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Nuclear physics and r-process nucleosynthesis in the multi-messenger era

Friday, 25 May 2018 11:00 (20 minutes)

The electromagnetic counterpart of the GW170817 neutron star merger provided the first direct evidence of the astrophysical formation of nuclei via rapid neutron capture (r-process) nucleosynthesis. Full understanding of this event from first principles and its role in galactic chemical evolution requires progress in a number of areas. One key area is nuclear physics. A neutron star merger r-process involves thousands of exotic nuclear species, the majority of which have never been studied in the laboratory. Here we will discuss r-process nuclear data needs and how nuclear physics uncertainties influence our interpretation of observed abundance patterns and kilonova signals. We will explore the promise of experimental campaigns at rare isotope beam facilities to reduce these uncertainties, and describe recent efforts to directly connect nuclear data to astrophysical environments via the 'reverse-engineering' of unknown nuclear properties from the r-process abundance pattern.

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