

## Detailed design, prototyping activities and beam irradiation tests for the new n\_TOF neutron spallation target

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A third-generation neutron spallation target for the CERN neutron time-of-flight (n\_TOF) facility is currently in the detailed design and prototyping phase. This “atypical” neutron source is subjected to short (7 ns) and high-intensity ( $1 \times 10^{13}$  ppp) proton pulses, resulting in extremely high dynamical effects. Construction is foreseen in 2019 and installation in 2020.

The design focuses on improving reliability, increasing average and instantaneous proton intensity on target and avoiding some issues encountered in the current target, among which the contamination of cooling system water with radioactive spallation products and creep phenomena.

After a preliminary design and initial prototyping stage, a design review on different design solutions took place in June 2017. A subsequent detailed design stage is ongoing for two solutions. They consist in a water-cooled Ti-6Al-4V-contained pure Pb monolithic target core as well as in a nitrogen cooled pure Pb massive slices.

This contribution details the following intimately related aspects, which are critical for the success of the Project:

1. Prototyping activity carried out to optimize the cladding process between Ti-6Al-4V and Pb, in order to guarantee the required heat dissipation from the target core;
2. Robustness studies for accidental scenarios (interruption of water circulation, loss of contact at the interface between Ti-6Al-4V and Pb);
3. Design of a beam irradiation test on target prototypes in the HiRadMat facility at CERN, in order to validate the different design solutions, which will take place in August 2018.

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