



Contribution ID: 122

Type: not specified

## Status and perspectives of the neutron time-of-flight facility n\_TOF at CERN

*Tuesday, 4 September 2018 15:19 (18 minutes)*

In 2002 the neutron time-of-flight facility n\_TOF started its operation at CERN using a 185-m beam line. After a series of successful measurement campaigns, a second beam line, at 18.5 m from the neutron-producing target, was built in 2014. The two lines provide an excellent combination of good energy resolution and high instantaneous neutron flux. The latter feature results in a much enhanced signal to background ratio for neutron-induced reactions on small mass radioactive isotopes and/or isotopes with very small cross sections.

Neutrons are created by spallation reactions induced by a pulsed 20 GeV/c proton beam impinging on a lead target. Two layers of water and borated water, respectively, surrounding the lead target, act as a coolant and at the same time as a moderator of the initially fast neutron spectrum, providing a wide neutron-energy spectrum ranging from the meV to the GeV region.

The innovative features of the facility have been complemented by a wealth of high-performance detection systems for fission, capture, and reactions involving charged particles in the exit channel. So far, a large number of experiments has been performed on a variety of isotopes of interest for nuclear astrophysics, advanced nuclear technologies, nuclear medicine, and for basic nuclear physics.

After the CERN long shutdown, a new phase of data taking is planned to start in 2021. The R&D of a new spallation target is ongoing and its upgrade will bring important improvements in both beam lines, eventually allowing the n\_TOF Collaboration to perform new, challenging measurements.

In this talk, the status of the n\_TOF facility will be presented together with an outlook on future opportunities.

### Selected session

Accelerators and Instrumentation

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**Session Classification:** Accelerators and Instrumentation