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The Cosmic Origin of the Heavy Elements: Implications from the Neutron Star Merger GW170817

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The recent detection of the binary neutron star merger GW170817 by LIGO and Virgo was followed by a firework of electromagnetic counterparts across the entire electromagnetic spectrum. In particular, the ultra-violet, optical, and near-infrared emission is consistent with a kilonova that provided strong evidence for the formation of heavy elements in the merger ejecta by the rapid neutron capture process (r-process). In this talk, I will discuss our current understanding of how kilonovae are produced by neutron star mergers and how r-process nucleosynthesis in these outflows can explain the cosmic origin of the heavy elements in the universe, which has been an enduring mystery for more than 70 years.

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