Advanced Monte-Carlo and GEANT4 simulations for optimizing future experiments dedicated to nuclear dynamics

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The project 12-145 led by IFJ PAN, Krakow, and IPHC, Strasbourg, is dedicated to Advanced Monte-Carlo and GEANT4 simulations for optimizing future experiments dedicated to nuclear dynamics. Our collaboration is interested in understanding the decay of compound nuclei produced in heavy-ion collisions, as they are a rich laboratory for fundamental nuclear physics, being governed by both “static” and dynamical effects, which in turn are determined by both macroscopic and microscopic properties. A disadvantage of this richness is that it makes the study difficult, since the various aspects lead to a complex interplay, with sometimes hard-to-track compensation effects. In order to unravel the puzzle, the necessity of measuring various observables, and their correlations, is now well established. With the goal to contribute to the field, the approach pursued by our collaboration consists in a two-fold investigation, with two kinds of calculations. One aspect is theoretical, with the development of dynamical model of the decay of excited rotating nuclei. The second aspect is directed towards experiment, with the development of advanced simulations of specific experimental set-ups. Our opinion is that combining these two aspects is required to offer an un-ambiguous interpretation of the measurements.