Modelling the formation of the ^{13}C neutron source in AGB stars

Diego Vescovi[1, 2, 3] and Sergio Cristallo[3, 2]

[1] *Gran Sasso Science Institute, Viale Francesco Crispi, 7, 67100, L'Aquila, Italy*

[2] *INFN, Section of Perugia, Via A. Pascoli snc, 06123, Perugia, Italy*

[3] *INAF, Observatory of Abruzzo, Via Mentore Maggini snc, 64100, Teramo, Italy*

Half of the elements heavier than iron are produced during the asymptotic giant branch (AGB) phase of low-mass stars through a series of slow neutron captures and β-decays. During this phenomenon, called *s*-process, Free neutrons are relased by the ^{13}C(α, n)^{16}O reaction, which works at about 100 MK in radiative conditions. Currently, a major source of uncertainty in AGB models is the partial-mixing process of hydrogen, required for the formation of the so-called ^{13}C pocket. Among the attempts to derive a self-consistent treatment of this physical process, there are 2D and 3D simulations of magnetic buoyancy [1]. The strong magnetic fields (10^4-10^6 G) requested by this formulation have been shown by the KEPLER mission to be typical of low mass stars [2]. The^{13}C pocket resulting from mixing induced by magnetic buoyancy extends over a region larger than those so far assumed, showing an almost flat ^{13}C distribution and a negligible amount of ^{14}N. Recently, it has been proved to be a good candidate to match the records of isotopic abundance ratios of *s*-elements in presolar SiC grains [3, 4]. However, up to date such a magnetic mixing has been applied in post-process calculations only [5], being never implemented in an stellar evolutionary code. Here we present new stellar models, performed with the 1-d hydrostatic FUNS evolutionary code [6], which include magnetic buoyancy. We comment the resulting *s*-process distributions and show preliminary comparisons to spectroscopic observations and pre-solar grains measurements.

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