

Alternative designs for the Beam Dump Facility (BDF) production target and in-beam test plans at CERN

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CERN's upcoming Beam Dump Facility (BDF) will host a new high-Z production target. The device will act as a beam dump to safely absorb 356kW of the 400 GeV/c proton beam delivered by the Super Proton Synchrotron (SPS). At the same time, it will generate a large number of high energy particle collisions in an attempt to produce hidden sector particles for the Search for Hidden Particles (SHiP) experiment.

Previously, the baseline target design of tantalum clad TZM and W blocs was tested in-beam via a scaled target prototype which underwent pre- and post-experiment material characterisation as described in contribution to IWSMT16 by Rui Franqueira Ximenes.

Since the baseline design was tested, several alternative designs have recently been considered which aim to improve physics and operational concerns, as well as waste packaging and disposal aspects. These include Niobium-alloy clad W, helium cooled W plates, and W/Cu peripherally cooled plates. Several of these designs will be tested in an existing slow-extraction test-bench in the North-Area at CERN, aimed at baselining the final configuration by mid-2025 in view of the delivery of the Technical Design Report by end of 2025.

This presentation will describe the thermal and mechanical design of the alternative target technologies being considered, as well as the status and plans for the future in-beam tests.

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