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Abstract for an Invited Paper  
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**Modeling kilonovae using neutron star merger simulations : current status and uncertainties**

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Numerical simulations of neutron star-neutron star and black hole-neutron star binaries play an important role in the interpretation of gravitational wave and electromagnetic signals from merging binaries. In this talk, I will first provide a broad overview of current simulations of black hole-neutron star binaries, and of the challenges that we face to bring these simulations to the level of accuracy and physical detail required to reliably extract information from merger observations in the Advanced LIGO/Virgo era. I will then look in more detail at the modeling of kilonovae, the bright optical/infrared emission that follows neutron star mergers. I will in particular focus on the impact of neutrino transport on the properties of kilonovae. I will discuss the strength and limitations of the algorithms currently used to model neutrino transport, the impact of these limitations on kilonova modeling, and some promising way forward to improve on the current state-of-the-art for neutrino transport in merger simulations.