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Scattering of the halo nucleus ^{11}Be on a heavy target at energies around the Coulomb barrier

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The discovery of halo nuclei has brought renewed interest in the modelling of nuclear reactions. The dynamics of weakly bound nuclei at energies close to the Coulomb barrier are of great interest due to the interplay between the reaction process and the structure of the projectile. The Coulomb interaction dominates the reaction process with heavy targets, the low binding energy and the strong dipolar polarization contribute to a significant enhancement of the breakup cross section, even below the Coulomb barrier [1].

Besides the one-neutron halo structure and the weak binding energy for the last neutron, ^{11}Be has one bound excited state at 320 keV ($J^{\pi} = 1/2^{-}$) which has a strong dipolar coupling to the gound state ($J^{\pi} = 1/2^{+}$).

In this conference I will present new experimental data for the elastic, inelastic and breakup channels of the ^{11}Be+ ^{197}Au at incident energies around and below the Coulomb barrier, with the elastic and inelastic channels separated for the first time in this energy range [2]. The experiment was performed at TRIUMF, using the HPGe detector array TIGRESS in coincidence with Silicon detectors for the identification of the Be fragments. State-of-the-art CDCC calculations including core excitations are able to explain all the scattering distributions simultaneously, and clearly support the latest dB/dE distribution measured at RIKEN (Fukuda et al [3]). The present study settles the question about the dB/dE to the continuum of the ^{11}Be and demonstrate that the reaction mechanism is sensitive to subtle structure features, such as core deformation in a halo nucleus.

[1] J.P. Fernández-García et al., PRL 110, 142701 (2013)
[2] V. Pesudo et al., PRL, submitted.
[3] N. Fukuda et al., PRC 70, 054606 (2004)

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