LNGS SEMINAR SERIES

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Determination of level widths in 15N using nuclear resonance fluorescence

- Abstract -

The stable nucleus 15N is the mirror of the astrophysically important 15O, the product of the slowest reaction in the hydrogen burning CNO cycle, which therefore determine the production rate of the cycle. Knowing the level structure of 15N valuable information can be extracted also for its mirror. Most of the 15N level widths below the nucleon emission thresholds are known from just one nuclear resonance fluorescence (NRF) measurement published more than 30 years ago, with limited precision in some cases [1]. A recent experiment with the AGATA demonstrator array aimed to determine level widths using the Doppler Shift Attenuation Method (DSAM) in 15O and 15N populated in the 14N + 2H reaction. In order to set a benchmark value for the upcoming AGATA demonstrator data, the widths of several 15N levels have been studied with high precision using the bremsstrahlung facility gELBE [2] at the electron accelerator of Helmholtz-Zentrum Dresden-Rossendorf (HZDR). The precision of our new dataset are on a 10% level even for the weakest transitions, which have 60% and 100% error bars in the old dataset.

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[1] R. Moreh et al., Phys. Rev. C 23, 988 (1981).

[2] R. Schwengner et al., Nucl. Inst. Meth. A 555, 211 (2005).

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