Contribution ID: **2005** Contribution code: **TUPM126** Type: **Poster Presentation**

Cooling and thermomechanical studies for the impact tattoos beam dump design

Tuesday, 9 May 2023 16:30 (2 hours)

The Isotope and Muon Production using Advanced Cyclotron and Target technology (IMPACT) project at the Paul Scherrer Institut aims to produce and fully exploit unprecedented quantities of muons and radionuclides for further progress in particle physics, material science and life science. The proposed Targeted Alpha Tumor Therapy and Other Oncological Solutions (TATTOOS) facility will provide, for research purposes, medically relevant radionuclides, especially α-emitters, via proton-induced spallation. This new 100 μA / 590 MeV proton beamline will deliver up to 40 kW to an oxygen-free copper beam dump.
A hybrid analytical / numerical cooling model was developed to reduce the simulation time and the total amount of CFD simulations. This model consists of analytical surface temperatures applied as boundary conditions to an ANSYS thermal model. It was validated using CFD simulations and then used in the design process of the beam dump.
Since the copper blocks are brazed together at temperatures beyond the recrystallization point, a temperature dependent multilinear isotropic hardening model was used to simulate the behavior of soft-ductile annealed copper. Irradiation induced hardening was also taken into account to ensure that no exhaustion of ductility would occur in the beam dump.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Primary author: MARTINIE, Rémi (Paul Scherrer Institut)

Co-authors: EICHLER, Robert (Paul Scherrer Institut); IVANOV, Aleksandar (Paul Scherrer Institute); JOLLET, Sven (Paul Scherrer Institut); KISELEV, Daniela (Paul Scherrer Institut); LAUBE, Daniel (Paul Scherrer Institute); REGGIANI, Davide (Paul Scherrer Institut); SNUVERINK, Jochem (Paul Scherrer Institute); SOBBIA, Raffaello (Paul Scherrer Institut)

Presenters: MARTINIE, Rémi (Paul Scherrer Institut); IVANOV, Aleksandar (Paul Scherrer Institute)

Session Classification: Tuesday Poster Session

Track Classification: MC4: Hadron Accelerators: MC4.T20: Targetry and Dumps