

Deuteron Beam Commissioning of the Linear IFMIF Prototype Accelerator Source and LEBT

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The Linear IFMIF Prototype Accelerator aims to operate in Rokkasho Fusion Institute a 125 mA/cw deuteron beam at 9 MeV. In order to prove the technical feasibility of the IFMIF accelerators concept.

A 2.45 GHz ECR ion source developed by CEA-Saclay is designed to deliver 140 mA/100 keV CW D + beam. The low energy beam transfer line (LEBT) relies on a dual solenoid focusing system to transport and match the beam into the next accelerating section which is a Radio-Frequency Quadrupole (RFQ). At the end of the LEBT, the normalized RMS emittance has to be lower than 0.3π mm.mrad in order to reach the optimal beam transmission through the RFQ.

This contribution will present the different commissioning phases of LIPAC ion source and LEBT. The experimental results that have been obtained will be reported. In particular, beam emittance measurements as a function of ion source extraction voltage gaps, total extracted current from the source and solenoid tunings will be showed.

In order to model as well as possible the beam transport through LEBT, intensive beam dynamics simulations that take into account space charge compensation have been performed using a self-consistent particle-in-cell code. Simulation results will be discussed and compared to experimental data.

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