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Chemical clocks and their time zones: exploring the cosmic time evolution of [s/Mg] in the Milky Way

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A linear relation between [s/alpha] and age has been found for stars with near solar metallicity. However, this “chemical clock” relationship has been shown to be non-universal, with dependencies on metallicity and position in the Galaxy. Using a novel empirical technique for recovering stellar birth radii (Rbirth) in observations, I will show the cosmic time evolution of [Ce/Mg], [Ba/Mg], and [Y/Mg] for different birth radii using APOGEE DR17 and GALAH DR3 data. The age-[s/Mg] relation is strongly dependent on birth location in the Milky Way, with stars born in the inner disc having the weakest correlation. The non-universal relations of chemical clocks is caused by their fundamental trends with Rbirth over time, and suggest that the tight age-[s/Mg] relation obtained with solar-like stars is due to similar Rbirth for a given age.

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