CRYOMODULE DEVELOPMENT AT MICHIGAN STATE UNIVERSITY FOR THE RARE ISOTOPE ACCELERATOR

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Abstract

The Rare Isotope Accelerator (RIA) is to provide an intense supply of exotic isotopes for nuclear physics research. A superconducting linac is to accelerate heavy ions to an energy of 400 MeV per nucleon, with a beam power of up to 400 kW. Design studies for a 10th-harmonic driver linac (base frequency = 80.5 MHz) are in progress at Michigan State University. Quarter-wave and half-wave resonators, interspersed with superconducting magnets, are to be used for the first two segments of the linac; elliptical cavities are envisaged for the third segment. The basic cryomodule design is flexible enough so that it can be adapted to all of the cavity sizes and shapes needed for RIA. A titanium rail system is used for support and alignment of the cavities and magnets. The cavities have coaxial couplers and externally-actuated tuners. The number of cavities per cryomodule ranges from 4 to 10. A prototype elliptical cavity cryomodule has been fabricated for two 6-cell cavities of geometric β = 0.47. RF testing and microphonics studies were done in 2004. A prototype low-beta cryomodule is under construction, with RF testing to be done in 2005. The low-beta cryomodule accommodates one quarter-wave cavity, one half-wave cavity, and 2 superconducting magnets. Passive and active magnetic shields are used to ensure that the stray fields from the magnets do not degrade the cavities' performance.

NO SUBMISSION RECIEVED