Nucleosynthesis simulations in AGB stars

Alexander Koloczek
M. Pignatari, R. Reifarth, C. Ritter, K. Sonnabend and the NuGrid collaboration

HIC for FAIR
Helmholtz International Center

HGS-HIRe for FAIR
Helmholtz Graduate School for Hadron and Ion Research

Kr isotopic ratios in presolar grains

Kr isotopic ratios in presolar grains

Data

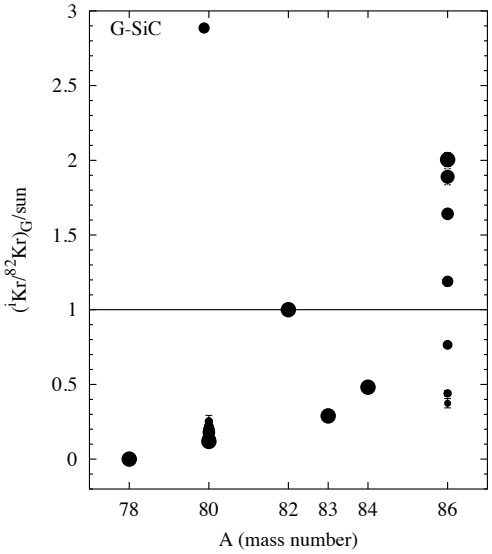


Fig. 1. Kr−G isotopic ratios measured in mainstream SiC grains (black circles, data from Lewis et al. 1994) are plotted for different grain size separates, from the smallest (KJA, small circles) to the largest (KJG, big circles).

Kr isotopic ratios in presolar grains

Data

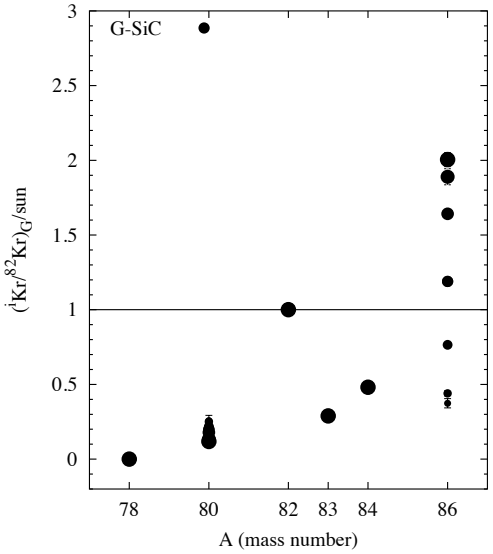


Fig. 1. Kr−G isotopic ratios measured in mainstream SiC grains (black circles, data from Lewis et al. 1994) are plotted for different grain size separates, from the smallest (KJA, small circles) to the largest (KJG, big circles).

Simulation

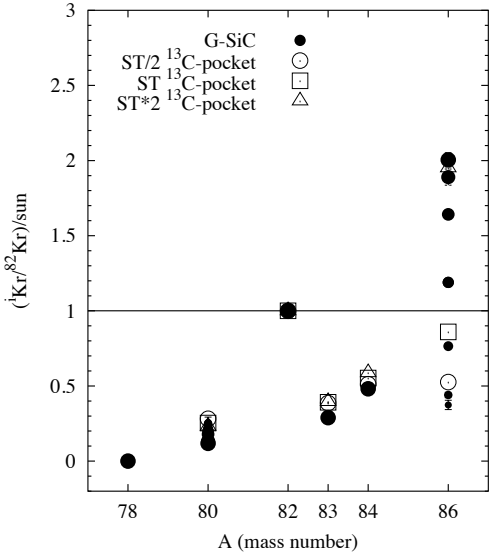


Fig. 2. M= 1.5 $M_\odot$ [Fe/H]= −0.30. Kr−S isotopic ratios in mainstream SiC grains (black circles) are compared with the *s*−component predictions at the last thermal pulse (19th TP). Predictions are presented for standard ^{13}C-pockets (ST, empty squares), ST*2 (empty triangles) and ST/2 (empty circles).

