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Suppression of the stellar enhancement factor and reaction rates far from stability THOMAS RAUSCHER, Department of Physics, University of Basel, Switzerland — Nuclei in astrophysical plasmas occur in excited states because they are in thermal equilibrium with the stellar plasma. This modifies the reaction cross sections and has important consequences for the determination of stellar reaction rates. The application of detailed balance implies that stellar effects are less pronounced in the direction of positive Q-value and that measurements should preferably be performed in this reaction direction. However, we show that the general Q-value rule does not apply for a number of cases due to the suppression of low-energy transitions in the exit channel by an additional barrier (Coulomb or centrifugal). Additionally, it has to be realized that the validity of detailed balance cannot be taken for granted in all cases. This is well known for nuclei at stability having isomeric states but may also become problematic in nuclei with low level densities. Another complication with low level densities is that the Hauser-Feshbach model cannot be applied anymore to predict reaction cross sections. Resonant and direct reactions also become important. Preliminary results of a new large-scale prediction of astrophysical reaction rates across the nuclear chart including both the compound and the direct mechanism will be shown.

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