Contribution ID: **52** Type: **Contributed talk**

Analysis of reactions induced by the halo nucleus 6He at energies around the Coulomb barrier

Monday, 8 June 2015 15:20 (20 minutes)

Reactions induced by neutron halo nuclei have been intensively studied in the last years. The weakly bound neutron-halo structure can affect the dynamics of reactions at energies around the Coulomb barrier producing a significant reduction of the elastic scattering cross section with respect to the Rutherford prediction. This effect can be associated with couplings to breakup channels, since the continuum of such nuclei is close to the ground state. One method to obtain a complete theoretical description of such collisions is the Continuum Discretized Coupled Channels (CDCC) formalism, where the breakup process is considered as an inelastic excitation of the projectile in the continuum.

The halo nucleus 6He is composed by an alpha core and two weakly bound neutrons (S=0.97 MeV). These two neutrons have a large probability to be far away from the alpha core, producing the so-called nuclear halo.
New experimental elastic cross sections for the reaction 6He+64Zn at energies around the Coulomb barrier have been measured and compared with Optical Model (OM) and CDCC calculations. In addition, CDCC calculations taking into account only Coulomb or nuclear couplings have been perfomed. The results show an important effect of the coupling to the continuum states, where nuclear couplings have been found more relevant than that of Coulomb.
This effect has been also obseved in the OM calculations, where the inclusion of an analytical Coulomb dipole polarization potential has no influence.
In the case of reactions with a heavy target, 6He+208Pb, as a consequence of the strong electric field produced by the target, the effect of the dipole Coulomb breakup has been observed larger than for the reaction with a medium mass target, 6He+64Zn.
On the other hand, elastic angular distributions and quasielastic barrier distributions with the stable weakly bound 6Li, on the same target 64Zn, have been also analyzed within the CDCC method, showing non neglible effects of couplings to breakup channels, although not as strong as in the 6He case.

Primary author: Dr FERNÁNDEZ-GARCÍA, Juan Pablo (INFN - LNS)

Co-authors: Dr DI PIETRO, Alessia (INFN-LNS); Dr MORO, Antonio (Universidad de Sevilla); Dr TORRESI, Domenico (Univerità di Catania, INFN-LNS); Prof. LATTUADA, Marcelo (INFN-LNS); Dr FISICHELLA, Maria (INFN-LNS); Dr ZADRO, Mile (Ruder Boskovic Institute - Croatia); Dr FIGUERA, Pierpaolo (INFN-LNS); Dr SCUDERI, Valentina (INFN-LNS)

Presenter: Dr FERNÁNDEZ-GARCÍA, Juan Pablo (INFN - LNS)

Session Classification: Reactions with radioactive beams

Track Classification: Reactions with radioactive beams