



Contribution ID: 1756 Contribution code: WEPR72

Type: **Poster Presentation**

Integration of the beam dynamics and neutronics simulation tools for the IFMIF-DONES accelerator design

Wednesday, 22 May 2024 16:00 (2 hours)

In this work we present the coupling of the simulation processes of two different physical phenomena. These being the Beam Dynamics at the high energy line of an accelerator, and the Neutron flux transport produced by beam-target nuclear interactions. This work is held within the framework of the IFMIF-DONES project (International Fusion Irradiation Facility-DEMO Oriented NEutron Source), whose main goal is to test materials capable of withstand the extreme irradiation conditions that future fusion reactors will have to manage. In order to recreate these conditions, a Deuteron beam is accelerated until it reaches a 40 MeV energy, 125 mA and it is shaped to have an specific profile by the end of the High Energy Beam Transport line. Colliding with a Lithium target afterwards, it will produce a neutron flux whose irradiation effects are upon study. In this contribution we focus on how the BD of the HEBT, i.e. the profile shaping, affects this neutron flux by developing a coupling tool that runs sequentially both softwares (TraceWin for BD and MCNP6.2 for Neutron transport) and that serves multiple purposes since it allows to determine the impact of the HEBT on neutron configuration.

Footnotes

Funding Agency

This work has been carried out within the framework of the EUROfusion Consortium, funded by the European Union via the Euratom Research and Training Programme (Grant Agreement No 101052200-EUROfusion)

Paper preparation format

LaTeX

Region represented

Europe

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Session Classification: Wednesday Poster Session

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D11 Code Developments and Simulation Techniques