Contribution ID: **14** Type: **2.Parallel session talk**

Neutron-Halo Breakup Dynamics with ^{11}Be projectile on the lead target ^{208}Pb at deep sub-barrier Coulomb energies

Thursday, 26 September 2024 09:25 (25 minutes)

Recent experimental measurements of the breakup of ^{8}B proton-halo nucleus on a lead target at deep sub-barrier energies by Pakou et al.[1] and Yang et al.[2], have shown that the breakup channel is the main reaction channel at these energies. Further, these works indicated the effect of Coulomb polarization on the proton halo state, with the correlation information revealing that the prompt breakup dominating mechanism occurs predominantly on the outgoing trajectory. This was further investigated in [3], in which it was emphasized the role of the continuum states of
the projectile for the breakup to occur on the outgoing trajectory. By investigating the possible universality of such behavior for weakly-bound projectiles on heavy targets, we have followed a theoretical analysis, using continuum-continuum coupled channel calculations, considering the total fusion and breakup cross-sections in the interaction of the neutron-halo ^{11}Be projectile on the same lead target ^{208}Pb. In this case, with a confirmation of the same behavior, we further verified that such a feature emerges from the enhancement of the breakup cross-section, due to the continuum-continuum couplings coming exclusively from its Coulomb component. Therefore, by assuming that these couplings are delaying the breakup process (which is also in line with Refs.[4,5]), even without a full dynamical calculation, which could provide more support to our conclusion, we claim that such behavior should be associated with the projectile breaking up on the outgoing trajectory. In resume, we have shown in Ref.[6], which is being presented here, that the importance of the breakup channel over the total fusion channel, at energies below the Coulomb barrier, can also be extended to neutron-halo projectile on heavy targets. Based on the available investigations, one could anticipate this may be a universal feature in the breakup of weakly bound projectiles on heavy targets.

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Session Classification: Parallel 6 : Few-body aspects of nuclear physics and nuclear astrophysics

Track Classification: Few-body aspects of nuclear physics and nuclear astrophysics