

# Collisions induced by halo and/or weakly bound nuclei around the Coulomb barrier : experimental results at INFN-LNS

P.Figuera<sup>1</sup>

<sup>1</sup>INFN-Laboratori Nazionali del Sud, Catania Italy

The study of nuclear collisions involving halo or weakly bound nuclei, at energies around the Coulomb barrier, had a considerable interest in the last decade since the peculiar structure of such nuclei in the entrance channel can deeply affect the reaction dynamics (see e.g.[1-5]). One expects that direct processes like breakup or transfer become important due to the halo and cluster structure of the weakly bound projectiles. Coupling to continuum effects are expected to have an important role on elastic scattering and fusion around the barrier. In addition, the study of fusion reactions is complicated by the fact that, together with complete fusion (CF), one may have incomplete fusion processes (ICF) following the breakup of the weakly bound projectile.

In this contribution, we will summarize some of the experimental results on the above topic obtained by our group at INFN-LNS over the last years in collisions induced by the halo nuclei  ${}^6\text{He}$  and  ${}^{11}\text{Be}$  and by the stable weakly bound nuclei  ${}^6\text{Li}$  and  ${}^7\text{Li}$ . Very strong entrance channel effects are observed in elastic scattering, transfer/breakup and fusion cross sections comparing collision induced by the  ${}^6\text{He}$  and  ${}^{11}\text{Be}$  halo nuclei with the ones induced on the same target by their cores  ${}^4\text{He}$  and  ${}^{10}\text{Be}$  e.g. [6-8]. As also observed by other authors, collisions induced by the stable weakly bound  ${}^6\text{Li}$ ,  ${}^7\text{Li}$  shows some peculiarities compared to ones induced by well bound nuclei such as absence of usual threshold anomaly in the optical potential and strong competition of CF with ICF and transfer in the heavy residue production cross section e.g. [9-11].

Comparing our experimental results with the ones of other authors we will summarize our present understanding of the discussed topic, underlining the need of new better quality data, both with stable and radioactive beams, and the related experimental challenges.

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