Contribution ID: **57** Type: **Invited Talk**

New results from the LUNA collaboration at the Bellotti Ion Beam Facility

Sunday, 8 September 2024 10:10 (25 minutes)

The study of many reactions of astrophysical relevance can benefit greatly from direct cross section measurements in a deep underground environment, where the low cosmic-ray background of these sites can be exploited to achieve excellent sensitivity. In this talk I will give an overview of recent results from the LUNA collaboration with a focus on ^{14}N(p,γ)^{15}O.

An accurate understanding of this reaction, that is the slowest of the CNO cycle, is essential in many astrophysical settings, from the precise estimates of the lifetimes of massive stars and globular clusters to its crucial role in determining the CNO neutrino flux emitted by the Sun. In this scenario, despite the significant efforts over the last twenty years, this reaction remains a predominant source of uncertainty when assessing the solar chemical composition.

As a pilot project at the LNGS Bellotti Ion Beam Facility, the LUNA collaboration has measured ^{14}N(p,γ)^{15}O with a focus on its angular distribution using Tantalum Nitride solid targets, developing novel approaches to limit the beam-induced background contributions. An excellent sensitivity was achieved in synergy with the high beam current provided by the new 3.5 MV accelerator in its deep-underground location.

New angular distribution data have been obtained in the energy range from 0.3 to 1.5 MeV, including also the weaker transitions, many of them not observed by previous authors. In this talk I will present the differential cross section results that provides a novel comprehensive picture of the reaction at astrophysical energies.

Primary author: COMPAGNUCCI, Alessandro (Gran Sasso Science Institute and INFN, LNGS)

Presenter: COMPAGNUCCI, Alessandro (Gran Sasso Science Institute and INFN, LNGS)

Session Classification: Underground Nuclear Astrophysics

Track Classification: Underground Nuclear Astrophysics