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Recent results of n_TOF facility at CERN

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Astrophysics is approaching a stage where a number of long-standing central questions about our Universe can finally be addressed within a consistent and quantitative way. The so called Standard Model, based on the General theory of Relativity, the Nuclear and the Particle Physics, describes satisfactorily the hot Big Bang cosmology. The currently observed ratio of neutrons and protons (about 13% n and 87% p) was established, when the weak interactions froze out (after 1 s). In this context, the quest for the origin of the chemical elements plays a prominent role: The production of 2H, 3He, 4He and 7Li (after 200 s) in the Big Bang bears important consequences for cosmology and particle physics, whereas the heavy elements beyond Fe witness ongoing neutron capture nucleosynthesis in evolved stars and supernova explosions with immediate constraints for Galactic chemical evolution.

The difficult task is to understand the formation of these heavy elements, where not only the nuclear physics is complicated but also the mechanisms and thermodynamics are not completely understood yet. Advances in our understanding of these processes and of the astrophysical sites where they occur, require advances in laboratory measurements of neutron cross sections.

In this framework the n_TOF collaboration has started a vast program of nuclear capture measurements with the aim of reducing the respective cross section uncertainties below 3%, in order to improve the reliability of astrophysical models.

The innovative feature of the n_TOF facility at CERN, in the two experimental areas, (20 m and 200 m flight paths), i.e. the high instantaneous flux, the high energy resolution and low background, allow for an accurate determination of the neutron capture cross section for radioactive samples or for isotopes with small neutron capture cross section, which are of interest for Nuclear Astrophysics

The n_TOF facility itself, the main results obtained so far, and the implication of the astrophysical program of the n_TOF collaboration will be presented in this talk

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