

Heat Load Investigation of Collector for High-Average Power Beam Dump of 80 MW Klystron for CEPC LINAC

For the average output power of the C-band klystron for CEPC LINAC, the power capacity and stability of the collector are investigated. The characteristics of the electron collection, the modeling of the cooling system, and the suppression of the magnetic field are analyzed. The dissipated power is associated with the transverse energy of the electron beam guided by the applied magnetic field profile. We successfully terminated the magnetic field at the collector entrance to defocus the beam for a higher beam spread for lower heat load without using any extra reverse coil. The results indicate that the klystron, driven by a 425-kV, -416-A electron beam, can withstand a maximum beam power of 177 MW at zero RF drive. Thermal results indicate, with 0.03% duty factor an average power of 52 kW in the collector, a maximum temperature $< 88^{\circ}\text{C}$ is measured on the collector with an optimized cooling system. The simulated and theoretical temperatures are in agreement. The power capacity, cooling efficiency, and stability analysis of the collector are carried out in this article. The results establish the high-power capacity and integrity of the collector.

Primary authors: Dr IQBAL, Munawar (IHEP); Prof. ZHOU, Zusheng (IHEP); Mr XIAO, Ouzheng (IHEP); Dr ALEEM, Abid (IHEP); Mr HABIB, Noman (IHEP); Mr LIU, Yu (IHEP); Mrs WANG, Yiao (IHEP); Mr XIAO, Han (IHEP)

Presenter: Dr IQBAL, Munawar (IHEP)

Session Classification: Poster

Track Classification: Accelerator: 02: Accelerator technology