Contribution ID: **51** Type: **Oral**

Elastic scattering of the halo nucleus 11Li and its core 9Li on 208Pb at energies around the Coulomb barrier

Friday, 25 May 2012 10:40 (20 minutes)

The discovery of the halo nuclei has brought renewed interest in the modeling of nuclear reactions. This structure will affect the reaction properties at near Coulomb barrier energies.

Therefore we have studied, for the first time, the dynamics of the halo nucleus 11Li in presence of a strong electric field of 208Pb at energies below, 24.2 MeV, and around, 29.7 MeV, the Coulomb barrier at the ISACII facility at TRIUMF.

To disentangle the halo contribution in the scattering we have studied the behavior of the core by measuring the 9Li+208Pb reaction at the same center-of-mass energies of 23.0 and 28.3 MeV. We have compared the elastic differential cross section results of 9Li+208Pb with optical model calculations using the double-folding Sao Paulo Potential (SPP) for the real part and a Woods-Saxon potential for the imaginary part, whose parameters are obtained from the fit of the elastic data.

In this contribution the angular distribution of the elastic differential cross section of 11Li+208Pb is presented and compared with Continuum-Discretized Coupled-Channel (CDCC) calculations based on a simple two-body model (2n+9Li) for the 11Li nucleus. The coupling to the breakup channels produces a significant reduction of the elastic cross section below the grazing angle at energies around and below the Coulomb barrier. This effect will be discussed in terms of the strong dipole coupling to the states in the low-lying continuum of 11Li.

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Session Classification: Dynamics and Thermodynamics of exotic Nuclear Systems

Track Classification: Dynamics and Thermodynamics of exotic nuclear systems