

# The CEMP star SDSS J02220313: the first evidence for proton ingestions in very low-metallicity AGB stars?

Sergio Cristallo,<sup>1,2</sup> Elisabetta Caffau,<sup>3</sup> Piercarlo Bonifacio,<sup>3</sup> and Gabriele Cescutti<sup>4</sup>

<sup>1</sup>*INAF - Osservatorio Astronomico d'Abruzzo, Teramo, Italy*

<sup>2</sup>*INFN - Sezione di Perugia, Perugia, Italy*

<sup>3</sup>*GEPI, Observatoire de Paris, Paris, France*

<sup>4</sup>*INAF - Osservatorio Astronomico di Trieste, Trieste, Italy*

Carbon-enhanced metal-poor (CEMP) stars are common objects at metal-poor regime. We present observations of a CEMP star, SDSS J02220313, with a known high carbon abundance and a strong enhancement in neutron-capture elements of the first peak (Sr and Y) and of the second peak (Ba) of the slow neutron capture process (the s-process). Therefore, this star can be classified as a CEMP-s star.

However, SDSS J02220313 presents some peculiarities: a larger overabundance (with respect to iron) of the first s-process peak than the second s-process peak and an extremely large Ba/La ratio (more than a factor 10) [1]. Both features do not match with a standard s-process, nor with a pollution typical of the intermediate neutron capture process (i-process).

The enhancement in heavy elements suggests that the evolved companion had a low main sequence mass and that the latter experienced a proton ingestion episode at the beginning of the AGB phase [2]. We identify a transient phase of that peculiar mixing episode which shows the nucleosynthesis features characterizing SDSS J02220313. We speculate on the possible theoretical scenario.

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[1] E. Caffau et al., A&A, submitted (2019).

[2] S. Cristallo et al., PASA **26**, 139 (2009).