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Nuclear Astrophysics at the Low-Energy Frontiers: Updates from underground laboratories

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Nuclear fusion reactions are the heart of nuclear astrophysics: they sensitively influence the nucleosynthesis of the elements in the earliest stages of the Universe and in all the objects formed thereafter; control the associated energy generation and neutrino luminosity; influence the evolution of stars. LUNA (Laboratory for Underground Nuclear Astrophysics) is an experimental approach for the study of nuclear fusion reactions based on an underground accelerator laboratory.

The LUNA Collaboration has been directly measuring cross sections of nuclear processes belonging to Hydrogen, Helium burning and Big Bang Nucleosynthesis relevant in several astrophysical scenarios with unprecedented sensitivity, due to the huge background suppression available in the underground Gran Sasso Laboratories. In this talk, after a general introduction, the latest LUNA results and ongoing measurements will be presented.

Future researches will be carried out in the framework of the new LUNA-MV experiment as well as in several other underground laboratories. I will give an update with the status of new laboratories as well as future plans.

Primary author: CAVANNA, Francesca (Istituto Nazionale di Fisica Nucleare, sezione di Torino)

Presenter: CAVANNA, Francesca (Istituto Nazionale di Fisica Nucleare, sezione di Torino)

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