

Impact of T - and ρ -dependent decay rates and new (n, γ) cross sections on the s-process in low-mass AGB stars

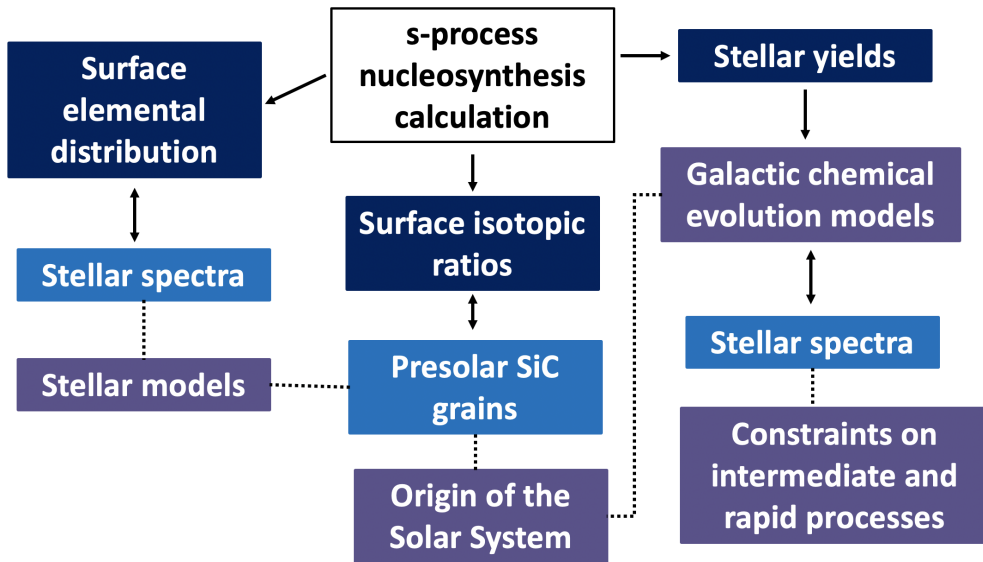
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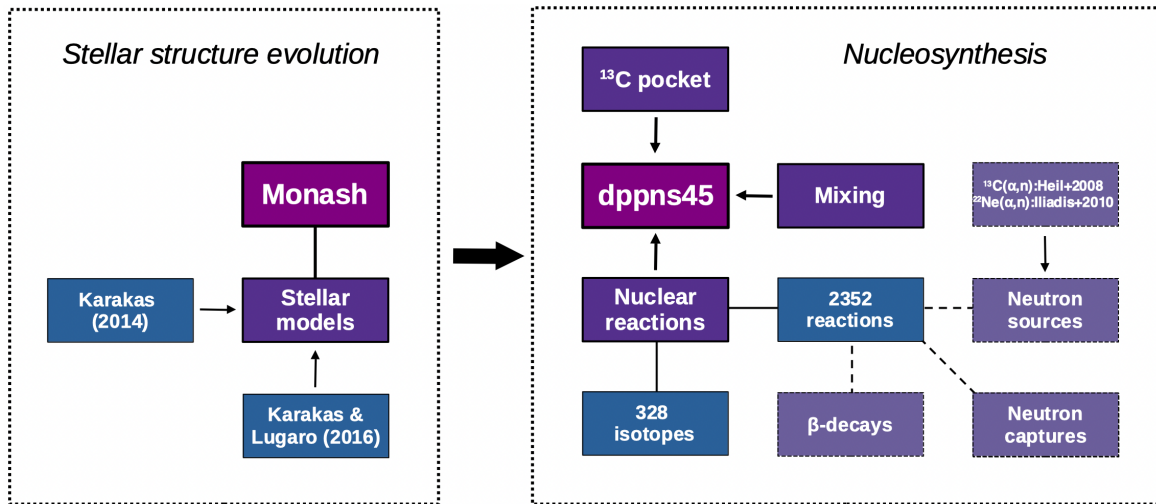
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University of Szeged
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Stellar structure models

