Design Status of the SRF Linac Systems for the Facility for Rare Isotope Beams


Facility for Rare Isotope Beams (FRIB), Michigan State University, East Lansing, MI 48824 USA

Summary

The Facility for Rare Isotope Beams (FRIB) will utilize a powerful, superconducting heavy-ion driver linac to provide stable ion beams from protons to uranium, at energies of > 200 MeV/u at a beam power of up to 400 kW. ECR ion sources installed above ground will be used to provide highly charged ions, that will be transported into the linac tunnel approx. 10 m below ground. For the heavier ions, two charge states will be accelerated to about 0.5 MeV/u using a room-temperature 88.5 MHz RFQ and injected into a superconducting cw linac, consisting of 112 quarter-wave (60.5 MHz) and 229 half-wave (322 MHz) cavities, installed inside 51 cryomodules operating at 2K. A single stripper section will be located at about 17 MeV/u (for uranium). Transverse focusing along the linac will be achieved by 9 T superconducting solenoids within the same cryostat as the superconducting rf accelerating structures. The project is currently progressing towards a Department of Energy performance baseline definition in spring 2012. Pending DOE approval for CD-3a (Start of Construction for Conventional Facilities), the project plans to start target building and linac tunnel construction in 2012.

Linear Accelerator Cooling System

FRIB is currently assembling a Technology Demonstration Cryomodule (TDCM) with two half wave resonators and one 9 T solenoid. The TDCM serves as half-wave cryomodule prototype as well as 2K systems test. FRIB cavity suppliers will be in place before CD-2 approval. 

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