Neutron capture cross-sections of ^{53}Mn

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Motivation

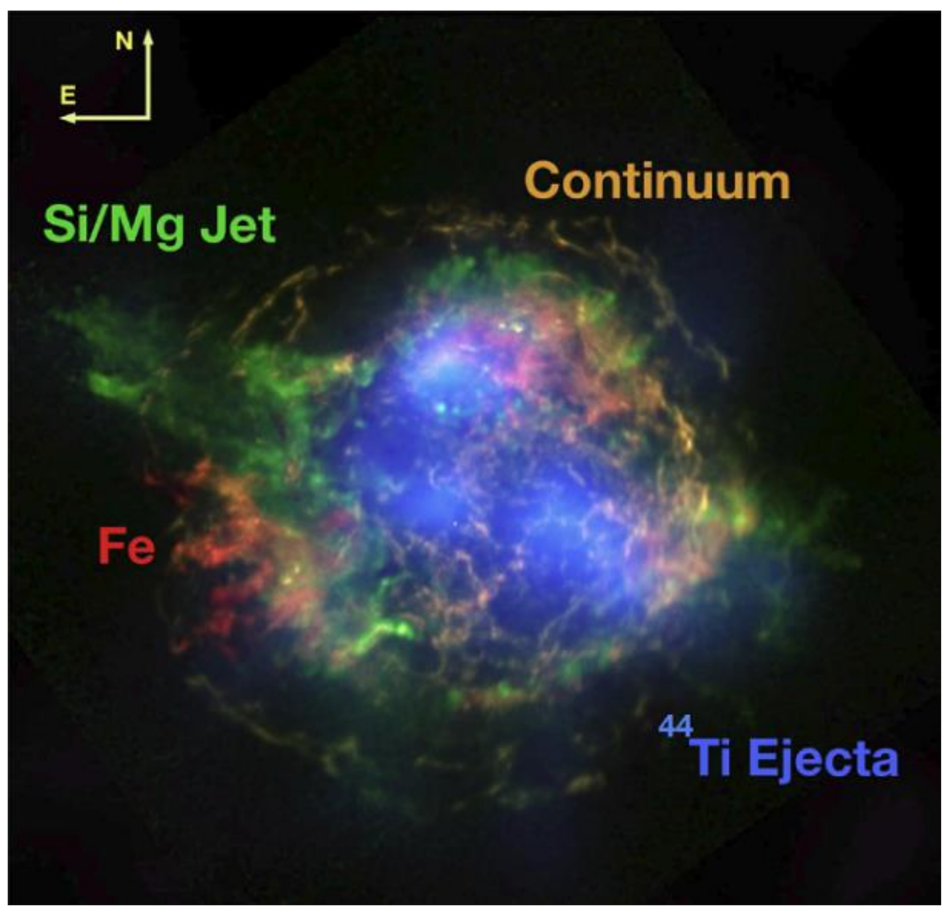

Fig. 1: Cassiopeia A SN remnant. The colors corresponds to different radiations of the given elements and isotopes. [1]

