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The (hot) r-process scenario: from reaction equilibria to kilonovae

The cosmic site of the rapid neutron capture process (r-process) is still unknown, although recent observational evidence supports compact binary mergers (CBMs) as the main source for r-process nuclei in our universe. The very neutron-rich dynamical ejecta in CBMs host a hot r-process where local (n,g)-(g,n) equilibria are established, leading to robust nuclear compositions that primarily depend on the nuclear properties (e.g., masses). When the local equilibria freeze out and the composition starts decaying to stability, late-time effects related to fission can alter the abundance pattern considerably. Finally, radioactive decays on timescales of days to weeks power an electromagnetic afterglow that could possibly be observed as a macronova/kilonova.

In this talk, the hot r-process scenario is reviewed on the example of dynamical CBM ejecta, with a focus on the impact of nuclear masses and reaction rates on observables.

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