

# S-band RF pulse compressor for high-gradient carbon therapy linac

*Tuesday 27 August 2024 16:00 (2 hours)*

Novel hadron radiotherapy accelerator-based systems require a fast-imaging capability, synchronized with the hadron beam, to allow positioning and treating the tumor practically at the same time. Such systems must operate at high repetition rates (~1,000 pulses per second) to provide reasonable treatment times. Currently, Argonne and RadiaBeam are collaborating on a high-gradient carbon therapy linac project, ACCIL, based on 40 MV/m S-band accelerating structures. In order to operate at repetition rates, the structures must be powered by the 5 MW klystrons. However, high gradient operation requires quadruple of this power. Therefore, we developed a compact S-band RF pulse compressor based on an E-plane polarizer and a spherical cavity operating at 2856 MHz. It incorporates features such as a cut-off circular port opposite to the circular waveguide to facilitate vacuum pumping, along with cooling channels distributed around the cavity and polarizer to manage the thermal loads. The RF pulse compressor is expected to generate a flat 18 MW 300 ns flat-top RF pulse with a 62% efficiency. We will present the mechanical design and fabrication status of the device.

## Footnotes

## Funding Agency

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