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SÉMINAIRE

A new approach to nuclear evaluation using a self-consistent multichannel modelling methodology

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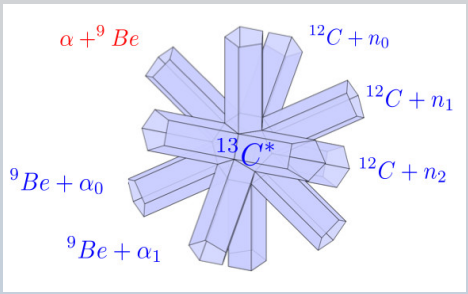
café servi à partir de 11h

Traditional methodology of nuclear data evaluation, which has been in use for the past four decades, is showing its limitations in reducing significantly the uncertainties in neutron cross sections below their current level. This suggests that a new approach should be investigated. My PhD work aims at establishing that major qualitative improvement is possible by changing the reference framework historically used for evaluating nuclear model data. The central idea is to switch from the restrictive frame of the incident neutron (neutron spectroscopy) and target nucleus to the more general framework of the excited compound nucleus. Such a revolution, which implies the simultaneous modelling of all the reactions leading to the same compound nucleus, opens up the possibility of direct comparisons between nuclear model parameters, whether those are derived for reactor physics applications, astrophysics or basic nuclear spectroscopy studies. This would have the double advantage of bringing together evaluation activities performed separately, and of merging experimental databases and theoretical nuclear parameter files. A demonstration of the applicability of the method is being established by $^{16}O(n,\alpha)^{13}C$ and $^{13}C(\alpha,n)^{16}O$ cross sections calculations both separately and consistently. This unified approach after numerical and practical validation has been connected to the CONRAD code developed in our group, giving access to the Generalized Least Squares capability in order to retrieve the best set of nuclear model parameter from fit of experimental data. The major achievement of this work will be the release of a brand new set of evaluated parameters according to the nuclear structure of ^{17}O; it will bring valuable feedback on current ($n+^{16}O$) evaluated data quality in use in reactor physics and still debated within the CIELO international taskforce. Connected questions emerging from this unified approach will be raised along this seminar.



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