Upgrading β-decay rates in the dppns45 post-processing nucleosynthesis code

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dppns45 code

▶ Developed in the 1990s by John Lattanzio and Robert Cannon

▶ *Stromlo* stellar structure evolution code → *dppns45*
   post-processing nucleosynthesis code

▶ 328-species nuclear network by Maria Lugaro
   ▶ including all the isotopes on the s-process path (up to Po)

▶ Reaction rates based on the JINA REACLIB database
   ▶ Constant radioactive decay and electron capture rates

- ▶ **Because of the operation of the branching points, the temperature and density-dependent decay rates are essential for the accurate study of the s-process in AGB stars**
  - ▶ Upgrade by Andrés Yagüe López: added a routine that allows to include specific decay rates

- ▶ Temperature and density-dependent radioactive decay and electron captures rates were created based on NETGEN database
  - ▶ Beta-decay rates from Takahashi & Yokoi (1987), and from Goriely (1999)

- ▶ The new tables were tested on a model of an average AGB star, with M = 3 solar masses and z = 0.014 metallicity

$X^i_{NETGEN}/X^i_{REACLIB}$ ratio

$^{79}Se \rightarrow^{79} Br$
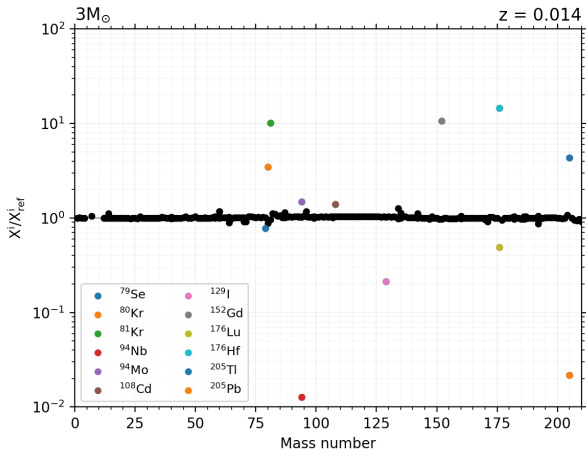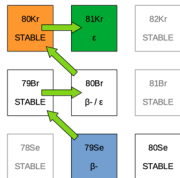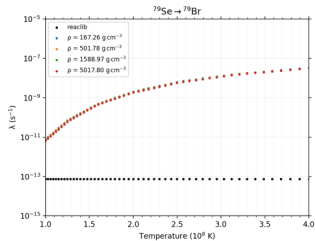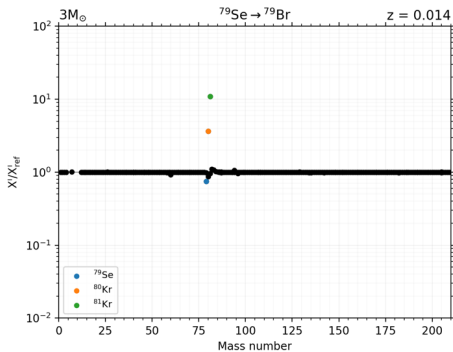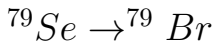
Conclusion

▶ The code update was successful, the results are considered physically correct

▶ Future:
  ▶ Comparison of the new dppns45 predictions updated with the FRUITY calculations

  ▶ Updation of the neutron capture rates in the code

Thank you for your attention!