

An Updated Library of Reaction Rates for the Astrophysical rp-Process. The Importance of Nuclear Structure Effects.

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We developed an updated library with reaction rates important for the study of the astrophysical rp- process. It includes both experimental and theoretical rates parametrized in terms of the standard REACLIB format. The experimental data contain various compilations updated with the most recent data. The theoretical data are taken from the shell-model calculations whenever available otherwise statistical Hauser-Feshbach calculations were used. All theoretical rates were recalculated using the refined reaction Q-values. All new rates include stellar enhancement factors. The data are accessed through a convenient web interface.

A thorough analysis of formal quality of fitted data is given. It includes the correct asymptotic behaviour at low and high temperatures and estimation of the errors of fitting. The comparison with previously used rates is done.

We show on the particular examples ($^{65}\text{As}(p,\gamma)^{66}\text{Se}$, $^{69}\text{Br}(p,\gamma)^{70}\text{Kr}$, and $^{73}\text{Rb}(p,\gamma)^{74}\text{Sr}$) the crucial importance of the nuclear structure effects for the calculated reaction rates. The last statement is valid for both experimental and theoretical data.

It is anticipated that this JINA project evolves into an evaluated public data archive for reaclib library data.