

## NEAR at n\_TOF/CERN: THE FIRST MULTI-FOIL ACTIVATION MEASUREMENT

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The n\_TOF facility at CERN is a facility designed to study neutron induced reactions. It is based on a pulsed proton beam impinging on a lead spallation target and it consists of two flight paths. The NEAR Station is a newly developed experimental zone, located at a distance of only ~3m from the spallation target and just outside the target-moderator assembly's shielding wall [1]. The aim of the n\_TOF NEAR Station is to take advantage of the extremely high neutron flux to perform measurements of MACS (Maxwellian Averaged Cross Section) mainly for nuclear astrophysics purposes but also for measurements important for other scientific fields such as fusion technology [2]. In all of the aforementioned cases, the neutron activation technique is going to be employed.

Although extensive simulations have been performed to obtain the characteristics of the neutron beam at NEAR, the newly built experimental area remains unexplored experimentally. Therefore, it is of utmost importance to identify the neutron beam flux and energy distribution prior to initiating any actual research activity. For this reason, a multi-foil activation project has been launched.

In the present work, the preparation and realisation of the first multi-foil activation measurements will be presented along with their preliminary results. The reactions under study were selected according to the cross-section's dependency on neutron energy as well as the product nucleus half-lives. Various reactions with different resonances have been considered for the characterisation of the thermal and epithermal energy regions while for the characterization of the fast neutron energy range threshold reactions were utilised. After the irradiation, the induced activities of the samples were measured using a 27% relative efficiency HPGe detector and compared to the simulations.

In this presentation, the newly constructed experimental area will be presented along with the first set of multi-foil activation measurements. The experimental results will be compared to the simulations and the first conclusions drawn on the neutron flux will be discussed.

### REFERENCES

- [1] THE N\_TOF COLLABORATION, The new n\_TOF NEAR Station (September 2020) <https://cds.cern.ch/record/2737308?ln=en>
- [2] MENGONI, THE N\_TOF COLLABORATION, n\_TOF: The neutrons time-of-flight facility (n\_TOF) studies neutron-nucleus interactions for neutron energies ranging from a few meV to several GeV (July 2021) <https://indico.cern.ch/event/1051020/>