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R-process production and transients from neutron star mergers

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The mergers of neutron stars with neutron star or black hole binary companions have long been suspected to be a major site of astrophysical r-process production. The first direct detection of a binary neutron star merger in August of 2017 (GW1701817) provided a critical test of this theory. I will explain the physics governing the nature of r-process transients, and discuss how we can decode mergers radioactively-powered emission to learn about merger-driven nucleosynthesis. I will apply these insights to GW170817, and outline what we learned about the r-process from this event, and what questions remain.