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The measurement of X17 boson anomaly: the n_TOF channel 3He(n,X17)

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Significant anomalies have been observed in the relative angular emission of electron-positron pairs in the 7Li(p,e+e−)8Be, 3H(p, e+e−)4He and 11B(p,e+e−)12C nuclear reactions [1–3] that have been interpreted as the signature of a boson (hereafter referred to as X17) of mass MX17 = 16.8 MeV/c2. It has been proposed that the X17 could be a vector boson, mediator of a fifth "protophobic"force, i.e. characterized by a strong suppression of the coupling to protons compared to neutrons [4]. Under this assumption, the X17 discovery could explain, at least partially, the long-standing (recent) anomaly on the muon (electron) magnetic moment [5]. Till now, few experiment repeated the ATOMKI measurements, but still a clear confirmation (or rejection) of the existence of the X17 is pending. At n_TOF, we would like to measure a new reaction induced by neutrons (3He(n,X17)) which produce the same *4He state produced by 3H(p,X17)4He. In this talk, after a brief presentation of the physics motivations, the new reaction will be analyzed, together with the ab initio calculations. The apparatus, designed to study such reaction at n_TOF facility, is based on a MPGD which works in TPC mode. The use of magnetic field, allow the reconstruction of the electron energy, charge and angle. In the detector R&D, particular care has been devoted to reduce the amount of material with a wide use of Crabon fiber to reduce the background produced by scattered neutrons as well as reducing the production of external pair creation.

[1] A. J. Krasznahorkay et al., Phys. Rev. Lett. 116, (2016) 042501.
[2] A. J. Krasznahorkay et al., Phys. Rev. C 104, (2021) 044003.
[3] A. J. Krasznahorkay et al., Phys. Rev. C 106, (2022) 061601.
[4] J. L. Feng, B. Fornal, I. Galon, S. Gardner, J. Smolinsky, T. M. P. Tait and P. Tanedo Phys. Rev. Lett. 117, (2016) 071803.
[5] L. Morel, Z. Yao, P. Cladè, S. Guellati-Khèlifa, Nature 588, (2020) 61.
[6] The MEG II collaboration: https://arxiv.org/pdf/2411.07994

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