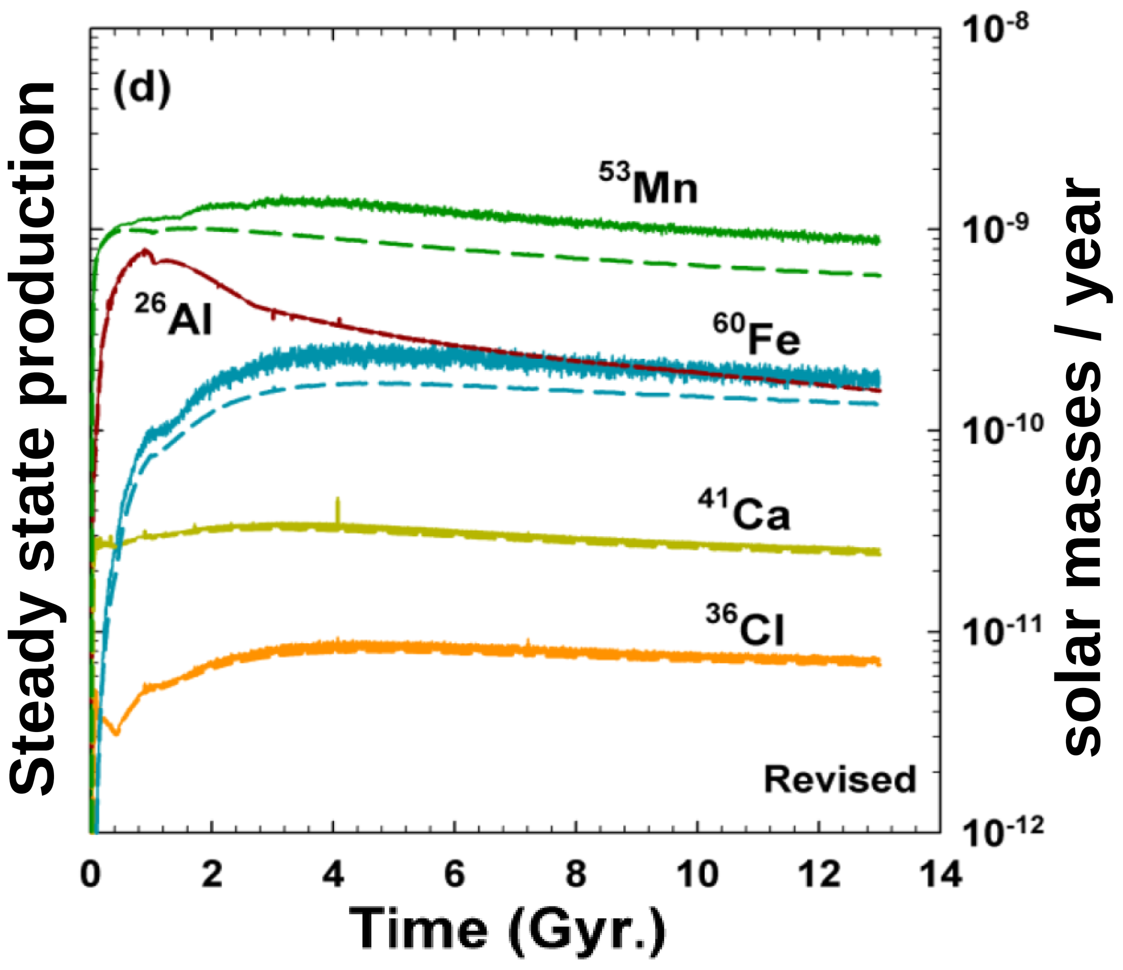

Fig. 2: The GCE predicted trends of the short-lived nuclides, ^{26}Al, ^{36}Cl, ^{41}Ca, ^{53}Mn and ^{60}Fe, normalized to the GCE predictions of their stable nuclides (for details see [2]).

ERAWAST Material

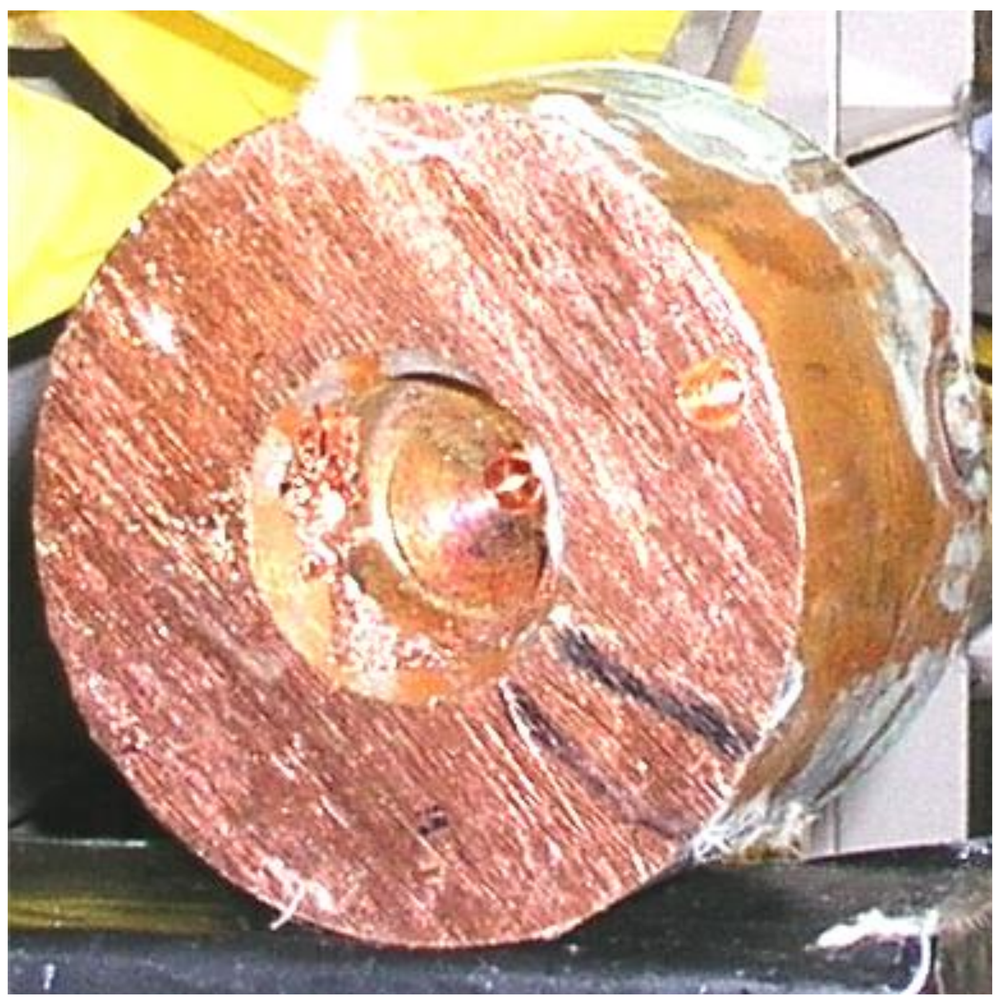

Fig. 3: Cu beam dump used to gain ^{53}Mn. About 500 g of drill ships are available for further experiments [3].

