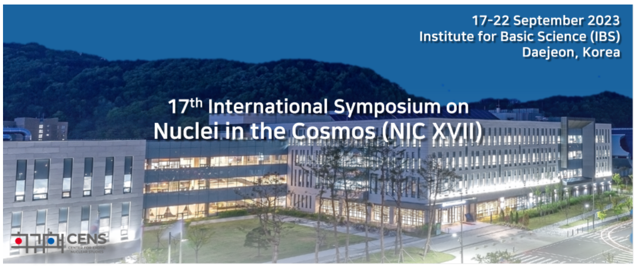


Contribution ID: **39** Type: **Oral**

# The Impact of Binary Evolution on Stellar Nucleosynthesis

*Thursday, 21 September 2023 15:00 (15 minutes)*

Almost all of the nuclei in the cosmos originate from stars. Low-mass (~1-8M⊠) stars are thought to synthesise a large fraction of the universe's carbon, nitrogen, and fluorine, and about half of all elements heavier than iron making them an important ingredient in galactic chemical evolution (GCE) models. Low mass stars synthesise material through a variety of nuclear processes such as H-burning, He-Burning, and the slow neutron capture process. Most theoretical nucleosynthesis calculations assume that the stars are single, and these calculations are commonly used for GCE models. However, over half of low mass stars are observed to have at least one stellar companion in what is known as a binary system. Binary evolution could lead to mass transfer and stellar mergers which in turn could influence the conditions within the stellar interior. In this talk, we question the use of only single star calculations within GCE models and investigate the influence of binary evolution on the production of carbon-12, nitrogen-14, aluminium-26, and s-process elements (e.g., Pb208) by a low-mass stellar population at solar metallicity. We find that for a stellar population with a binary fraction of 0.7 the overall output of carbon-12 decreases by ~12%, nitrogen-14 decreases by <5%, aluminium-26 increases by ~25%, and lead decreases by <5%. We also find that binary evolution could explain some of the anomalous abundances observed in globular clusters and planetary nebulae.

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**Session Classification:** Stellar modelling

**Track Classification:** Stellar modelling