Overview of n_TOF facility activities during LS$_2$

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Outlook

• What is n_TOF?
• Where is it?
• Activities for LS2
  • Horizontal beam line
  • Target exchange
    • Beam line
    • Cooling station
    • Shielding
C. Rubbia et al., *A high resolution spallation driven facility at the CERN-PS to measure neutron cross sections in the interval from 1 eV to 250 MeV*, CERN/LHC/98-02(EET) 1998.
The n_TOF Facility at CERN: a Google view

n_TOF 185 m flight path

Pb Spallation Target

Neutron Beam 10\degree prod. angle

Booster 1.4 GeV

Proton Beam 20 GeV/c 7\times10^{12} ppp

PS 20 GeV

Linac 50 MeV

\rightarrow Linac 4
The n_TOF Facility

The goal of the n_TOF is to provide unprecedented precision in neutron kinetic energy determination, which will in turn bring much-needed precision in neutron-induced cross-section measurements. Such measurements are vital for a range of studies in fields as diverse as nuclear technology, astrophysics and fundamental nuclear physics. The n_TOF will provide neutron rates some three orders of magnitude higher than existing facilities, allowing measurements to be made more precisely and more rapidly than in the past.

CERN COURIER

July 2, 2001
The n_TOF Facility (2014)

Two experimental areas (EAR):
- Horizontal flight path:
  EAR1 at 182.5 m
- Vertical flight path:
  EAR2 at 18.2 m

Both beam lines have:
- 1st collimator:
  halo cleaning + first beam shaping.
- Filter station.
- Sweeping magnet.
- 2nd collimator: beam shaping.

Two experimental areas running in parallel.
n_TOF experimental setup

• Spallation target → neutrons
• 1\textsuperscript{st} collimator (Ø=11 cm)
  • Halo cleaning, first shaping of the beam + filter station
• Sweeping magnet
• 2\textsuperscript{nd} collimator (Ø=1.8/8 cm) – beam shaping for EAR
• Experimental Area 1
  • 186 m from spallation target, location of samples and detector
n_TOF Beam Line

Entrance of n_TOF beam line

Escape line

EAR-1
Main n_TOF LS2 activities

**BEAM LINE**
- Replacement sweeping magnet in EAR1 with a permanent one (same technology as in EAR2)
- Installation of a new system remotely controlled to exchange big and small second collimator in EAR1
- New SEM grid upstream of the target in the FTN line (replacing a BTV)

**EAR1 AND EAR2 (TYPE A LABORATORY)**
- Implementation of the recommendation by the French and Swiss authorities in matters of safety:
  - Audible alarms for beam imminent warning, fire detection and ventilation stop
  - buffer zone
  - sink to wash hands
- Remote monitoring gas system

**CONTROL ROOM**
- Move control room and offices to barrack 506 close to EAR2

**ELECTRONIC LABORATORY**
- Install a laboratory to develop, test and commission detectors to be used for the new beam line commissioning and physics data taking
- About 50 m² equipped with:
  - Fume cupboard to handle chemicals and for soldering
  - Mini-DAQ -> standard data taking (only calibration mode) and storage data same format as in operation
  - Standard furniture
  - Tests with radioactive sources
- Possible location:
  - Either new barrack 506 (preferred) or Barrack 547 (actual laboratory) to be upgraded in space and equipment

**DAQ**
- Consolidation work
- WEB interface to the nTOF database for the handling and bookkeeping of operational data and information

**BEAM OPERATION**
- Discussion with OP and BI on how to improve beam monitoring in view of the higher intensities reachable by the injectors
- Discussion with CO on a dedicated nTOF VISTAR page to improve communication

**NEW TARGET**
- Remove target No. 2 and replace it with a new design, Target No. 3

**NEW TARGET SHIELDING**
- Remove fixed wall shielding and replace it by a mobile shielding

**RENEWAL OF COOLING STATION**
- Dismantle water cooling circuit and replace it with a N₂ gas cooling circuit
Main n_TOF LS2 activities

New sweeping magnet

Consolidation of collimator N°2
SEM grid replacing BTV

Baseline is 40 µm tungsten wires
n_TOF target #3

General design

- Lead blocks (6x)
- Aluminium intermediate anti-crep plates (5x)
- Nitrogen outlet
- Nitrogen inlet
- Cover
- Vessel (Inox)
- Aluminium extremities anti-crep plate (2x)
- Cradle (lead blocks support)

- Vertical moderator (Aluminium)
- Lead wedge
- Moderator support (Inox)
- Horizontal moderator (Aluminium)
- Bi-metallic transition Inox/Alu

Total weight: 1.8 tons
n_TOF target #2 removal

https://edms.cern.ch/document/1867100/0.4
n_TOF target #2 removal

 Dump 26 m
 EAR2 bunker 19 m
 Collimator 2 16 m
 Filter box 11 m
 Permanent magnet 9 m
 1st collimator
 Concrete shielding
 Vac chamber 1 0 m
 N_TOF target
Removal of Items Above Technical Gallery
Removal of Items Below Technical Gallery, e.g. long vacuum chamber
n_TOF target cooling station
n_TOF target cooling station
Modification of the target side shielding

Reconfiguration of the (fixed) shielding around the spallation target,

which dates back to the original installation of the facility in 1999
Future 3 trolley mobile shielding

Concrete Shielding 1
3 blocks

Shielding 2
4 blocks

Max aperture
800mm

Shielding 3
2.5 blocks

150 $\mu$Sv/h

150 $\mu$Sv/h

10 $\mu$Sv/h
Schedule and coordination

• n_TOF Facility Refurbishment Project Schedule: EDMS 2001626
Thanks