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The Challenging Direct Measurement of the 65 keV Resonance Strength in $^{17}O(p,\gamma)^{18}F$ at LUNA

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A precise determination of proton capture rates on oxygen is mandatory to predict the abundance ratios of the oxygen isotopes in a stellar environment where hydrogen burning is active. The $^{17}O(p,\gamma)^{18}F$ reaction, in particular, plays a crucial role in AGB nucleosynthesis as well as in explosive hydrogen burning occurring in type Ia novae. At temperature of interest for the former scenario (20 MK $\leq$ T $\leq$ 80 MK) the main contributions to the astrophysical reaction rate come from the E_r = 65 keV resonance. The strength of this resonance is presently determined only through indirect measurements, with an adopted value $\omega\gamma = (1.6 \pm 0.3) \times 10^{-11}$ eV.

A new high sensitivity setup has been installed at LUNA, located at Laboratori Nazionali del Gran Sasso. The underground location of LUNA 400kV guarantees a reduction of the cosmic ray background by several orders of magnitude. The residual background was further reduced by a devoted shielding. On the other hand the 4π–BGO detector efficiency was optimized installing an Al target chamber and holder. With about 400 C accumulated on Ta_2O_5 targets, with nominal ^{17}O enrichment of 90%, the LUNA collaboration has performed the first ever direct measurement of the 65 keV resonance strength.

In the talk the setup details and preliminary results of the challenging direct measurement performed at LUNA will be reported.

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