ID de la contribución : **97** Tipo : **Talk in parallel session**

The LUNA project at Gran Sasso : new results about the early Universe and future perspectives

jueves, 2 de septiembre de 2021 17:10 (15)

In the cosmic silence of the Gran Sasso Underground Laboratory, where 1400 m of rock shield the experimental halls from external radiation, the LUNA experiment is able to recreate the processes that occurred during Big Bang Nucleosynthesis (BBN) and the ones that still occur in stars today. Among the reactions recently studied at LUNA there is a key process of BBN: the reaction by which a proton and a nucleus of deuterium fuse together to form ^{3}He, in symbols: D$(p,\gamma)^3$He. The measurement of this cross section was carried out with a precision of 3% at the energies of interest for the BBN and allowed for a deeper knowledge of the deuterium destruction process and a better evaluation of its primordial abundance. Thanks to this study, it was possible to refine the calculations of the primordial nucleosynthesis and to obtain an accurate determination of the density of ordinary (or "baryonic") matter, thus providing support to the standard cosmological model.
Presently the LUNA collaboration is continuing its scientific activity at the 400 KV accelerator but, in the next years, a new window will be opened by the acquisition with the new LUNA-MV facility, under installation at LNGS. The new accelerator will be able to provide hydrogen, helium and carbon high current beams up to an accelerating voltage of 3.5 MV and it will allow to explore the helium and carbon burning processes, by studying the key reactions shaping the evolution of massive stars such as ^{12}C+^{12}C, ^{13}C$(\alpha,n)^{16}$O and ^{22}Ne$(\alpha,n)^{25}$Mg.
The present contribution is aimed to summarise the most recent results achieved by LUNA Collaboration, in particular about the D$(p,\gamma)^3$He process, and to highlight the rich experimental program connected to the new facility.

Reference to paper (DOI or arXiv)

Your gender (free text)

Primary author(s) : ZAVATARELLI, Sandra (INFN - Genova)

Presenter(s) : ZAVATARELLI, Sandra (INFN - Genova)

Clasificación de la sesión : Discussion Panel Underground Laboratories 2

Clasificación de temáticas : Underground Laboratories