Nuclear Astrophysics Experiments with the Van de Graaff and Cyclotron Accelerators of ATOMKI

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Low energy accelerators providing stable beams have their importance in many different sub-fields of nuclear astrophysics. Depending on the nature of the astrophysical scenario to be investigated experimentally, the accelerators and the detection systems should fulfill special requirements.

The 5 MV Van de Graaff and the K20 cyclotron accelerators at the Institute of Nuclear Research (ATOMKI) in Debrecen, Hungary provide good possibility for the experimental investigation of the astrophysical p-process. The p-process, the production mechanism of the heavy, proton rich isotopes, is one of the least studied and understood mechanisms in nucleosynthesis. With the measurement of low energy proton- and alpha-capture cross sections (see e.g. [1]), important information can be obtained which contributes to the better understanding of the p-process. Additionally, low energy alpha-elastic scattering experiments provide the possibility to investigate alpha-nucleus optical potentials, which are also important in the reaction rate calculations relevant for the p-process (see e.g. [2]). Some details of this kind of experimental studies will be presented.

Besides the nuclear reaction studies concerning the p-process, several other nuclear astrophysics experiments are carried out at the accelerators of ATOMKI. These include e.g. the application of the Trojan Horse Method in cross section measurements [3], test experiments for the LUNA collaboration [4], etc. These works will be shortly discussed.

[1] Gy. Gyürky *et al.*, Phys. Rev. **C74,** 025805 (2006)
[2] G.G. Kiss *et al.* Eur. Phys. J. **A27** 197. (2006)
[3] A Tumino *et al.*, Phys. Rev. Lett. **98**, 252502 (2007)
[4] Gy. Gyürky et al., Phys. Rev. **C75,** 035805 (2007)