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Impact of level densities and γ-strength functions on r-process simulations

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Studies attempting to quantify the sensitivity of the r-process abundances to nuclear input have to cope with the fact that the theoretical models they rely on, rarely come with confidence intervals.
This problem has been dealt with by either estimating these intervals and propagating them statistically to the final abundances using reaction networks within simplified astrophysical models, or by running more realistic astrophysical simulations using different nuclear-physics models consistently for all the involved nuclei.
Both of these approaches have their strengths and weaknesses.
In this work, we run r-process calculations for five trajectories using 49 different neutron-capture rate models.
The results shed light on the importance of taking into account shell effects and pairing correlations in the network calculations.

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