

## Preliminary results of the characterisation of the n\_TOF-EAR2 facility at CERN

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The n\_TOF Collaboration operates the neutron time-of-flight facility at CERN [1]. The neutron source consists of a lead target irradiated by a 20 GeV/c pulsed proton beam. It comprises two experimental areas, EAR1 [2], located at 185 m from the spallation target, and EAR2 [3], located at 20 m above the target.

During CERN's second long shutdown (2019-2020), the facility went through a major upgrade, including the installation of a new spallation target. These changes have an impact on the characteristics of the neutron beam, i.e. the neutron flux, the energy resolution and the beam profile. A precise knowledge of the neutron flux is essential for the analysis of the experimental cross sections measured in the facility as well as planning future measurements, therefore the need of it being determined accurately. The energy resolution is the main feature in the characterization of the resonance region of the measured cross-sections. Compared to the previous target, the energy resolution and the characteristics of the flux are significantly improved.

In a commissioning phase in 2021 the changes in the characteristics of EAR2 were investigated. This work presents preliminary results of the neutron flux evaluation in EAR2 compared to extensive Monte Carlo simulations with the FLUKA code, as well as an overview of the improvement of the neutron energy resolution.

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[2] Guerrero C. et al, Performance of the neutron time-of-flight facility n\_TOF at CERN, Eur. Phys. J. A 49, 2013

[3] Colonna N. et al, The Second Beam-Line and Experimental Area at n\_TOF: A New Opportunity for Challenging Neutron Measurements at CERN, Nuclear Physics News, 25, 2015

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