INFN
Istituto Nazionale
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LNGS SEMINARS

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Nuclear astrophysics measurements with the new Tandem accelerator of ATOMKI

Abstract

A new 2 MV Tandem accelerator is in operation at ATOMKI since last year. Its scientific program includes nuclear astrophysics related experiments. The $^{17}O(p,\gamma)^{18}F$ reaction cross sections measurement is one of the first investigations using this new accelerator.

Second generation stars heavier than our Sun in their hydrogen burning phase produce the energy mainly by the CNO cycles. The branching point between the second and third CNO cycle is the ^{17}O nucleus, with the competition between the $^{17}O(p,\gamma)^{18}F$ and $^{17}O(p,\alpha)^{14}N$ reactions. Recently, the $^{17}O(p,\gamma)^{18}F$ reaction cross section have been measured by the LUNA Collaboration at energies relevant to the classical nove, the strength of the 183 keV resonance and several direct capture points below 400keV have been measured.

The measurement of the cross section of the same reaction at higher energies is ongoing at ATOMKI. The experiment uses the activation technique. The irradiations are done at the new 2MV Tandem accelerator of ATOMKI. The resulting radioactive ^{18}F decays with positron emission. To the activity determination the decay curve of the 511keV annihilation photons is recorded by a well shielded HPGe detector.

The talk will report on the preliminary results of this measurement campaign. The new, precise, high energy cross section data will help to constrain the R-matrix fits, resulting in more precise reaction rate estimates even at low temperature environments.

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LNGS - “B. Pontecorvo” room