SNI2022

GERMAN CONFERENCE FOR RESEARCH WITH SYNCHROTRON RADIATION, NEUTRONS AND ION BEAMS AT LARGE FACILITIES

Freie Universität Berlin, Rostlaube
September 5th – 7th, 2022
Europe/Berlin Time Zone

supported by

Senatsverwaltung für Wirtschaft, Energie und Betriebe | BERLIN

CONFERENCE BOOK

MON 16:15-18:15 | BOARD 76 | P1-MET1-14

POSTER SESSION

OPTIMIZATION OF A TARGET WITH MICROCHANNEL COOLING FOR HIGH-CURRENT ACCELERATOR-DRIVEN NEUTRON SOURCES

Presenter: Thomas GUTBERLET

Authors: Qi DING (1,2), Jörg WOLTERS (3), Johannes BAGGEMANN (1), Ulrich RÜCKER (1), Paul ZAKALEK (1), Jingjing LI (1), Yannick BESSLER (3), Thomas GUTBERLET (1), Thomas BRÜCKEL (1), Ghaleb NATOUR (2,3)

With the decommissioning of older fission-based neutron sources in Europe in recent years, the available capacity on neutrons for science and access is becoming critical for neutron users. To provide an alternative approach to the realization of neutron facilities, the High Brilliance Neutron Source (HBS) project has been initiated at the Jülich Centre for Neutron Science (JCNS) of the Forschungszentrum Jülich GmbH. It aims at developing a high-current accelerator-driven neutron source (Hi-CANS) to deliver high-brilliant neutron beams for neutron scattering. One of the key components is the neutron producing target that generates free neutrons by proton induced nuclear reactions with an energy well below the spallation threshold. For HBS, a solid tantalum target with a sophisticated internal microchannel water-cooling structure was developed for a 70 MeV pulsed proton beam with a peak current of 100 mA and an average power of 100 kW. The high-current requires a design minimizing proton accumulation within the tantalum target to avoid blistering problems. The high-power density requires an optimization of the microchannel cooling structure to reduce temperatures and to minimize thermo-mechanical stresses. Proton implantation was optimized with Monte-Carlo code FLUKA. Steady state and transient analysis on cooling effect of the target in operation were performed with ANSYS. The details of these investigations and the resulting microchannel target design will be presented.

Affillation

1: Jülich Centre for Neutron Science JCNS-HBS, Forschungszentrum Jülich GmbH, Germany; 2: Faculty of Mechanical Engineering, RWTH Aachen University, Germany; 3: Central Institute of Engineering, Electronics and Analytics ZEA-1, Forschungszentrum Jülich GmbH, Germany

Back to Monday Poster Table

Back to programme Monday, 5th September