



Contribution ID: 9

Type: **Oral contribution**

Higher-Order Mode Power Calculation of SHINE LINAC

Monday 6 October 2025 14:30 (30 minutes)

The Hard X-ray Free-Electron Laser Facility SHINE adopted 1.3GHz 9-cell superconducting (SC) cavities for electron acceleration, with a maximum bunch charge of 300 pC, a maximum repetition frequency of 1 MHz, and a minimum bunch length of 26 μm . Multiple higher-order modes (HOMs) are excited and coupled outside. HOMs above the cutoff frequency will propagate through the entire module cavity chain. Measures must be taken to suppress these modes.

The injector and main Linac of SHINE use 76 1.3 GHz SC modules and 2 3.9 GHz SC third-harmonic cavity modules. Beam-tube type HOM absorbers are installed between each cryogenic SC module, separated by 45 K cryogenic cooling to reduce heat leakage to the module's 2 K system. The HOM absorbers must have high absorption capacity or efficiency to absorb most of the HOM power, thereby reducing the HOM power shared by other module components.

This paper shows the calculation results of HOM power for each module in different sections of the SHINE linac, providing a guide for the structural design of HOM absorbers.

Primary author: Dr MA, Zhenyu (Shanghai Advanced Research Institute, Chinese Academy of Sciences)

Co-author: ZHANG, JieXi (ShanghaiTech University)

Presenter: ZHANG, JieXi (ShanghaiTech University)

Session Classification: Numerical Simulations for SRF Cavities

Track Classification: Numerical Simulations for SRF Cavities