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## Effects of MgF<sub>2</sub> on neutrons along the keV energy range and study of the neutron capture on fluorine.

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The main goal of this proposed experiment is to study the interaction of neutrons with magnesium fluoride (MgF<sub>2</sub>). These neutrons are produced at MONNET in the Joint Research Centre-European Commission at Geel, Belgium, using a lithium fluoride target (LiF), via  $7\text{Li}(p,n)$  reaction. There are three main goals for the experiment:

- 1.-Characterization of the angular and energetic distribution of the neutron production via protons onto  $7\text{Li}$  at 2.1 MeV, to be made using Time-of-Flight technique with the measurements of a 6-Lithium-glass detector. An energy of 2100 keV for the accelerated protons and a flight path of around 70 cm is intended to be used, in conjunction with gamma monitors (sodium iodide, NaI, and cerium bromide, CeBr<sub>3</sub>, detectors).
- 2.-Secondly, transmission measurements through pure magnesium (Mg) and magnesium fluoride samples shall be performed, in order to determine the total cross section. It is of special interest the keV range, due to discrepancies and lack of data for Mg and F isotopes ( $^{24}\text{Mg}$ ,  $^{25}\text{Mg}$ ,  $^{26}\text{Mg}$  and  $^{19}\text{F}$ ). In order to have a better result around the resonances, as well as at other energies at which the cross section is lower, two sets of samples have been collected: thin samples (1 mm of Mg and 1.4 mm of MgF<sub>2</sub>) and thick samples (6 mm of Mg, 8.5 mm of MgF<sub>2</sub>).
- 3.-Measurements of the moderation capabilities of MgF<sub>2</sub> with the aim of building a Beam Shaping Assembly for future clinical applications of Boron Neutron Capture Therapy, which are to be compared with simulated results using Monte Carlo methods. To this end, several samples of MgF<sub>2</sub> (similar to the ones used in the transmission part, stacked to reach 4 cm of thickness) were surrounded by other MgF<sub>2</sub> samples to compare the neutron spectra obtained after them.

Due to the temporal proximity between the date of the meeting and the experiment (which is expected to be performed in December 2023), only preliminary results will be presented.

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