Contribution ID: **184** Type: **Oral Contribution**

The Measurement of Alpha Neutron Yields and spectra (MANY) project: comissioning measurement of the 27Al(α,n)30P thick target yields at CMAM using miniBELEN and LaBr3 scintillators.

Wednesday, 26 October 2022 16:15 (20 minutes)

(α,xn) reactions play an important role in a wide range of applications such as nuclear astrophysics, neutron-induced background in underground laboratories, fission and fusion reactors and non-destructive assays for non-proliferation and spent fuel management applications. However, most of the currently available experimental data was measured decades ago. The data is incomplete and/or present large discrepancies not compatible with the declared uncertainties. Therefore, new measurements addressing the actual needs are required [1].
The MANY collaboration is a coordinated effort by several Spanish research groups aiming to carry out measurements of (α,xn) production yields, reaction cross-sections and neutron energy spectra. The α-beams are produced by the accelerator facilities at CMAM (Madrid, Spain) [2] and CNA (Sevilla, Spain) [3]. The measurements are carried out by using the new miniBELEN detector [4], a 4π long counter with a nearly flat response up to 10 MeV based on the use of 3He-filled neutron proportional counters embedded in a modular high-density polyethylene moderator, the MONSTER array [5], a time-of-flight neutron spectrometer based on the BC501/EJ301 liquid scintillation modules, and a fast-timing array of LaBr3(Ce) scintillation detectors of the FATIMA type [6] which provides gamma detection with angular resolution capabilities.
In this work we report the first results from the comissioning experiment carried out in 2021. In particular, we present and discuss the measurement of the well-known 27Al(α,n)30P thick target production yields at CMAM via direct neutron detection using miniBELEN and via activation with LaBr3(Ce) scintillators.

Acknowledgements:
This work has been supported by the Spanish Ministerio de Economía y Competitividad under grants FPA2017-83946-C2-1 & C2-2 and PID2019-104714GB-C21 & C22.

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Session Classification: P1 Accelerators and Instrumentation

Track Classification: P1 Accelerators and Instrumentation