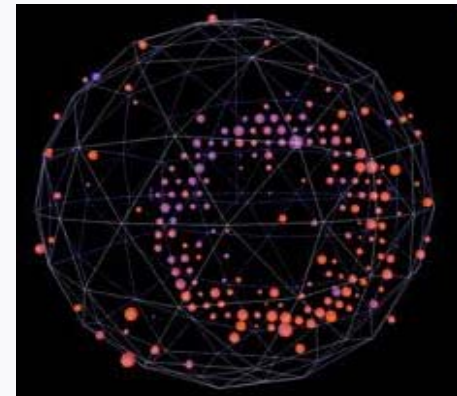
Monday, October 11, 2010 4:10 PM 428 Pupin Hall



Gravitational Waves, Neutrinos and Photons:

COMPREHENSIVE MULTIMESSENGER ASTRONOMY IN THE MAKING

Gravitational waves, ripples in the curvature of spacetime, carry information about the nature of gravity and fascinating astronomical phenomena never before observed by humanity, such as colliding black holes or consumed neutron stars. The LIGO-GEO600-Virgo interferometric gravitational-wave detector network has been successfully constructed and operated at or exceeding its initial sensitivity target. Searches for gravitational-wave signals at the sub-attometer level have already provided meaningful constraints on the population and characteristics of sources, in particular on the astrophysics of events which can also be observed through other messengers, such as gamma-rays, X-rays, radio, optical, and/or neutrinos. The simultaneous observation of neutrino or electromagnetic emission could be a crucial aspect for the first direct detections of gravitational waves, expected at the tens-of-zeptometers sensitivity level within a few years. Information on the progenitor, such as trigger time, direction and expected frequency range, can enhance our ability to identify gravitational-wave signatures with amplitudes close to the noise floor of the detector. Combining gravitational waves with electromagnetic and neutrino observations furthers the possibilities in extracting scientific insight that has been hidden from us before. I will discuss and interpret the results and successes from transient searches that have been completed with the LIGO-GEO600-Virgo network. I will give insight on the ways the multimessenger effort is currently being extended to include additional astrophysical events and messengers. I will also describe the status, some of the exciting science goals, and outlook for second and third generation interferometric gravitational-wave detectors.



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