Contribution ID: **359** Contribution code: **TUAA006** Type: **Oral Poster Presentation**

Cryomodule operation experience for the FRIB continuous-wave superconducting linac

Tuesday 27 August 2024 15:25 (5 minutes)

The superconducting (SC) driver linac for the Facility for Rare Isotope Beams (FRIB) includes 46 cryomodules for acceleration of heavy ions to 200 MeV per nucleon. FRIB cryomodules have been supporting sustainable and reliable delivery of high-power heavy ion beams, including 10 kW uranium beam, to the target for production of rare isotope beams to nuclear physics user experiments. The linac operates in continuous-wave mode for maximum utilization of beam from the ion source. A total of 104 quarter-wave resonators (QWRs; β=0.041 and 0.085; 80.5 MHz) equipped with stepper-motor frequency tuners and frictional mechanical dampers are operated at 4 K. A total of 220 half-wave resonators (HWRs; β=0.29 and 0.53; 322 MHz) equipped with pneumatic frequency tuners are operated at 2 K. We will present resonance control and phase stability performance as well as experience with tuner systems in linac operation. FRIB cavities are designed to be operated at a peak surface electric field of approximately 30 MV/m. We will present cavity field emission performance over the years of linac operation and discuss field emission reduction measures such as pulsed RF conditioning (presently in use) and plasma processing (in development). Automation of SC devices is a key aspect of efficient delivery of beams to users. We will present our experience with automation of SC devices such as start-up, shut-down, and fast recovery from an RF trip as well as performance tracking of linac SC devices.

Footnotes

Funding Agency

Supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics, award number DE-SC0023633.

Primary author: CHANG, Wei (Facility for Rare Isotope Beams, Michigan State University)

Co-authors: ZHANG, Danlu (Facility for Rare Isotope Beams, Michigan State University); NGUYEN, Hai (Facility for Rare Isotope Beams, Michigan State University); SAITO, Kenji (Facility for Rare Isotope Beams); KIM, Sang-Hoon (Facility for Rare Isotope Beams, Michigan State University); ZHAO, Shen (Facility for Rare Isotope Beams); KUNJIR, Shriraj (Facility for Rare Isotope Beams, Michigan State University); KONOMI, Taro (Facility for Rare Isotope Beams, Michigan State University); XU, Ting (Facility for Rare Isotope Beams); HARTUNG, Walter (Facility for Rare Isotope Beams, Michigan State University); DU, Xiaoji (Facility for Rare Isotope Beams, Michigan State University); Dr CHEON, Yoo Lim (Facility for Rare Isotope Beams, Michigan State University); CHOI, Yoonhyuck (Facility for Rare Isotope Beams); Dr WU, Yuting (Facility for Rare Isotope Beams, Michigan State University)

Presenter: CHANG, Wei (Facility for Rare Isotope Beams, Michigan State University)

Session Classification: Tuesday Oral Posters

Track Classification: MC4: Technology: MC4.2 Cryomodules and cryogenics