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First evaluation of the $^{17}\text{O}(p,\gamma)^{18}\text{F}$ 65 keV resonance strength by direct measurement at LUNA

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The $^{17}\text{O}(p,\gamma)^{18}\text{F}$ reaction plays a key role in the hydrogen burning in CNO cycle. At temperatures of interest for the H-shell burning in AGB stars, the reaction rate is dominated by the $E_{\text{c.m.}} = 65$ keV resonance.

The strength of this resonance is presently determined only through indirect techniques, with a literature value $\omega\gamma = (16 \pm 3)$ neV, leading to an expected counting rate of 0.3 reactions/C for typical experimental quantities.

The LUNA collaboration has recently performed a new direct measurement of the $^{17}\text{O}(p,\gamma)^{18}\text{F}$ cross section focused on the 65 keV resonance taking advantage of the ultra-low background of the deep underground Laboratori Nazionali del Gran Sasso (LNGS, Italy) and of a high stable intense proton beam ($\langle I \rangle = 200 \mu\text{A}$) provided by the LUNA400 accelerator. For this purpose, a high sensitivity and high efficiency setup based on a segmented 4π BGO detector was developed. All these experimental efforts allowed, for the first time ever, the evaluation of the 65 keV resonance strength by a direct technique. Moreover, also the Γ_p width was calculated, confirming the results of the $^{17}\text{O}(p,\alpha)^{14}\text{N}$ 65 keV resonance measured in a previous LUNA experiment.

In the talk, the results of the new LUNA measurement will be presented.

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