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Study of nuclear contribution to breakup cross section of 11Be halo nuclei within time-dependent approach

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In this work, the Coulomb breakup of one-neutron halo nuclei has been studied within the non-perturbative time-dependent approach from intermediate (70 MeV/nucleon) to low energies (5 MeV/nucleon) including the low-lying resonances in different partial and spin states of 11Be. We have shown that the inclusion of the resonant states of 11Be into the computational scheme leads to a significant improvement of the theoretical model, which gives a better agreement of the model description of the experimental data on the breakup cross sections [1, 2]. Also, the contribution of nuclear interaction to the breakup cross sections at low beam energies (5 - 30 MeV/nucleon) is studied. An optical potential between the projectile fragments and the target is easily introduced in this model.
Overall, this numerical technique allows an accurate and straightforward modelling of the nuclear interaction between the projectile and the target on a widely range of the beam energies.
The developed computational scheme opens new possibilities in investigation of Coulomb, as well as nuclear, breakup of other halo nuclei on heavy, as well as, light targets.

[1] T. Nakamura, et. al., Phys. Lett. B 331, 296 (1994).
[2] N. Fukuda, et. al., Phys. Rev. C 70, 054606 (2004).

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