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Feature of NC25 material and impact on flux trapping when used them for SRF cavity assembly

Thursday 25 September 2025 14:30 (3 hours)

FRIB has developed a high Q 0.53HWRs within a DOE R&D program titled Development of Transformative Preparation Methods to Push up High Q&G Performance of FRIB Spare HWR Cryomodule Cavities. In this study, we found that flux trapping produces 80 % of the residual surface resistance (Rres). The main contribution is that from thermoelectric current produced by Seebeck effect (Dynamical magnetic contamination) at the dissimilar metal join nearby cavity. Other contributions are DC magnetic contaminations: insufficient earth magnetic field and magnetic contamination from the magnetized components used nearby cavity. Uniform cool-down reduces the dynamic magnetic flux, the ambient field is reduced to ˜ 6 mG, and the resultant Rres is ˜ 3 nW. Active field cancellation reduces the DC ambient field more to 3 mG and decreases Rres to ˜ 2 nW. FRIB 0.53HWR is operated at 322 MHz at 2 K. RBCS is ˜ 0.5 nW, and Rres dominates to Qo. If reduce the Rres less than 0.5 nW, Qo could reach ˜1x10ˆ11. To enhance Qo, we tried to use NC25 bolts and nuts instead SUS ones, which are perfectly none magnetized material even after work unlike SUS. We investigated the impact on the cavity performance. In this paper, report about this result.

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Yes

Footnotes

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