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Astrofisica nucleare

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To understand the physical phenomena occurring in the Universe, including the evolution of stars, e.g. the sun, and the most pectacular events such as the supernovae explosion, an xhaustive knowledge of nuclear and particle physics is mandatory since these phenomena are powered by the interaction among the basic constituents of the matter. Nuclear astrophysics deals with the study of low-energy nuclear reactions with the purpose, among others, to measure the nuclear cross sections to be included in those codes to model the stellar evolution as well as the energy yield in fusion processes. Low energies, <100 keV, are requested for this is the window where these processes are more effective. Two effects have prevented to achieve a satisfactory knowledge of the relevant nuclear processes, namely the Coulomb barrier exponentially suppressing the cross section and the presence of atomic electrons. These difficulties have triggered theoretical and experimental investigations to extend our knowledge down to astrophysical energies. For instance, indirect techniques such as the Trojan Horse Method and new experimental facilities such as deep underground laboratories (LUNA@LNGS) have been devised yielding new cutting-edge results. In this contribution, I will report on some recent results in the field of nuclear astrophysics to sketch the state of the art in nuclear astrophysics.

Presenter: LA COGNATA, MARCO SALVATORE (LNS)

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