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Production of heaviest nuclei in compact binary mergers

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Since the discovery of the kilonova associated with GW170817, neutron star mergers have been regarded as astrophysical sites of the r-process nuclei. However, it remains a mystery how the robustness of the r-process patterns (or universality) in metal-poor stars can be explained. The mechanism that leads to high Th/Eu ratios (actinide boost) has not been well understood, either. In this talk, we discuss the r-process in the ejecta from the mergers of binary neutron stars or a neutron star and a black hole with the aim of solving these problems (universality and actinide boost). The nucleosynthesis is based on the long-term, GRMHD, neutrino-transport simulations of binary mergers, which self-consistently follow the evolution of both dynamical and post-merger phases.

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