Kr isotopic ratios in presolar grains

Data

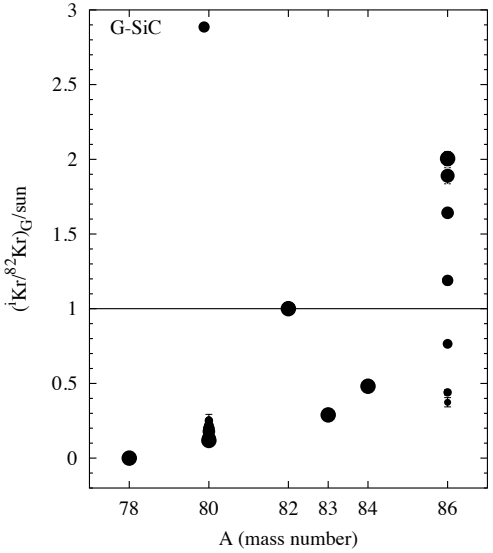


Fig. 1. Kr−G isotopic ratios measured in mainstream SiC grains (black circles, data from Lewis et al. 1994) are plotted for different grain size separates, from the smallest (KJA, small circles) to the largest (KJG, big circles).

Simulation

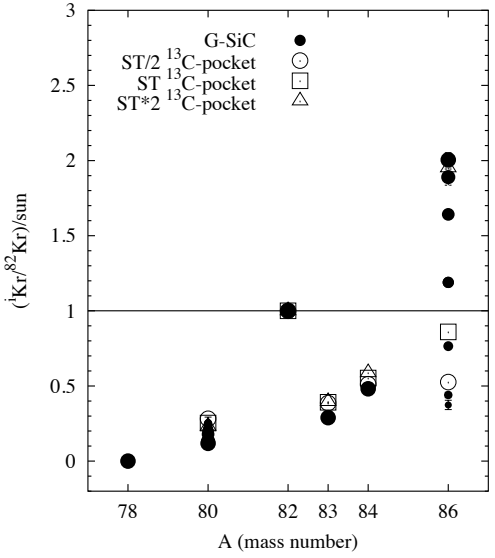


Fig. 2. M= 1.5 $M_\odot$ [Fe/H]= −0.30. Kr−S isotopic ratios in mainstream SiC grains (black circles) are compared with the s−component predictions at the last thermal pulse (19th TP). Predictions are presented for standard ^{13}C-pockets (ST, empty squares), ST*2 (empty triangles) and ST/2 (empty circles).

Simulation

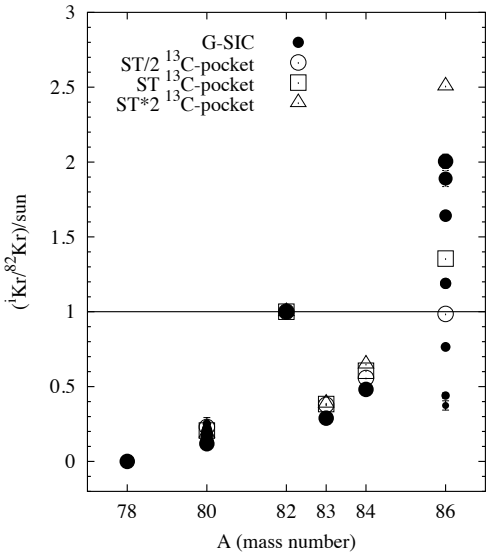


Fig. 3. M= 3 $M_\odot$ [Fe/H]= −0.30. The same as Fig. 2, but for the AGB stellar model with initial mass M= 3 $M_\odot$ (last thermal pulse, 25th TP).

All figures from Pignatari et al. 2006

What has changed?

What has changed?

- ^{13}C pocket included in parametrized way

What has changed?

- ^{13}C pocket included in parametrized way
- new simuations get ^{13}C pocket as result of the included physics

What has changed?

- ^{13}C pocket included in parametrized way
- new simuations get ^{13}C pocket as result of the included physics
- more consistent

What has changed?

- ^{13}C pocket included in parametrized way
- new simuations get ^{13}C pocket as result of the included physics
- more consistent
- also more dependent on assumptions

What has changed?

- ^{13}C pocket included in parametrized way
- new simuations get ^{13}C pocket as result of the included physics
- more consistent
- also more dependent on assumptions
- Trajectory from multizone model

What has changed?

