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Nuclear reaction cross sections and the optical potentials for the n-12C and N-12C scattering

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Realistic nuclear reaction cross-section models are an essential ingredient of reliable heavy-ion transport codes. Such codes are used for risk evaluation of manned space exploration missions as well as for ion-beam therapy dose calculations and treatment planning [1]. Comparison between data and reaction cross section theoretical calculations, mostly performed within the Glauber model [2] with folded potentials (f.p.) [3; 4], have been performed for many years [5; 6]. Also since the beginning of physics with RIBs the method has been applied to deduce density distributions of exotic nuclei as well as their root mean square radii (rms) [7–14] and the core-target survival probability in knockout reactions [15]. In order to improve the calculations of nucleus-nucleus folded potentials, usually called double folded potentials (d.f) Satchler and Love [3] proposed the calculate single folded (s.f) potentials using projectile densities together with phenomenological nucleon-target potentials. In this talk we will show that for 9Be and 12C very good agreement with experimental data can be found using nucleon-target (n-T) phenomenological potentials which we have obtained fitting the n+T cross section in a very large energy range and also the nucleus-target (N-T) cross sections at high energy. The advantage of s.f. potentials is to avoid the dependence on the target density choice as well as the choice of the parameters to describe the free n-n-amplitude in the Glauber model and to naturally include medium effects beyond the simple nn scattering.

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Experimental study on nuclear physics

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