

Towards Universal Predictions with the TALYS code

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The increasing need for cross sections far from the valley of stability, for astrophysical as well as advanced technological applications poses a challenge for nuclear reaction models. So far, nuclear reaction cross sections calculations have relied on more or less phenomenological approaches, depending on several parameters that are adjusted, to available experimental data, or deduced from systematical relations.

While such calculations are expected to be reliable for nuclei not too far from the experimentally known regions, it is clearly preferable to use more fundamental approaches, based on sound physical bases, when dealing with very exotic nuclei.

Thanks to the high computer power available today, all the ingredients required to model a nuclear reaction can now be microscopically determined starting from a nucleon-nucleon effective interaction as sole input, and are available to the nuclear physics community.

We have recently implemented all these microscopic ingredients in the TALYS nuclear reaction code, and we are now able to perform fully microscopic cross section calculations. We will discuss both the quality of these ingredients and the impact of using them instead of the usually adopted phenomenological parameters.