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Scattering of light halo nuclei on heavy target at energies around the Coulomb barrier

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The loosely bound structure of halo nuclei should affect the collisions with heavy targets at energies around the Coulomb barrier. One can thus expect a departure from Rutherford scattering. This deviation shed light on the structure as well as on how the scattering process depends upon the coupling to the continuum.

The interplay of two effects will occur: Firstly, the Coulomb break-up reduces the elastic cross section. Secondly, the distortion of the wave function, generated by the displacement of the charged core with respect to the centre of mass of the nucleus, reduces the Coulomb repulsion, and thus the elastic cross sections.

We report here on a series of experiments performed at different facilities to study the behaviour of the scattering of the light halo nuclei 6He, 11Li and 11Be on lead. The results are interpreted in the framework of 4-body Continuum-Discretized Coupled-Channel calculations. The departure from Rutherford scattering at energies below the barrier is well beyond the expected behaviour. Furthermore, the breakup probability data shed light on the effective breakup energy as well as on the slope of the B(E1) distribution.