Germanium-detector based study of the ^{2}H(p,γ)^{3}He cross section at LUNA

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Recent, precise measurements of the primordial ^{2}H abundance [1] have opened the possibility to precisely determine of the primordial baryon-to-photon ratio, independent from the cosmic microwave background. For their interpretation, the ^{2}H abundance data require equally precise nuclear data, in particular on the ^{2}H(p,γ)^{3}He reaction.
Deep underground in the Gran Sasso laboratory, Italy, the LUNA collaboration is undertaking a dedicated effort to measure the ^{2}H(p,γ)^{3}He cross section directly in the Big Bang energy window of interest. The campaign is divided in two phases based on a BGO and a high-purity germanium (HPGe) detector, respectively.
The present poster will report on the second, HPGe-based phase of the experiment. Due to the Doppler shift of the emitted γ-rays, in addition to the absolute yield also information on the γ-ray angular distribution, thus reducing the systematic uncertainty. The characterization and calibration of the setup and detectors, background conditions, and potential sources of uncertainty will be discussed.

References

[1] R. J. Cooke, M. Pettini, R. A. Jorgenson, M. T. Murphy, and C. C. Steidel, Astrophys. J. **781**, 31 (2014).