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Preparations for beam commissioning of the carbon RFQ at CERN

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Linear accelerators for medical applications present the possibility to reduce costs compared to cyclotrons or synchrotrons while offering higher beam stability and flexibility. In the framework of NIMMS, the Next Ion Medical Machine Study, the design of a linear accelerator for carbon ion therapy has been completed at CERN. The pre-injector is composed of a fully stripped $^{12}\text{C}^{6+}$ carbon ion source and a 750 MHz Radio Frequency Quadrupole (RFQ) accelerating the beam to 5 MeV/u. The Carbon RFQ is based on a compact, successfully commissioned 750 MHz RFQ presently operating for the commercial proton therapy Linac facility LIGHT. The RFQ is divided in two independent RF cavities of 2 m length. The first RFQ cavity, accelerating the ions to 2.5 MeV/u, is currently being built by CIEMAT and its delivery to CERN is planned for 2023. It will be commissioned initially with a proton and then a helium beam. Beam characterization is crucial to validate the transmission to the next sections of the Linac. In this paper, we describe the diagnostic test bench and highlight the necessary measurements for the acceptance of the second RFQ cavity.

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Footnotes

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Yes

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