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Nuclear Physics Experiments and Neutron Star Mergers[1]

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Neutron star mergers are fascinating events that offer the promise to answer a number of fundamental questions about the nature of matter at extreme conditions, and the evolution of stellar objects and the chemical composition of our Galaxy. Nuclear physics is a key ingredient in theories used to interpret multimessenger observations of neutron star mergers. The equation of state of nuclear matter is essential to the structure of neutron stars and dynamics of the merger. The properties of neutron-rich isotopes, far from β-stability, govern neutron-capture nucleosynthesis processes that take place in the outflow material of the merger. The subsequent radioactive decay of these isotopes powers the kilonova associated with neutron star mergers, and is expected to produce observable footprints for the production of heavy chemical elements. Measurement of these nuclear physics properties is an active area of current research in low-energy nuclear physics. In this presentation I will highlight recent experimental results, and discuss the exiting opportunities for new measurements in a number of next-generation facilities soon to be operational, such as the Facility for Rare Isotope Beams (FRIB).

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