DIVERSITY OF ABUNDANCE PATTERNS OF NEUTRON-CAPTURE ELEMENTS IN VERY METAL-POOR STARS

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The origin of the r(apid) neutron-capture process is yet unclear. Chemical abundance patterns of Very Metal-Poor (VMP) stars have been studied to constrain the origin of the r-process, as these stars are believed to reflect the nucleosynthesis yields of single event. Recent observations of VMP stars indicate that there are at least two components to r-process; "weak r-process" mostly responsible for relatively light n-capture elements, and "main r-process" responsible for heavy n-capture elements. A question is whether these two are well separated or there exists a variation in the r-process.
This paper presents the results of abundance analysis of n-capture elements in five VMP stars (HD107752, HD110184, HD85773, HD23798, BD+6 648) in the Milky Way halo observed by Subaru Telescope High Dispersion Spectrograph.
Their abundance patterns show overabundace at light n-capture elements (e.g. Sr, Y), infering element yielding of weak r-process, while heavy n-capture elements (e.g. Ba, Eu) are deficient; however, the overabundance of light ones is not as significant as that previously found in stars representing the weak r-process (e.g. HD122563 [1]). Our study shows that there is diversity in the abundance patterns from light to heavy n-capture elements. We have compared our abundance pattern with theoretical calculation of how electron fraction in electron capture supernovae affect the pttern of n-capture elements[2].

[1] Honda et al., ApJ 643,1180 (2006).
[2] Wanajo et al., ApJL, 726,L15 (2011)