Contribution ID: **87** Type: **Oral Presentation**

Reaction rates of alpha-induced reactions from the new Atomki-V2 α-nucleus potential

α-induced reactions play an essential role in various astrophysical scenarios. For intermediate mass and heavy target nuclei, various α-nucleus optical model potentials (AOMP) predict reaction rates which may differ by orders of magnitude. This wide range of predictions complicates nucleosynthesis calculations in reaction networks, in particular for the p-process with uncertain (γ,α) rates and for the weak r-process with uncertain (α,xn) rates.

The reason for this wide range of predictions is mainly the tail of the imaginary part of the AOMP (as identified in [1]). The new Atomki-V2 potential was suggested to overcome this problem, and it was found that predictions of the Atomki-V2 potential match the available experimental data with deviations of less than a factor of two in all cases [1]. Reaction rates from the Atomki-V2 potential have been calculated for 4359 nuclei between iron ($Z = 26$) and bismuth ($Z = 83$) [2].

This talk will present:
(i) the derivation of the Atomki-V2 AOMP [1,2] and a comparison to other global AOMPs;
(ii) the verification of the Atomki-V2 AOMP using latest data for the ^{96}Zr(α,n)^{99}Mo and ^{100}Mo(α,n)^{103}Ru reactions which are relevant of the weak r-process [3,4];
(iii) the impact of the reaction rates from the Atomki-V2 AOMP and its reduced uncertainties on the weak r-process [5].

As an outlook, it will become possible in the near future to test the Atomki-V2 predictions of cross sections of α-induced reactions for unstable nuclei in several upcoming experiments with radioactive beams.

[1] P. Mohr et al., Phys. Rev. Lett. 124, 252701 (2020).
[2] P. Mohr et al., At. Data Nucl. Data Tables 142, 101453 (2021).
[3] G. G. Kiss et al., Astroph. J. 908, 202 (2021).
[4] T. N. Szegedi et al., Phys. Rev. C 104, 035804 (2021).
[5] A.\ Psaltis et al., Astroph. J., submitted (arXiv:2204.07136).

Length of presentation requested

Oral presentation: 25 min + 5 min questions (Review-type talk)

Please select between one and three keywords related to your abstract

Nuclear physics - theory

2nd keyword (optional)

Nuclear physics - experimental

3rd keyword (optional)

Nucleosynthesis

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