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The n_TOF facility at CERN

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An innovative neutron Time-of-Flight facility (n_TOF) is operative since 2001 at CERN, with two experimental areas, 20 m and 200 m flight paths.
Neutrons in the wide energy range, from thermal to a few GeV, are generated by spallation of 20 GeV/c protons on a lead target. The high instantaneous neutron flux, low duty cycle, high resolution and low background make this facility unique for high-accuracy and high-resolution cross-section measurements relevant to Nuclear Astrophysics, Nuclear Technology and fundamental Nuclear Physics. Thanks to its features, n_TOF is particularly suited for measurements on radioactive isotopes, such as those involved in the branching of s-process nucleosynthesis, as well as in projects of nuclear waste incineration and for the design of Generation IV nuclear reactors.
To match the convenient characteristics of the neutron beam, the facility has been complemented with state-of-the-art detector and data acquisition systems. In particular, for the measurements of capture reactions, a high-performance 4⊠ total absorption calorimeter made of 40 BaF2 crystals has been built and extensively used, while innovative gas detectors have been developed for measurements of fission cross-sections.
Since the start of operations several measurements have been performed, on light elements, fission fragments and actinides. The high-quality data collected so far of n_TOF provide new insight on the processes of stellar nucleosynthesis and constitute the basis for more accurate data files to be used for the design of advanced nuclear energy systems.
During the CERN long shutdown, a new spallation target has been installed in the facility, it allowed to increase the neutron flux in the second experimental area of a factor two, and to further expand the range of measurements that can be performed at n_TOF. Furthermore, a new experimental area (NEAR station) in proximity of the spallation target has been made, the NEAR station is used to perform activation measurements.
In this talk, the n_TOF facility will be described, together with the main features of the detectors used for capture, fission and (n, charge particle) cross section measurements. An overview of the recent results will be given and the perspective of the new measurements will be presented.

Author: TAGLIENTE, Giuseppe (Universita e INFN, Bari (IT))

Presenter: TAGLIENTE, Giuseppe (Universita e INFN, Bari (IT))

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