

Development of the superconducting HWR cavities for NICA project

Tuesday 27 August 2024 16:00 (2 hours)

Nuclotron-based Ion Collider fAcility (NICA) is an accelerator complex under construction in JINR, in which superconducting linac-injector can accelerate protons up to 20 MeV and light ions to 7.5 MeV/u. To achieve this design target, a 325 MHz, $\beta = 0.21$ niobium half-wave resonator (HWR) called HWR1 was developed jointly by IMP and JINR. This paper optimizes the electromagnetic design of NICA cavity, designs the mechanical structure (including helium jacket) and gives the results of multi-physical studies. Simulation results show that $E_{pk}/E_{acc} = 6.29$, the coefficients of df/dp and LFD are 4.96 Hz/mbar and $-1.28 \text{ Hz}/(\text{MV/m})^2$, respectively. In addition, the niobium cavity has been fabricated and vertically tested, the magnetic shield and helium jacket are in the process of electron beam welding, and the cryomodule will be assembled in the next 1~2 months.

Footnotes

Funding Agency

Chinese Academy of Sciences “The Development of High Stability Cryomodule [E129812YR0]”, National Key R&D “Next generation heavy ion accelerator key components cooperation development [E01O591KJ0]”.

Authors: LIANG, Zehua (Institute of Modern Physics, Chinese Academy of Sciences); XU, Mengxin (Institute of Modern Physics, Chinese Academy of Sciences); WANG, Jiyu (Institute of Modern Physics, Chinese Academy of Sciences)

Co-authors: LI, Chunlong (Institute of Modern Physics, Chinese Academy of Sciences); HUANG, Qitong (Advanced Energy Science and Technology Guangdong Laboratory); TAN, Teng (Institute of Modern Physics, Chinese Academy of Sciences); LIU, Lubei (Institute of Modern Physics, Chinese Academy of Sciences); XIANG, Pingan (Advanced Energy Science and Technology Guangdong Laboratory); ZHANG, Shengxue (Institute of Modern Physics, Chinese Academy of Sciences); GUO, Hao (Institute of Modern Physics, Chinese Academy of Sciences); XIONG, Pingran (Institute of Modern Physics, Chinese Academy of Sciences); HE, Yuan (Institute of Modern Physics, Chinese Academy of Sciences)

Presenter: XU, Mengxin (Institute of Modern Physics, Chinese Academy of Sciences)

Session Classification: Tuesday Poster Session

Track Classification: MC3: Proton and Ion Accelerators and Applications: MC3.7 Superconducting structures