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Nuclear astrophysics plays an important role in understanding open issues of neutrino physics. As an example, the two key reactions of the solar p-p chain $^3He(^3He,2p)^4He$ and $^3He(^4He,\gamma)^7Be$ were studied at low energy with LUNA (Laboratory for Underground Nuclear Astrophysics), providing an accurate experimental footing for the Standard Solar Model and consequently to study the neutrino mixing parameters.
The LUNA collaboration has now completed the measurement of the $D(p,\gamma)^3He$ cross section with unprecedented precision at Big Bang Nucleosynthesis (BBN) energies. The accurate study of this deuterium-burning process provides a precise determination of the universal baryon density Ω_b, in agreement with the value derived from CMB data and with comparable accuracy.
Finally, our analysis severely constrains the possible existence of "dark radiation", i.e. the existence of relativistic particles not foreseen in the standard model, such as sterile neutrinos or hot axions [1]. The LUNA result and consequences in cosmology and particle physics are discussed in this contribution.

[1] E. Di Valentino, C. Gustavino et al., Phys. Rev. D 90, 023543 (2014).

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