

Nuclei in the Cosmos (NIC XVII)



Contribution ID: 205

Type: Poster

Simulation Study of Neutron Production for NDPS at RAON

Tuesday, 19 September 2023 17:30 (5 minutes)

Nuclear Data Production System (NDPS) is one of the experimental systems at the Rare isotope Accelerator complex for ON-line experiments (RAON). It provides high-energy neutrons up to tens of MeV. The primary objective of NDPS is to accurately measure the neutron-induced nuclear cross sections, particularly for the neutron energy extending up to tens of MeV region. A beam commissioning of NDPS is scheduled for 2024. Ion beams, such as H, 2H, 16O, and 40Ar, are accelerated from Superconducting Linac 3 (SCL3) and transported to the NDPS target room. High-energy neutrons will be produced by bombarding an ion beam into the neutron production target at the NDPS target room and delivered to users for the experiments.

For the preparation of forthcoming beam commissioning, simulation studies are performed to calculate neutron productions using the Monte Carlo particle transport codes, namely MCNPX, FLUKA and PHITS. By analyzing the simulation results of various combinations of the ion beams target materials and comparing with available benchmark measurements, an optimal pairing of ion beam and target is proposed for the beam commissioning.

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Session Classification: Poster session (New facilities, instruments and tools)

Track Classification: Others (new facilities, instruments, tools, etc)