References

[1] B.W.Grefenstette, et al.: *Astrophys. J.* **834** (2017) 13
[2] S. Sahijpal: *J. Astrophys. Astr.* **35** (2014) 121
[3] D.Schumann, et al.: *Radiochim. Acta* **97** (2009) 123
[4] D.Rochman, et al.: *Nucl. Data Sheets* **163** (2020) 163
[5] J.Ulrich, et al.: *Phys. Rev. C* **102** (2020) 024613

Activation Method

^{53}Mn atoms in target

capture cross-section averaged over neutron spectrum

$$A = N \times \langle \varphi \rangle_t \times \left(1 - e^{-\lambda \cdot t_{exp}}\right) \times \langle \sigma \rangle_E$$

produced ^{54}Mn activity at end of irradiation

average neutron flux during the exposure time

Results

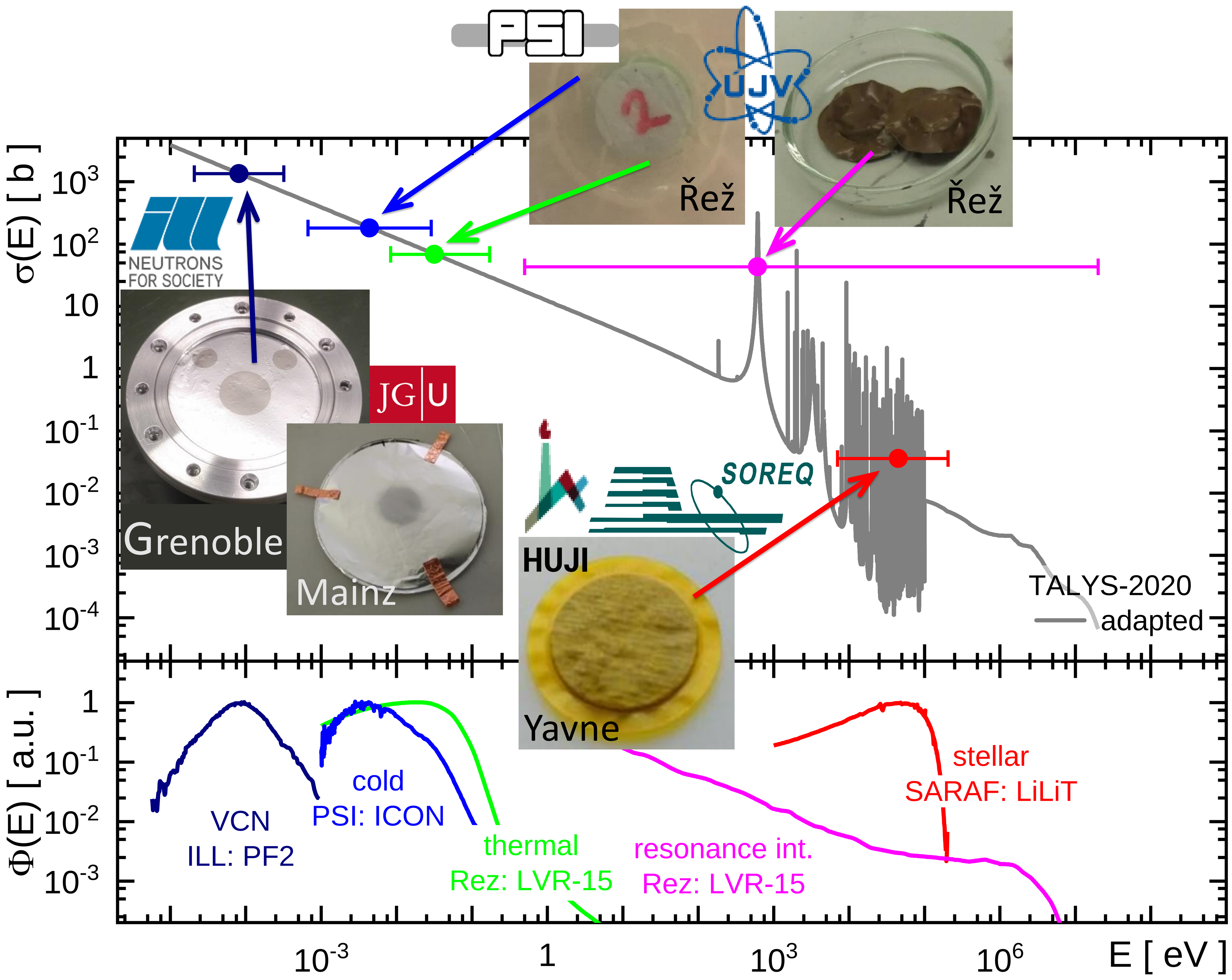

Fig. 4: Compiled results of neutron capture cross sections. The adapted TALYS-result [4] use the thermal ^{53}Mn cross section as anchor point [5].

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