**Effects of distortion on the intercluster motion in $^{2}$H, $^{3}$He, $^{3}$H, $^{6}$Li and $^{9}$Be on Trojan horse applications**

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Deuteron induced quasi-free scattering and reactions have been extensively investigated in the past few decades as well as $^{6}$Li, $^{3}$H, $^{3}$He and $^{9}$Be induced ones. This was done not only for nuclear structure and reaction mechanisms investigation but also for important astrophysical implications (Trojan Horse Method). In particular the width of the spectator momentum distribution in several nuclei which have been used as Trojan Horse ones have been obtained as a function of the transferred momentum. Trojan Horse method applications is also discussed because the momentum distribution of the spectator particle inside the Trojan horse nucleus is a necessary input for this method. This gives us hints on distortion effects at low energies as well as implications for nuclear astrophysics. It is the goal of the present work to estimate the distortion of the momentum distribution of the spectator based on the experimental data obtained in the previous publications. This is performed by comparing the momentum distribution extracted in the Plane Wave Impulse Approximation (PWIA) from experimental data with the theoretical calculation.

What is clear from our analysis is that as far as the energies of the ejectiles are large enough the momentum distribution of the spectator extracted from the experimental data using the PWIA agrees with the theoretical prediction calculated using the Fourier transform of the bound state wave function of the Trojan Horse nucleus. We find that the deviation of the theoretical momentum distributions from the experimental one is correlated with the transfer momentum from the projectile to the ejectiles. When the average transferred momentum is large compared to the bound state wave number the experimental FWHM reaches the theoretical one. The application of the THM should take into account the distortions caused by the interaction of the spectator with the fragments from the sub-reaction; they can be taken into account by adopting the ”distorted” FWHM extracted from the experimental data instead of the theoretical one. The paper has been submitted to Phys. Rev. C.