

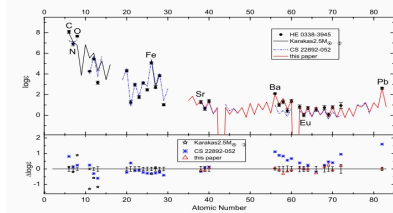
# Study The Neutron-Capture Processes Based on The Odd Isotopic Fractions of Barium

Cui Wenyuan, Hebei Normal University, China

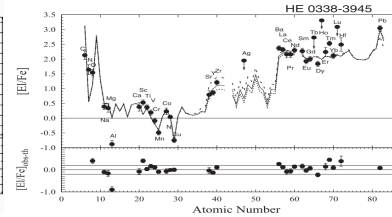
## ➤ Motivations

✓ Why isotopes important?

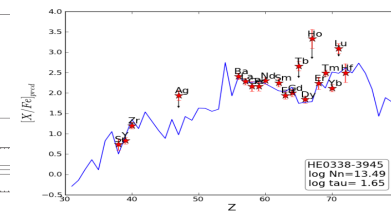
For the same r/s star HE 0338-3945



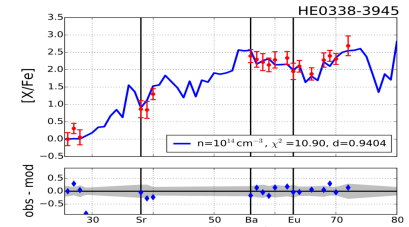
Cui+, 2010



Bisterzo+2012



Dardelet+2015



Hampel+2016

✓ What is the correct value of the isotopic fraction of Ba in the solar pure r-process?

The solar r-pattern obtained by subtracting the s-components.

Under the **same barium abundance**, the stellar model and classic method **give different isotopic yields**.

➤ We measured the odd isotopic fractions of barium for five r-II stars and one r/s stars.

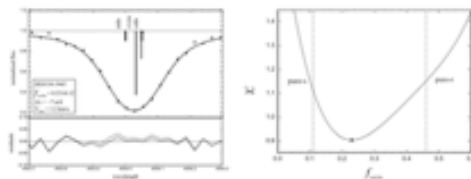
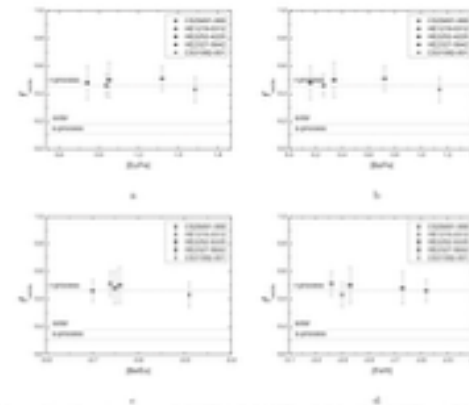


Fig. 1. Left panel: Synthetic profiles for observed odd isotopic BaII resonance line at 4704 Å in HE 0338-3945 with the model fit below. The comparison, a line with  $\xi_{\text{Ba,odd}} = 0.10$  (i.e. 0.23  $\nu$ - $\nu$ ) and modelled here from planetary distribution lines. The value for  $\xi_{\text{Ba,odd}}$  has been optimized so one that minimizes  $\chi^2$ , and the value for  $\langle \delta \nu_{\text{Ba}} \rangle$  remains the same. Right panel:  $\delta \nu_{\text{Ba}}$  for the HE 0338-3945 line, the star shows where the minimum of the fit lies.

Meng+2016



Cui+2018

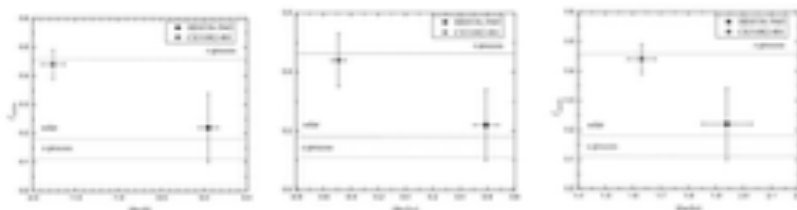


Figure 3. Fraction of the odd isotopic BaII line ( $f_1$ ) vs the fraction of the even isotopic BaII line ( $f_2$ ) for HE 0338-3945. The fraction of the odd isotopic BaII line ( $f_1$ ) is shown in the top row, and the fraction of the even isotopic BaII line ( $f_2$ ) is shown in the bottom row. The fraction of the odd isotopic BaII line ( $f_1$ ) is shown in the left column, and the fraction of the even isotopic BaII line ( $f_2$ ) is shown in the right column. The fraction of the odd isotopic BaII line ( $f_1$ ) is shown in the top row, and the fraction of the even isotopic BaII line ( $f_2$ ) is shown in the bottom row. The fraction of the odd isotopic BaII line ( $f_1$ ) is shown in the left column, and the fraction of the even isotopic BaII line ( $f_2$ ) is shown in the right column.