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Constraining nucleosynthesis in CEMP-s progenitors using Fluorine

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Carbon-Enhanced Metal-Poor (CEMP) stars are among the most important objects for constraining the formation and evolution of the first stellar populations in the Galaxy. CEMP stars with enhancements in slow neutron-capture process (s-process) elements (CEMP-s stars, objects with [Fe/H] < -2, [C/Fe] > 0.7 and [Ba/Fe] > 1) are a significant fraction (as high as 25%) of all metal-poor stars. Of the proposed formation channels for CEMP-s stars, mass transfer in a binary system from an AGB companion which is now an unseen white dwarf is the most widely accepted scenario.

Fluorine production at low metallicity is extremely sensitive to the physical conditions where produced and probably related to the same nucleosynthetic process responsible for s-process element production in AGB stars during the thermal-pulsating phase. Thus, Fluorine measurements in CEMP-s stars provide a direct test for CEMP-s formation scenarios, nucleosynthesis, and chemical enrichment mechanisms in the early beginnings of the Milky Way galaxy.

At low-metallicity, [Fe/H] < −2, Fluorine have been detected and measured in just 2 stars: HE 1305+0132 by Schuler et al. (2007) and HD 5223 by Lucatello et al. (2011). A handful of upper limits also exist.

We present Fluorine measurements in 2 CEMP-s stars along with a careful comparison with state-of-the-art nucleosynthesis predictions indicating some successes, and shortcomings, of the models.

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