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Comparison of 352 MHz LINAC structures for injection into an ion therapy accelerator

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In the frame of ongoing initiatives for the design of a new generation of synchrotron-based accelerators for cancer therapy with ion beams, an analysis of linac designs has been started, to address a critical element with strong impact on performance and cost of the accelerator. The goal is to identify alternatives at lower cost and similar or possibly smaller footprint than the standard 217 MHz injector presently used in all carbon therapy facilities in Europe. As an additional feature, a new linac design can be tailored to produce radioisotopes for treatment and diagnostics in parallel with operation as synchrotron injector.
In this paper is analysed the attractive option of moving to 352 MHz frequency, to profit of reliable mechanical designs already developed for protons and of the cost savings that can be obtained using as RF power sources klystrons with a much lower cost per Watt than tubes or solid-state units.
The paper will present a Quasi-Alvarez Drift Tube Linac (DTL) version of an injector linac for carbon ions at q/m=1/3 and compare it with recently developed DTL and IH designs. The option of a separated-IH type linac will be also discussed, together with a standard IH design at 352 MHz. Finally, a DTL design at 352 MHz for injection of fully stripped helium ions into the synchrotron will be presented.

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Footnotes

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