Contributed Talk

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Title: Holographic Bound on Area of Compact Binary Merger Remnant

Abstract: Using concomitantly the Generalized Second Law of black hole thermodynamics and the holographic Bekenstein entropy bound embellished by Loop Quantum Gravity corrections to quantum black hole entropy, we show that the boundary cross-sectional area of the post-merger remnant formed from the compact binary merger in gravitational wave detection experiments like GW150914 {\it et. seq.}, by the LIGO-VIRGO collaboration, is bounded from below. This lower bound is more general than the bound obtained from application of Hawking's classical area theorem for black holes, since it does not depend on whether the inspiralling compact binary pair or the postmerger remnant consists of black holes or other exotic compact objects. The derivation of the bound entails an estimate of the entropy of the gravitational waves emitted during the binary merger which adapts to gravitational waves an extant formalism proposed originally for particle ensembles. The results for the minimal cross-sectional area of the merger remnant due to binary compact mergers observed recently by the LIGO-VIRGO collaboration are discussed. While accurate measurement of the mass of the remnant for the BNS merger GW170817 remains a challenge, we provide a {\it proof of principle} that for BNS mergers our lower bound on the cross-sectional area of the remnant provides an alternative approach to probe the validity of neutron star Equations of State, {\it independent} of the tidal deformations of the components.