

# Feasibility study for dual higher-order-modes for plasma processing of FRIB superconducting coaxial resonators

*Sunday 25 August 2024 16:00 (2 hours)*

In-situ plasma processing is a promising technique to reduce field emission in superconducting radio-frequency cavities and thus maintain maximum accelerator performance for long-term operation. Continuous-wave accelerators such as FRIB are more challenging than pulsed accelerators due to relatively weak coupling ( $Q_{\text{ext}} = 2E6$  to  $1E7$  for FRIB) via the fundamental power coupler (FPC). This results in an unfavorable mismatch at room temperature and makes fundamental-mode plasma processing difficult. Hence we have investigated the use of higher-order-modes (HOMs) with less FPC mismatch. Several HOMs are promising for lower-mismatch plasma generation. However, HOMs often present a less favorable plasma distribution. To improve the plasma distribution, we are studying techniques to drive the plasma with two HOMs simultaneously. Plasma development results will be presented for FRIB beta = 0.085 quarter wave resonators including ignition threshold measurements and plasma distribution assessments.

## Footnotes

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