Recent results and possible prospective at LUNA, using a solid target

G. Imbriani for the LUNA collaboration

The determination of the astrophysical S-factor of the $^{14}N(p,\gamma)^{15}O$ reaction is of great interest because this reaction represents the bottleneck of the CNO cycle, which, in turn, has a large influence on the determination of the age of globular clusters and also plays a role in the estimate of the Solar neutrino fluxes.
We will report on the measurements performed at the underground facility LUNA in the energy range 130-370 keV, using a solid target and a high resolution detection system. This allowed the possibility to study of the excitation function to all populated final staes. We will show the results of the R-matrix analysis for the extrapolation of the S-factor to zero energy and how these new data modify the astrophysical scenarios.
Finally we will show the future perspectives of the LUNA experiment using a solid target.