$$Y = 0.26, Z = 0.007$$

2.5 M_☉3 M_☉4 M_☉

$$Y = 0.28, Z = 0.014$$

2 M_☉3 M_☉4 M_☉

$$Y = 0.30, Z = 0.03$$

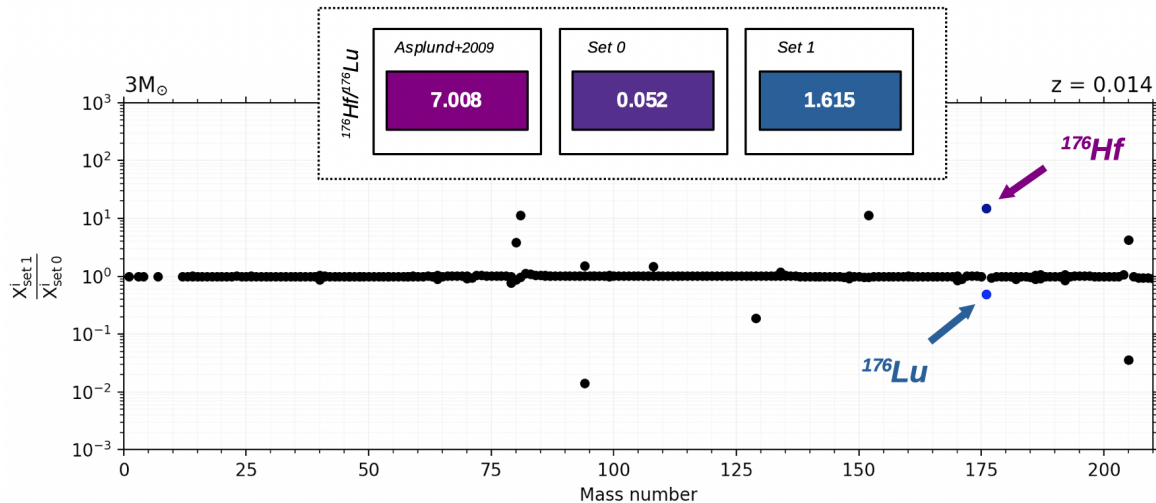
2.5 M_☉3 M_☉4 M_☉

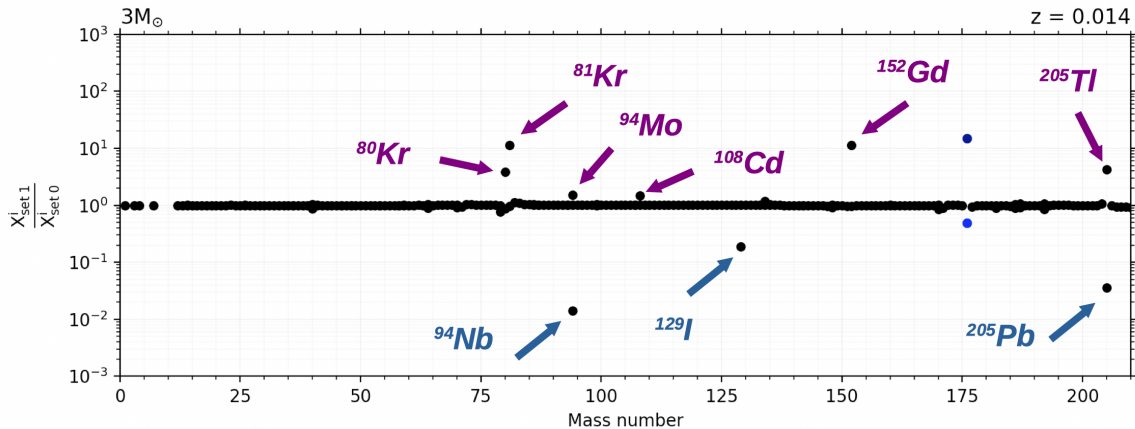
Property of the reaction network

	Set 0	Set 1	Set 2
β -decay rates	Terrestrial from JINA REACLIB ¹	T and ρ -dependent from NETGEN ²	T and ρ -dependent from NETGEN
Neutron capture rates	ka02 from JINA REACLIB	ka02 from JINA REACLIB	ka02 from JINA REACLIB Recommended MACS from ASTRAL ³

