Contribution ID : **20** Type : **oral contribution**

The study of 20Ne(p,γ)21Na and 21Ne(p,γ)22Na reactions at LUNA

Tuesday, 28 May 2024 17:10 (20)

Among the hydrogen burning processes in stars, proton reactions with Ne isotopes are very relevant to constrain the production and abundances of neon and sodium isotopes in massive stars, novae and supernovae. In particular the 20Ne(p,γ)21Na reaction is the first and slowest reaction of the NeNa cycle and it controls the speed at which the entire cycle proceeds: its rate affects the synthesis of all the elements in the cycle. In the temperature range from 0.1 GK to 1 GK, it is dominated by the Ep= 386 keV resonance and by the direct capture component. On the other hand, The 21Ne(p,γ)22Na reaction has a relevant role in the production of the radioactive isotope 22Na in novae and supernovae. At T~0.1-0.7GK, the main contributions to the stellar rate are provided by several resonances (Ep=126, 271, 272, 290 and 352 keV). Both reactions have been recently studied at LUNA (Laboratory for Underground Nuclear Astrophysics) using the intense proton beam delivered by the LUNA 400 kV accelerator and a windowless differential-pumping gas target coupled with two high-purity germanium detectors. New resonance strengths and branching ratios have been determined for all the resonances of interest and several new transitions observed for 22Na excited states. The contribution is aimed to summarize the new results and to highlight their impact on Ne-Na cycle.

Primary author(s) : ZAVATARELLI, Sandra (INFN - Genova); Prof. CACIOLLI , Antonio (Universita' di Padova and INFN); Dr. CAVANNA , Francesca (INFN - Sezione di Torino); Dr. MASHA, Eliana (Helmholtz-Zentrum Dresden-Rossendorf); Dr. SIDHU, Ragandeep Singh (SUPA, School of Physics and Astronomy, University of Edinburgh)

Presenter(s) : ZAVATARELLI, Sandra (INFN - Genova); Prof. CACIOLLI , Antonio (Universita' di Padova and INFN); Dr. CAVANNA , Francesca (INFN - Sezione di Torino); Dr. MASHA, Eliana (Helmholtz-Zentrum Dresden-Rossendorf); Dr. SIDHU, Ragandeep Singh (SUPA, School of Physics and Astronomy, University of Edinburgh)

Session Classification : Session 8