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Phase space measurements of 90 mA and 52.5 keV H^- ion beam at J-PARC frontend

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A 90-mA and 52.5-keV negative hydrogen ion (H^- ion) beam has been extracted from the J-PARC Radio Frequency (RF) H^- ion source. The 90-mA beam phase-space distribution at the entrance of the Radio Frequency Quadrupole (RFQ) cavity was measured at the test stand. Compared with the 60-mA beam condition for the present J-PARC user operation, reasonable increase in the operation parameters (the RF input power to the ion source, the electrostatic voltage for beam extraction, and the solenoid currents for Twiss matching with the RFQ) was observed. The normalized RMS emittance increased by a few 10 %, which is within the acceptable range of the RFQ. In addition, the dependence of the beam phase-space distribution was investigated with respect to the operation parameters. Numerical analyses show that the optimum solenoid current was determined to remove the beam halo component with the orifice in the beam transport section, which was originally installed for the differential vacuum pumping of the ion source and the RFQ. In the presentation, the effect between the beam current and the phase-space distribution are discussed in aspect of the H^- ion beam optics.

Footnotes

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