# Low energy nucleus-nucleus reaction treatment in radiation transport codes: the BME-FLUKA interface.

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The accurate description of radiation propagation into the matter turns out to be crucial for practical purposes im many applicative fields. A valuable tool is represented by Monte Carlo codes able to simulate the transport and interaction of different particles in any complex geometry consisting of various materials. Reliable nucleus-nucleus event generators are an essential ingredient in order to assure the needed prediction capability when heavy ions play a significant role, for instance in case of hadrontherapy and space radiation protection. Nevertheless, especially at low and intermediate energies (below 1 GeV/n), our knowledge of nuclear dynamics, reflecting the poor collection of experimental information, is far from being comprehensive and systematic.

Our group developed a theoretical approach to heavy ion reactions at few ten MeV/n based on the Boltzmann Master Equations (BMEs), describing the thermalization of the composite system produced by complete or incomplete fusion, and a binary fragmentation model. The validity of this approach has been confirmed through the analysis of a large set of data (varying from double differential particle spectra to residue excitation functions) for asymmetric and, more recently, light systems.

Its coupling with FLUKA, planned to cover nucleus-nucleus reactions below 100 MeV/n, implies the capability of fast treating any projectile-target combination over an energy range in which different mechanisms may occur. This requirement excludes the too time-consuming numerical integration of the suitable set of coupled BMEs on a event by event basis. The presently adopted solution will be presented together with the first examples of its validation and the outline of possible improvements.