



Contribution ID: 1879 Contribution code: THPM062

Type: **Poster Presentation**

Heavy Ion CW RFQ Test Stand Development

Thursday, 11 May 2023 16:30 (2 hours)

A center for ion beam therapy and research is under development in Waco, TX with site preparation and construction underway. The center incorporates state-of-the-art accelerator technologies including the capability to perform ultra-high dose irradiation (FLASH) research with ions. The ion source and beam capture system will be comprised of an Electron-Cyclotron-Resonance (ECR) source coupled to a Radio-Frequency Quadrupole linac (RFQ) through a conventional Low-Energy Beam Transport (LEBT) section. An RFQ linac, which uses electrical RF focusing, has the noted advantage of capturing, auto-bunching and efficiently accelerating DC (constant current) ion beams directly from the source. A test stand is being designed and implemented using an existing CW, variable-frequency, ion RFQ with the capability to accelerate ions with a charge to mass ratio of 1/8 up to 1/2 to a maximum output energy of 0.4 MeV/nucleon. The ion RFQ, originally used as an injector to the HZB cyclotron, has been transferred to the Waco center for ion therapy and research. This paper documents source, the LEBT design and optimization to match to the RFQ capabilities. This multi-ion RFQ frontend will serve as the pre-accelerator and ion selector for injection into higher energy ion cyclotrons.

Funding Agency

Footnotes

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Yes

Primary author: IZZO, Christopher (Fermi National Accelerator Laboratory)

Co-author: JOHNSTONE, Carol (Fermi National Accelerator Laboratory)

Presenter: IZZO, Christopher (Fermi National Accelerator Laboratory)

Session Classification: Thursday Poster Session

Track Classification: MC8: Applications of Accelerators, Technology Transfer and Industrial Relations and Outreach: MC8.U01: Medical Applications