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Chemical evolution of neutron-capture elements across the Milky Way

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The majority of elements beyond the Fe peak are produced by neutron capture processes which can be rapid (r-process) or slow (s-process) with respect to the β-decay in nuclei. Understanding which are the astrophysical formation sites of these two processes has become one of the major challenges in chemical evolution. In particular, the r-process sites are still under debate, with possible main producers candidates being peculiar supernovae (magneto-rotational supernovae, MR-SNe) or merging of compact objects (neutron stars or neutron star-black hole).

In this talk, I will first present the main steps done in chemical evolution simulations to understand the origin of neutron capture elements and then I will show results from our latest work. We studied both the abundance patterns and the radial gradients of five s-process elements (Y, Zr, Ba, La, Ce) and four mixed/r-process elements (Eu, Mo, Nd, Pr) in the Galactic thin disc using a detailed two-infall chemical evolution model with state-of-the-art nucleosynthesis prescriptions. Predictions of our model are compared with data from the sixth data release of the Gaia-ESO survey, which consists of 62 open clusters located at different Galactocentric distances and with ages ranging from 0.1 to 7 Gyr, and 1300 disc field stars.

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