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# Impact of collective states on direct pre-equilibrium emission

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## Résumé

We report on microscopic pre-equilibrium emission calculations of the one-step direct process for both spherical and axially deformed nuclei. In the case of spherical target nuclei, a fully microscopic approach is used as all the transition potentials are built from the (Q)RPA wave functions, obtained with the D1S Gogny force, and a g-matrix used as the effective interaction for the transition. We will describe how the target spectrum specificities, such as the collective content as well as the presence of high spin and non natural parity states, impact on the pre-equilibrium emission and need to be accounted for to achieve a good description of experimental cross sections. Examples will be given for nucleon induced reactions on double magic nuclei (RPA based calculations), or on spherical nuclei with pairing (QRPA-based calculations). Calculations performed for axially deformed target in a coupled channel framework will also be depicted. The semi-microscopic JLM convolution model is used together with microscopic QRPA wave functions, that include collective effect, to build the relevant optical and transition potentials that are involved in the description of a nucleon inelastic scattering process off an axially deformed nucleus. This method will be applied to predict the pre-equilibrium emission in the case of neutron induced reaction on <sup>238</sup>U. [1] M. Dupuis, T. Kawano, J.-P. Delaroche, E. Bauge, Phys.Rev. C 83, 014602 (2011) [2] E. Bauge, J.-P. Delaroche, M. Girod, G. Haouat, J. Lachkar, Y. Patin, J. Sigaud, J. Chardine, Phys.Rev. C61, 034306 (2000) [3] S. Peru, G. Gosselin, M. Martini, M. Dupuis, S. Hilaire, J.-C. Devaux, Phys. Rev. C 83, 014314 (2011). [4] M. Dupuis, E. Bauge, L. Bonneau, J.-P. Delaroche, T. Kawano, S. Karataglidis, and S. Péru, in Proceedings of the Second International Workshop on Nuclear Compound Reactions and Related Topics (EPJWeb of Conferences, vol. 2, Les Ulis, 2010), p. 11001.

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