

Monte Carlo Charged-Particle Reaction Rates: a New Frontier

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We will give a brief historical account of reaction rate calculations, starting from the early work of Bethe, continuing to the pioneering evaluations of Fowler and collaborators, including successor evaluations, such as NACRE. We will point out the great importance of these efforts for the field of nuclear astrophysics, but will also emphasize the shortcomings of these rates for modern precision work in stellar evolution and nucleosynthesis. This talk will describe a new kind of experimental rate evaluation, by using Monte Carlo techniques, in order to estimate for the first time statistically meaningful charged-particle reaction rates.

We will discuss our recently published work [Nucl. Phys. A 841 (2010)] , as well as continuing efforts in this direction.