



Contribution ID: 1049 Contribution code: TUPA176

Type: **Poster Presentation**

Alvarez drift tube linac for medical applications in the framework of HITRIplus project

Tuesday, 9 May 2023 16:30 (2 hours)

A first beam dynamics and RF design of an Alvarez-type drift tube linac (DTL) has been defined in the framework of the EU project, HITRIplus. Its main application is to be exploited as a carbon ($^{12}\text{C}^{4+}$) and helium ($^4\text{He}^{2+}$) ion injector into a compact synchrotron for patient treatment. As a second implementation, helium particle acceleration with a higher duty cycle of 10% enables the possibility for radioisotope production. The 352.2 MHz structure efficiently accelerates two ion species, for $A/q=3$ and 2, in the energy range of 1–5 MeV/u and for a beam current of ~0.5 mA. The design extends to a full length of ~7 meters. Permanent magnet quadrupoles are utilized all along the DTL for focusing both ion beams. This paper presents a first-phase analysis towards a realistic DTL design capable of providing full beam transmission and minimum overall emittance increase for two ion beams.

Funding Agency

Footnotes

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Session Classification: Tuesday Poster Session

Track Classification: MC4: Hadron Accelerators: MC4.A08: Linear Accelerators