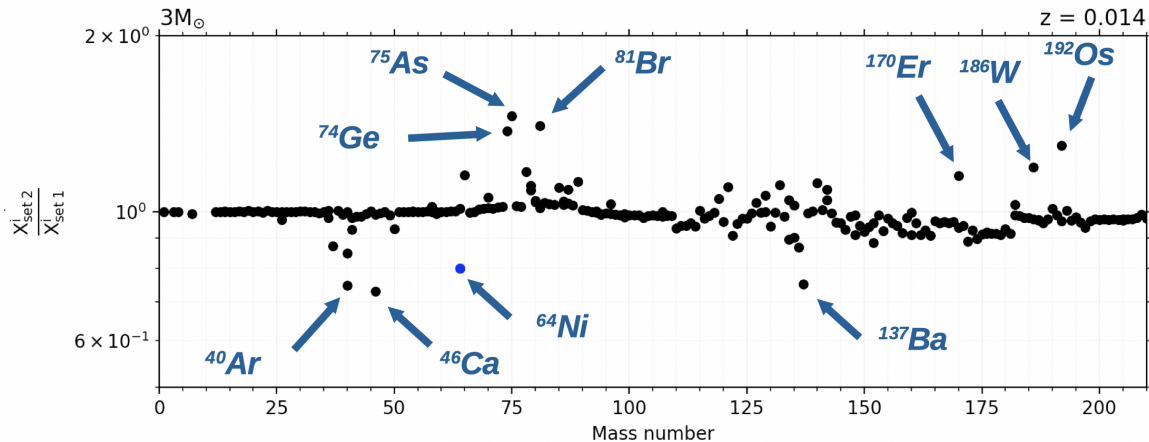
(1) <https://reaclib.jinaweb.org> (2) <http://www.astro.ulb.ac.be/Netgen/> (3) <https://exp-astro.de/astral/>

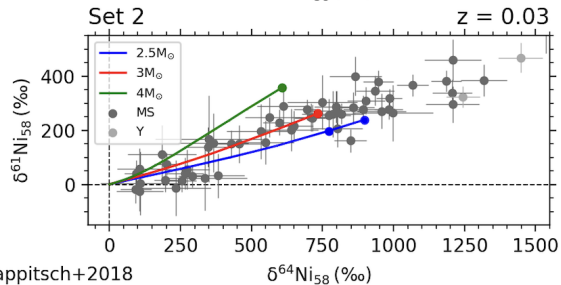
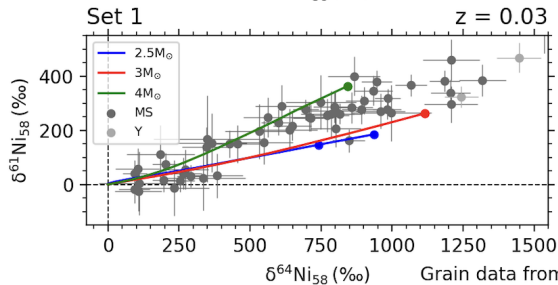
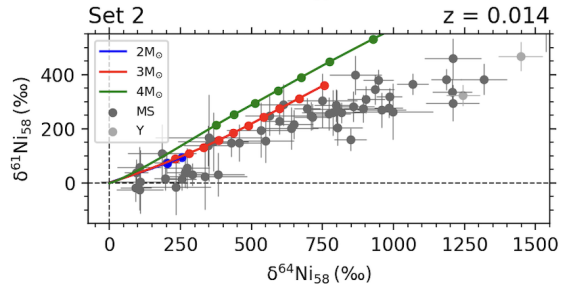
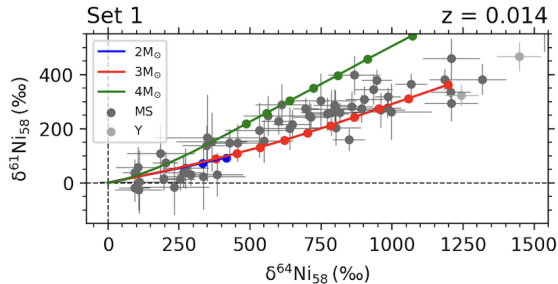
What is the impact of the temperature- and density-dependent decay rates on surface abundances? (Set 0 \rightarrow Set 1)





What effect do the new neutron-capture rates on surface abundances?
(Set 1 \rightarrow Set 2)





Grain data from Trappitsch+2018

Summary

- ▶ Temperature- and density-dependent decay rates cause order of magnitudes changes in surface abundances
 - ▶ e.g. ^{94}Nb , ^{152}Gd
 - ▶ $^{176}\text{Hf}/^{176}\text{Lu}$ ratio goes closer to solar
- ▶ Neutron capture rates cause $\sim 50\%$ changes in surface abundances
 - ▶ e.g. ^{64}Ni , ^{137}Ba