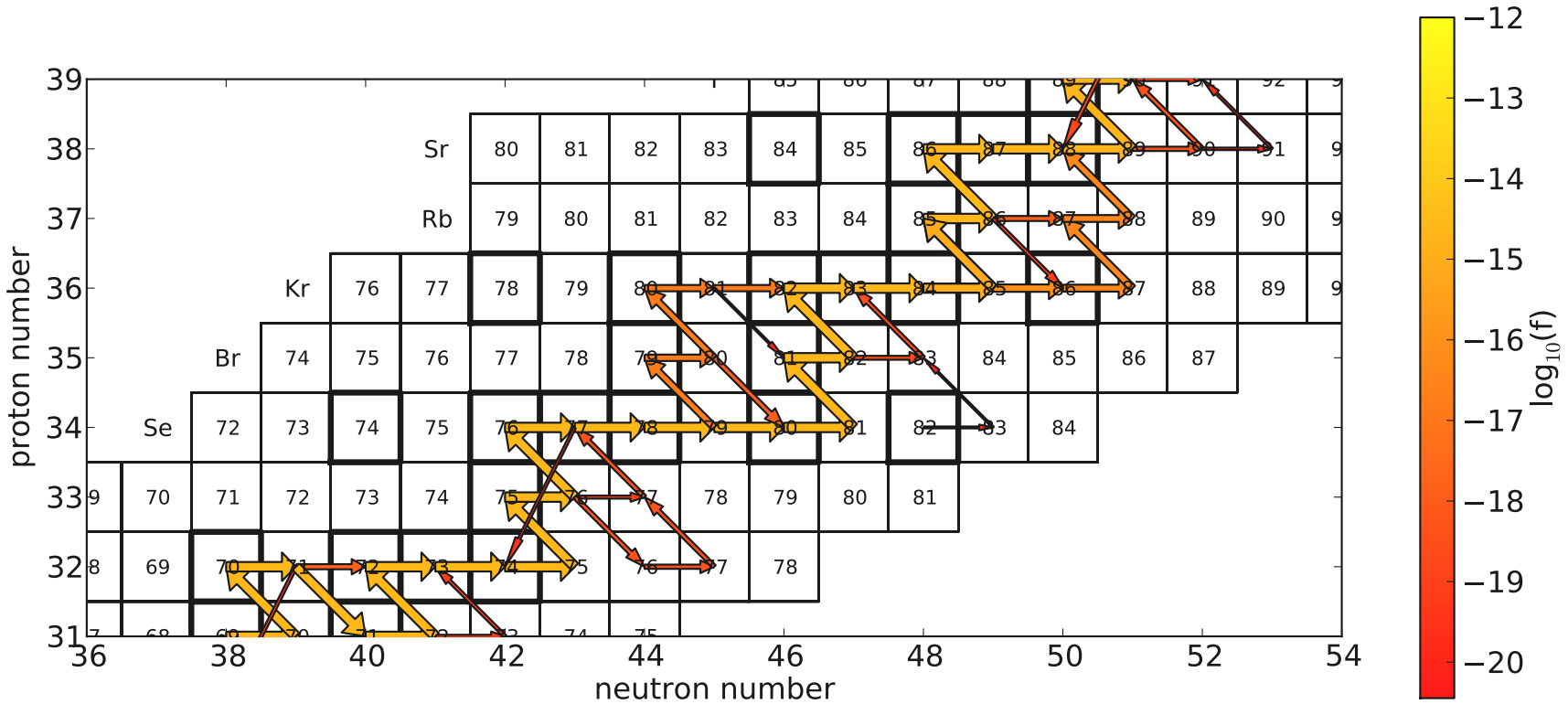
- ^{13}C pocket included in parametrized way
- new simuations get ^{13}C pocket as result of the included physics
- more consistent
- also more dependent on assumptions
- Trajectory from multizone model
- all abundances and mass flows saved

s-process path in a ^{13}C pocket

($M = 3\ M_{sol}$, $Z = 0{,}5\ Z_{sol}$)

