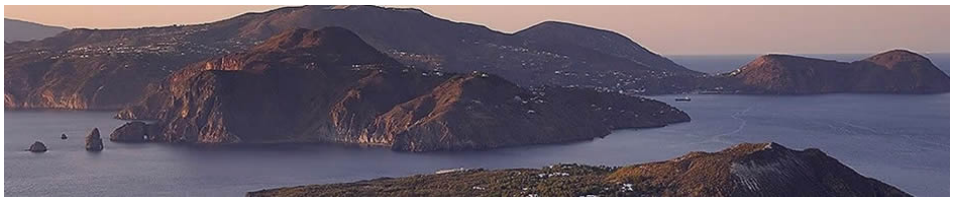

Contribution ID: **17** Type: **not specified**

Origin of heavy elements from Neutron Star Mergers, lessons from GW170817

The first gravitational-wave detection of the merger of a neutron star binary (GW170817) corroborated many theories on the nature of these events while at the same time, displaying a number of surprises. Although long-believed to be an engine for gamma-ray bursts, the off-angle detection of gamma-rays suggests a wider jet opening angle than previously believed. Similarly, the inferred rate of mergers and the detection of optical and infra-red from the ejecta (so-called kilonova or macronova emission), demonstrated the importance of these mergers in producing r-process elements. But the strong optical emission suggests that the ejecta is not limited to pure r-process elements, and these mergers now suffer from some of the same issues supernovae have in explaining the r-process.

I will review what we know of r-process production from both theory and observations of the GW170817, discussing the differences between neutron star mergers and supernovae in the production of r-process elements. From this work, we can begin to address the successes and challenges of this important site of r-process production.

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