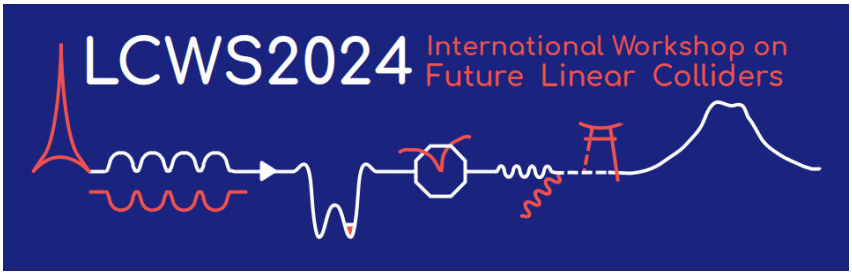


Contribution ID: **263** Type: **Oral presentation (remote)**

# Supercondtucting Thin Films on Higher Order Mode Antennas to Increase the CW Performance of SRF Cavities at MESA

*Wednesday, 10 July 2024 16:00 (20 minutes)*

The Mainz Energy-recovering Superconducting Accelerator (MESA), an energy-recovering (ER) LINAC, is currently under construction at the Institute for Nuclear physics at the Johannes Gutenberg-Universität Mainz, Germany. In the ER operation mode, continuous wave (CW) beam is accelerated from 5 MeV up to 105 MeV. The energy gain of the beam is provided through 2 enhanced ELBE-type cryomodules containing two 1.3 GHz 9-cell TESLA cavities each. By pushing the limits of the beam current up to 10 mA, a quench can occur at the higher order modes (HOM) antennas. The quench is caused by the increased power deposition induced by the electron beam in ER mode. Calculations have shown that an upgrade from 1 mA to 10 mA can increase the deposited power in the HOMs up to 3080 mW. From this power approximately 30% will be present at the HOM feedthrough and can be used as a thermal input. Previous simulations have shown a power limit of 95 mW, which includes the power of a recirculating beam at 1 mA but is exceeded at 10 mA. A solution to increase the power limit is to coat the antennas with a superconducting thin films which provides higher critical fields, temperature, and currents. Nb_3 Sn and NbTiN are the material candidates . First simulations shown an increased power limit, which includes the limits for MESA.

## Apply for poster award

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