Abstract Submitted
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Nuclear astrophysics, BBN and neutrinos CARLO GUSTAVINO, INFN — Big Bang Nucleosynthesis (BBN) theory describes the formation of light isotopes such as D, ^3He, ^4He, ^6Li and ^7Li in the first minutes of cosmic time. Their abundance depends on the competition between the universal expansion rate and the yields of relevant nuclear reactions. As the universal expansion rate depends on the density of relativistic particles, the abundances of light isotopes allow to constrain the number of neutrinos species, provided that the knowledge of the relevant nuclear processes is accurate enough. The baryon density and the primordial abundance of deuterium (D/H) are presently measured with high accuracy, providing a suggestive, but still inconclusive, hint of the presence of dark radiation (i.e. extra neutrinos). The uncertainty of the $^2H(p,\gamma)^3He$ cross section at BBN energies represents the most important obstacle to improve the contraints on the existence of dark radiation. This reaction will be studied at the underground Gran Sasso Laboratory with the LUNA accelerator. The goal is to measure the $^2H(p,\gamma)^3He$ reaction cross section inside the BBN energy region, with an accuracy of less than 3%. The forthcoming LUNA measurement and its impact in cosmology, as well as in particle and nuclear physics, will be discussed.

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