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## Inference of multi-channel r-process element enrichment in the Milky Way using neutron star merger observations

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Observations of GW170817 strongly suggest that binary neutron star mergers produce rapid neutron-capture nucleosynthesis (r-process) elements. However, it remains an open question whether these mergers can account for al the r-process element enrichment in the Milky Way's history. In particular, the neutron star merger-only enrichment scenario has been shown to be inconsistent with the observed r-process abundance trend of stars in the Galaxy. In this talk, I wil show the constraints on the contributions of the neutron star merger channel using recent astrophysical neutron star observations, including gravitational waves, radio, X-ray, and gamma-ray observations. I will then present a Bayesian framework to consistently combine these lines of observations with r-process abundance data to quantify the contribution and uncertainties of single and multiple astrophysical enrichment sources.

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