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Galactic Chemical Evolution of Short-Lived Radioactive Isotopes in the Milky Way galaxy

We have developed Galactic Chemical Evolution (GCE) models to understand the spatial and temporal distribution of the short-lived radionuclides (SLRs), ^{26}Al, ^{36}Cl, ^{41}Ca, ^{53}Mn, and ^{60}Fe in the Milky way galaxy. In our simulations, the galaxy is radially divided into eight annular rings of 2 kpc width from 2-18 kpc to study the evolution of each galactic ring individually. Further, the solar neighbourhood (8-10 kpc) is divided into independent spatial grids of area, 0.1–1 kpc^2, to understand the canonical abundances of the SLRs in the early solar system (ESS). In GCE models, various generations of stars (in the mass range 0.1-100 M) form and evolve from the accreted gas according to star formation rate and initial mass function to enrich the interstellar gas with their nucleosynthetic yields.

The results from the GCE models explain the abundance trends of SLRs, ^{26}Al, ^{36}Cl, ^{41}Ca, ^{53}Mn, and ^{60}Fe in the galaxy from 2-18 kpc. The SLRs have a higher abundance in the inner galactic regions and a decrease in the galaxy's outer regions. The abundance of SLRs is also higher in the early phase of the galaxy formation due to the increased star formation rate. In our simulations, the solar system forms inside a stellar cluster and has canonical values of ^{60}Fe/^{56}Fe and ^{53}Mn/^{55}Mn in the ESS. We have also proposed a hypothesis for a possible scenario to explain the observed abundance of ^{26}Al/^{27}Al and ^{41}Ca/^{40}Ca in the early solar system.

Length of presentation requested

Oral presentation: 17 min + 3 min questions

Please select between one and three keywords related to your abstract

Chemical Evolution: the Milky Way

2nd keyword (optional)

Nucleosynthesis

3rd keyword (optional)

Origin of the Solar System

Author: Dr KAUR, Tejpreet (Punjab University, India)

Co-author: Prof. SAHIJPAL , Sandeep (Punjab University, India)

Presenter: Dr KAUR, Tejpreet (Punjab University, India)