s-process path in a ^{13}C pocket

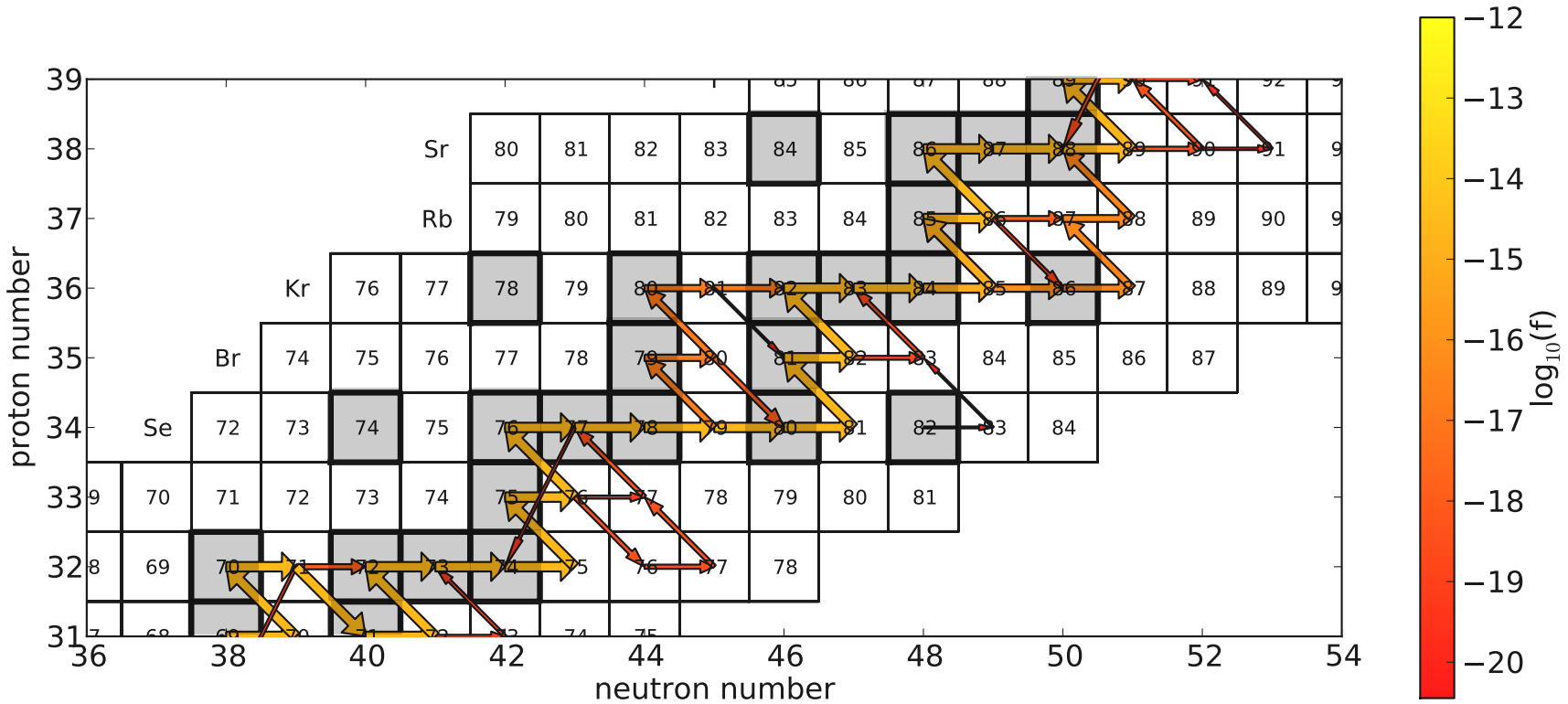
($M = 3\ M_{sol}$, $Z = 0{,}5\ Z_{sol}$)



s-process path in the vicinity of the branching point ^{85}Kr. Stable isotopes are distuingished by bold frames. The integrated mass flow is plotted for 8 orders of magnitude.

s-process path in a ^{13}C pocket

($M = 3\ M_{sol}$, $Z = 0{,}5\ Z_{sol}$)



s-process path in the vicinity of the branching point ^{85}Kr. Stable isotopes are distuingished by bold frames. The integrated mass flow is plotted for 8 orders of magnitude.

Results for the ^{85}Kr branching

Results for the ^{85}Kr branching

- ... on the poster

Results for the ^{85}Kr branching

- ... on the poster
- Experimental data needed!

Results for the ^{85}Kr branching

- ... on the poster
- Experimental data needed!
- FRANZ

Results for the ^{85}Kr branching

- ... on the poster
- Experimental data needed!
- FRANZ

- Further sensitivity studies for other branching points and TP

Results for the ^{85}Kr branching

- ... on the poster
- Experimental data needed!
- FRANZ

- Further sensitivity studies for other branching points and TP

Thank you for your attention!