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Galactic Chemical Evolution with r-process elements

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The origin of the heaviest elements is still a matter of debate. For the rapid neutron capture process (r-process), multiple sites have been proposed, e.g., neutron star mergers and (sub-classes) of supernovae. R -process elements have been measured in a large fraction of metal-poor stars. Galactic archaeology studies show that the r-process abundances among these stars vary by over 2 orders of magnitude. On the other hand, abundances in stars with solar-like metallicity do not differ greatly. While the large scatter at low metallicities might point to a rare production site, why is there barely any scatter at solar metallicities? In this talk, I will discuss chemical evolution scenarios that provide an explanation for the observed abundance features of r-process elements in our Galaxy, especially at the lowest metallicities. Further, I will explain how adding short lived radioisotopes to the model can help to further constrain the r-process and other processes, and explain why certain short lived radioisotopes arrive conjointly on Earth, even though they were produced at different nucleosynthesis sites.

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