BEAM ROBUSTNESS AND OPERATIONAL CRITERIA ON IFMIF ACCELERATOR

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The IFMIF accelerator system is based on two similar beam lines running in parallel. Each D^+ beam of 125 [mA] is produced by an ECR injector and ejected with an energy of 95 [keV] to a room temperature RFQ where it will be bunched at 175 [MHz] and accelerated to 5 [MeV]. Then this beam is passing through a Medium Energy Beam Transport (MEBT) line in order to match its parameters to the conditions required by the four-croyomodule Superconducting Linac (SRF Linac). After these accelerator stages, the 40 [MeV] beam is transported by a High Energy Beam Transport (HEBT) line up to the liquid Lithium target where neutrons will be produced. On the target, the specifications of the beam footprint mentioned a rectangular shape (20 x 5 [cm^2]) with a flat-topped homogenious current density profile and small energy spread. The two beams footprints will overlap, doubling the current density on target and thus increase the neutron flux.

In the frame of the IFMIF/EVEDA project, crucial issues concern the stability of the beam footprint conditions and require an estimation of the performances. Previous studies have shown the feasibility for such HEBT to transport and shape the beam, and also to evaluate the effect of errors. In this study, first we simulate the beam along this HEBT in order to establish the range/tolerance of specifications for the input beams controlling the degradation of the beam footprints on target. Then, comparing with reasonable assumptions for the beams conditions after the SRF Linac, we study the impact on the other systems in interface to the Lithium target assembly and the high flux test cells. The evaluations are carried out by using the TraceWin code developed by CEA.