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## Development of a Low Emittance Proton Injector for a Transportable Compact Neutron Source

A transportable compact neutron source is under development for nondestructive testing of concrete structures such as bridges. It consists of a compact proton injector, a 2.5 MeV Radio-Frequency Quadrupole (RFQ) linac and lithium target. To meet the requirements of a 2.5 MeV RFQ linac, a new compact ion Source-LEBT integrated proton injector was developed at IMP. It includes a permanent magnet compact 2.45 GHz ECR ion source, two sets of deceleration-acceleration type Einzel lenses, a beam kicker, an ACCT and a set of beam steers. For an electrostatic LEBT, thermal deformation, optics mismatching and sparks between the LEBT sections were the main technology difficulties. Therefore, this paper was mainly studied how to achieve good beam matching and low emittance beam. Test results of this ion source prove that it is the ability of delivering a proton beam with current of 20 mA operated in 30 kV. The range of duty factor was from 1% to 4% (50 Hz/0.3 ms, 200 Hz/0.2 ms). After series of experimental investigation, the beam current and emittance at the entrance of RFQ can meet the requirements of a 2.5 MeV RFQ. The rms emittance at the LEBT exit is less than 0.15  $\pi$ mm.mad.

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Yes

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