

## Nuclei in the Cosmos (NIC XVII)



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# A new underground measurement of the $^{14}\text{N}(p,\gamma)^{15}\text{O}$ reaction at Bellotti Ion Beam Facility \\\

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An accurate understanding of the slowest reaction of the CNO cycle, the  $^{14}\text{N}(p,\gamma)^{15}\text{O}$ , is crucial for estimating the lifetimes of massive stars and globular clusters, as well as determining the CNO neutrino flux from the Sun. Despite the efforts of many groups over the years, including pioneering underground measurements made by the LUNA collaboration, this reaction remains the predominant source of uncertainty when determining solar chemical composition.

The installation of a new 3.5 MV accelerator in the Bellotti Ion Beam Facility of the Gran Sasso National Laboratories (LNGS) will provide unprecedented opportunities for the nuclear astrophysics community. As a pilot project at this new facility, the LUNA collaboration is conducting a  $^{14}\text{N}(p,\gamma)^{15}\text{O}$  experiment, focused on measuring the excitation function and angular distribution using improved solid targets, optimized to limit the beam-induced background contributions. The aim of this renewed measurement is to provide high-quality differential cross section data between 0.3 and 2.0 MeV, which may give new insights and strengthen the knowledge of this fundamental reaction.

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