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Framatome to complete post-irradiation examinations for CERN

April 28, 2021 – Framatome was selected by the European Laboratory for Particle Physics (CERN) to perform post-irradiation examinations of refractory materials irradiated with high-energy proton beams. The experiments will be performed in the beam dump target prototype of the Beam Dump Facility (BDF).

CERN will provide Framatome with six radioactive target blocks irradiated in the prototype. Framatome experts will complete specialty testing and measurement studies to assess microstructural, mechanical and thermo-physical characteristics of the targets. The findings will contribute to CERN's design validation of the final BDF and help scientists understand the behavior of proton beam-induced thermal stresses and temperature cycles in clad refractory metals.

"We look forward to continuing our work with CERN on research projects that drive advancements in particle physics," said Alexis Marincic, senior executive vice president of the Engineering and Design Authority at Framatome. "The applicability of our specialty laboratory services and engineering expertise helps customers explore capabilities within power-generating nuclear stations and beyond, including high-energy physics laboratories."

The <u>BDF</u> is a new facility at CERN dedicated to highintensity beam dump and fixed-target experiments. Currently in its design phase, the first aim of the



Remotely operated material analyses in Hot Cell Laboratory.

facility is to search for light dark matter and hidden sector models with the Search for Hidden Particles experiment. A dense target/dump sits at the core of the facility. The target/dump is designed to safely absorb the high-energy super proton synchrotron (SPS) beam and to maximize the production of charm and beauty mesons. An average power of 300 kW will be deposited on the target, which will be subjected to unprecedented conditions in terms of temperature, structural loads and irradiation.

To provide a representative validation of the target design, a prototype target has been designed, manufactured, and tested under the SPS fixed-target proton beam, up to an average beam power of 50 kW, corresponding to 350 kJ per pulse.

Framatome experts will perform the material analyses at the company's Hot Cell Laboratory using remote-handling tooling. This laboratory is part of Framatome's independent Technical Centers and one of only a few facilities in the world that can flexibly assess highly activated materials.

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Learn more about:

- Beam-impact tests of a prototype target for the BDF at CERN: Experimental setup and preliminary analysis of the online results: <u>https://journals.aps.org/prab/abstract/10.1103/PhysRevAccelBeams.22.123001</u>
- Design of a high-power production target for the BDF at CERN: https://journals.aps.org/prab/abstract/10.1103/PhysRevAccelBeams.22.113001
- SPS BDF: Comprehensive Design Study: <u>https://doi.org/10.23731/CYRM-2020-002</u>

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