

Status of the direct cross section measurement of $^{18}\text{O}(p,\gamma)^{19}\text{F}$ at LUNA

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Summary

The reaction $^{18}\text{O}(p,\gamma)^{19}\text{F}$ plays an important role in the context of Asymptotic Giant Branch (AGB) star evolution and nucleosynthesis. This reaction represents the bridge between CNO and other cycles, which are active during shell H burning. Moreover, the observed O isotope abundance in meteorites crucially depends on the precise knowledge of this rate at low energies.

The low energy cross section of this reaction is influenced by the tails of higher energy broad states and by the presence of a state at 95 keV, which lies directly inside the energy window corresponding to the relevant stellar temperature range.

In the context of the LUNA experiment we measured the low-energy cross section of this reaction, taking advantage of the low environmental background at the Gran Sasso underground laboratory.

Two setups were used for the experimental campaign: measurements for the determination of the strength of the 95 keV resonance were done using a high-efficiency 4πigreco BGO detector, whereas gamma-ray branching measurements of the non-resonant low energy component and of higher-energy resonances utilized a high-resolution HPGe detector.

The experimental campaign was recently concluded. This talk will present the current status of the analysis.

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