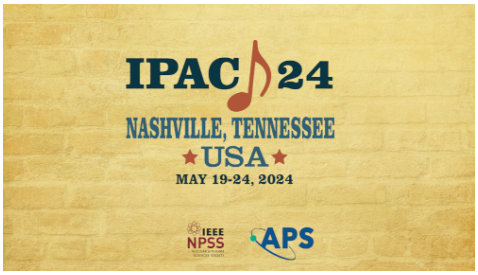

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Superconducting thin films on higher order mode antennas to increase the CW performance of SRF cavities at MESA

Sunday 19 May 2024 14:00 (4 hours)

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 mode continues 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 HOM Antennas. The quench is caused through the increased power deposition induced by the electron beam in ER mode. Calculation shown that an upgrade from 1 mA to 10 mA is increasing the deposited power in the HOMs up to 3080 mW. 30% of this power will be out coupled with the HOM couplers and can be used as a thermal input. Simulations show a power limit of 95 mW which includes the power for 1 mA but is exceeded at 10 mA. A solution to increase the power limit are superconducting thin films which provides higher critical fields, temperature and currents. As candidates are Nb3Sn and NbTiN are chosen. First simulations of the power limit for coated HOM antennas are shown.

Footnotes

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