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Neutron induced reactions for BBN: the Trojan Horse approach

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Nuclear reactions induced by neutrons play a key role in several astrophysical scenario like primordial nucleosynthesis, s and r process and so on. From an experimental point of view, their reaction cross sections and reaction rates at astrophysically relevant temperatures are usually a hard task to be measured directly. Nevertheless big efforts in the last decades have led to a better understanding of their role in the different nucleosynthetic networks. In this work we will review the possibility of application of the Trojan Horse Method to extract the cross section at astrophysical energies for neutron induced reactions, examining validity tests as well as different applications. Moreover a detailed study of the $^3\text{He}(n,p)^3\text{H}$ reaction off the $^2\text{H}(^3\text{He},pt)\text{H}$ three-body process will be discussed. The experiment was performed using the ^3He beam, delivered at a total kinetic energy of 9 MeV by the Tandem at the Physics and Astronomy Department of the University of Notre Dame. Data extracted from the present measurement are compared with other published sets available in literature. the reaction rate will be calculated and the astrophysical applications will also be discussed in details for the case of the Big Bang Nucleosynthesis.

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