Contribution ID: **111** Type: **Oral**

Reaction dynamics with halo nuclei

Friday, 25 May 2012 10:10 (30 minutes)

Huge efforts have been done in the last years in major laboratories around the world to understand the reaction dynamics around the Coulomb barrier with neutron halo nuclei. Reactions induced by n-halo nuclei have been extensively studied, in a wide range of energies and on different targets, in order to understand the role played by the halo on the reaction dynamics (e.g. [1-3].
Owing to the very low binding energy and extended matter distribution, n-halo induced reactions exhibit very large total reaction cross-section. Moreover, an important reaction process in collisions induced by such nuclei is the break-up. In fact, at energies well above the Coulomb barrier a large fraction of the total reaction cross-section is due to break-up. At these energies nuclear and Coulomb break-up have been studied in great detail both experimentally and theoretically and we have now a quite good understanding of the process [4].
At low energies, close to the Coulomb barrier, coupling effects dominate the reaction dynamics. Since the ground state of halo nuclei lies very close to the continuum, coupling with the continuum (break-up) may affect the various reaction processes. Low energy elastic scattering induced by n-halo nuclei shows a suppression of the elastic cross-section in the Coulomb-nuclear interference region. The recent results of 11Be experiment performed at Rex-ISOLDE, have shown a strong suppression of the Coulomb-nuclear interference with a low charge target showing that nuclear as well as Coulomb effects are important at large impact parameters in collisions induced by halo nuclei [5].
The collision dynamics at the barrier with proton-halo nuclei is expected to be different, but almost no experimental data exist.
In this contribution recent experimental results on reactions induced by n-halo nuclei will be presented along with the discussion of future perspective with p-halo beams.

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Primary author: DI PIETRO, Alessia (INFN Laboratori Nazionali del Sud, Catania)

Presenter: DI PIETRO, Alessia (INFN Laboratori Nazionali del Sud, Catania)

Session Classification: Dynamics and Thermodynamics of exotic Nuclear Systems

Track Classification: Dynamics and Thermodynamics of exotic nuclear systems