

# **Finding Cosmic Goldmines: Merging Neutron stars and Kilonovae**

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From the iodine in our bodies to the gold in our jewelry, heavy elements occupy myriad roles in human life. But how did these elements come to exist in nature? This question lies at the heart of my talk, which will focus on two nucleosynthesis sites -- binary neutron star mergers and black hole-neutron star mergers -- and the 'kilonova' transients they produce. Kilonovae, the glow of freshly-made heavy elements, are the only direct observational evidence of heavy element nucleosynthesis in situ and hold great promise for uncovering how and where these elements are made. In 2017, the landmark detection of the kilonova AT2017gfo confirmed that neutron star mergers are a site of heavy element production. But questions abound with respect to the details of nucleosynthesis in merger ejecta and features of kilonova light curves. In this talk, I will present our latest predictions based on general-relativistic magnetohydrodynamic simulations that include neutrino physics. I will show how detailed numerical modeling can allow us to link kilonovae to their progenitors, interpret past and future observations of these transients, and gain unprecedented insight into the origin of heavy elements.