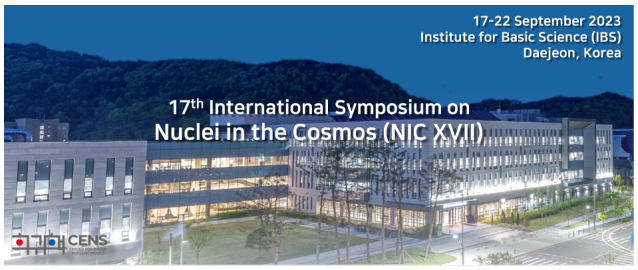

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Influence of key SN properties on Galactic Chemical Evolution

Tuesday, 19 September 2023 18:15 (5 minutes)

Galactic chemical evolution ("GCE") is a great tool to probe the influence of various astrophysical sites on the observed abundances of stars. We use the high resolution ((20 pc)^3 /cell) inhomogeneous GCE tool "ICE"to estimate the impact of two main supernova ("SN") properties on observed stellar abundances:

First, we will show that supernova yields need to be metallicity dependent in order to explain the observed alpha element abundances.

Second, we show that SN explosion energies have a significant impact on the mixing of the interstellar medium.

We further use pedicted SN explosion energies to constrain under which circumstances SNe "fail", i.e., collapse to a black hole instead of leaving behind a neutron star. We then use these predictions to estimate if black hole –neutron star mergers might be a second, earlier acting rapid neutron capture ("r") process production site.

Finally, we speculate whether a rare sub class of supernovae ("magnetorotationally driven supernovae") can act as an additional and earlier r-process site and conclude that our simulations with an adequate combination of these two sites successfully reproduce the observed r-process elemental abundances in the Galactic halo.

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