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Experimental study of alpha-induced nuclear reactions on Tellurium isotopes for the astrophysical gamma-process

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Heavier p isotopes are believed to be produced through the γ -process. The path of γ -process can be modelled with network calculations. These calculations include about 20000 reactions on more than 2000, mostly unstable nuclei. Theoretical cross section of reactions involving alpha-particles are found to be very sensitive to the alpha-nucleus optical potential, which is not known well enough at low, astrophysical energies. This potential can be studied experimentally by measuring the cross section of (α, n) reactions close above the reaction threshold. The aim of the present work is thus to measure the cross section of the $^{122}\text{Te}(\alpha, n)^{125}\text{Xe}$, $^{124}\text{Te}(\alpha, n)^{127}\text{Xe}$ and $^{130}\text{Te}(\alpha, n)^{133}\text{Xe}$ reactions for which no data exist in literature.

The half-life of the produced Xe isotopes allows us to use the activation technique. Tellurium targets with natural isotopic composition will be used in order to measure the three reactions in parallel. The experiments are in progress using the cyclotron accelerator of ATOMKI. In this poster details of the experimental technique and the preliminary results of the first test measurements will be presented.

Authors: GYÜRKY, György (Atomki); MÁTYUS, Zsolt

Presenter: MÁTYUS, Zsolt

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