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A helium-cooled target design for the Super Proton Synchrotron Beam Dump Facility at CERN

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CERN's upcoming SPS Beam Dump Facility (BDF) will host a production target designed to manage challenging thermal and mechanical conditions while providing the physics output required by the Search for Hidden Particles (SHiP) experiment. It must fully absorb 400 GeV/c protons and dissipate up to 305 kW. The baseline design consists of water-cooled tantalum-alloy clad TZM and tungsten (W) blocks. Challenges for the maintenance and reliability of the baseline design led to the development of alternative concepts. The leading design —a helium-cooled W target—optimizes thermal management and structural integrity while simplifying the manufacturing and improving its physics performance for the SHiP experiment. The experimental validation of this concept will be via testing multiple prototypes in an existing slow beam extraction test bench at CERN' s North Area.
In parallel, extensive R&D is being pursued on: properties of pure W products including hot-rolled plates; manufacturing of seamless blocks; W-W diffusion bonding techniques.
This contribution includes an overview of the helium-cooled target design and a summary of the ongoing material characterization, prototyping and beam-tests.

Footnotes

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Region represented

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Author: PARKIN, Michael (European Organization for Nuclear Research)

Co-authors: ROMERO FRANCIA, Alvaro (European Organization for Nuclear Research); MUCHER, Christophe (European Organization for Nuclear Research); AHDIDA, Claudia (European Organization for Nuclear Research); GRENIER, Damien (European Organization for Nuclear Research); BERTHOME, Emmanuel (European Organization for Nuclear Research); RODRIGUEZ-CASTRO, Enrique (European Organization for Nuclear Research); DRAGONI, Francesco (European Organization for Nuclear Research); MAZZOLA, Giuseppe (European Organization for Nuclear Research); AVILES SANTILLANA, Ignacio (European Organization for Nuclear Research); GRENARD,

Jean-Louis (European Organization for Nuclear Research); GENTINI, Luca (European Organization for Nuclear Research); ESPOSITO, Luigi Salvatore (European Organization for Nuclear Research); CALVIANI, Marco (European Organization for Nuclear Research); FRASER, Matthew (European Organization for Nuclear Research); FRANQUEIRA XIMENES, Rui (European Organization for Nuclear Research); SGOBBA, Stefano (European Organization for Nuclear Research); GRIESEMER, Tina (European Organization for Nuclear Research)

Presenter: ROMERO FRANCIA, Alvaro (European Organization for Nuclear Research)

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