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Study of 2H(p,gamma)3He cross section over a wide energy range

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Nuclear reactions involving few-nucleon systems are relevant both in stellar environments and during Big Bang Nucleosynthesis (BBN) when, soon after the Big Bang, light elements were produced. This phenomenon can be described by a theoretical model (BBN theory) that requires as input the cross section of the nuclear reactions involved in the formation of the light elements, as well as cosmological and standard physics input, and produce as output the prediction for the light nuclei abundances. From the comparison of such prediction with astronomical observational data an indirect test of both cosmological and fundamental physics models comes out. In the case of deuterium, the abundance derived by recent observations is characterized by a much smaller uncertainty than that predicted by BBN theory and a small tension between the two values exists. The uncertainty on the BBN prediction is dominated by that on the 2H(p,gamma)3He cross section poorly known in the BBN energy range. In this talk, I will report on two recent measurements of such cross section done at the LUNA 400 kV accelerator in the underground Gran Sasso Laboratory and at the 3MV Tandetron accelerator in HZDR, respectively. The two measurements were performed using different experimental setups and cover, as a whole, the energy range 50-800 keV.

Primary author: Prof. GUGLIELMETTI, Alessandra (Università degli Studi di Milano and INFN Milano)

Presenter: Prof. GUGLIELMETTI, Alessandra (Università degli Studi di Milano and INFN Milano)

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