

New and precise data of the possible i-process star J094921.8-161722

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Several Carbon Enhanced Metal-Poor (CEMP) stars have been categorized as CEMP-rs, denoting that their spectra show overabundances both slow (s-) and rapid (r-) process elements. The nature of these stars is not yet explained, but hypotheses such as the “double pollution” and the intermediate (i-) process nucleosynthesis have been proposed. Two groups of authors have studied the stars GIU J190734.24-315102.1 and J094921.8-161722, and provided observation-based abundances that support the double pollution hypothesis. However, using the same observation-based data of J094921.8-161722, that shows a non-negligible enhancement of thorium, another group of researchers supported the possibility of the i-process to be the source of enrichment, invoking a parsimonious argument. Here we show element abundances, including Th and U, and Ba and Eu isotopic ratio determinations, from new ESO UVES spectra of optimal quality in the blue. Our approach is dedicated to re-derive stellar properties and abundances from revised methods that use state-of-the-art 3D NLTE and 1D NLTE models, which have been scrutinized and proven to minimize model and data processing biases. We discuss the compatibility with i-, and r- + s-process nucleosynthesis models. Further, we evaluate the possibility of dating the star based on cosmochronometry from Th and U.

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