

## Trojan Horse particle invariance in fusion reactions

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Trojan Horse method plays an important part for the measurement of several charged particle induced reactions cross sections of astrophysical interest. In order to better understand its cornerstones and the related applications to different astrophysical scenarios several tests were performed to verify all its properties and the possible future perspectives. The Trojan Horse nucleus invariance for the binary reactions  $d(d,p)t$ ,

${}^6,7\text{Li}(p,\alpha){}^3,4\text{He}$  was therefore tested using the appropriate quasi free break-ups, respectively. In the first cases results from  ${}^6\text{Li}$  and  ${}^3\text{He}$  break up were used, while for the lithium fusion reactions break-ups of  ${}^2\text{H}$  and  ${}^3\text{He}$  were compared. The astrophysical  $S(E)$ -factors for the different processes were then extracted in the framework of the Plane Wave Approximation applied to the different break-up schemes. The obtained results are compared with direct data as well as with previous indirect investigations. The very good agreement between data coming from different break-up schemes confirms the applicability of the plane wave approximation and suggests the independence of binary indirect cross section on the chosen Trojan Horse nucleus also for the present cases. Moreover the astrophysical implications of the results will also be discussed in details.

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