

## Design and simulation of Electron gun and Magnet of C-Band 80MW klystron for CEPC LINAC

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After the discovery of the Higgs boson at LHC, Chinese scientists have proposed a circular electron-positron collider (CEPC) and a super proton-proton collider (SPPC). The main component of the CEPC accelerator complex is the collider ring, booster, damping ring and Linac which has a circumference of 100 kilometers. The Linac's primary high-power RF components consist of 33 units of 80 MW S-band (2860 MHz) klystrons and 236 units of C-band (5720 MHz) klystrons. This paper describes the design and simulation of the complete electron gun and electromagnet for 80 MW C-band klystrons of CEPC Linac. At an acceleration potential of 425 kV, a space charge beam current of 425A is achieved with an average cathode loading of less than 9.0 A/cm<sup>2</sup>. It has been calculated that the maximum surface electric field at the high voltage ceramic seal and beam optics is less than 23 kV/mm and 4.80 kV/mm, respectively. With an average beam radius of 5.40 mm, the electron beam is successfully transported to the interaction cavity with a beam ripple rate of around 5.0%. The 3-D CST simulation validates and finds agreement with the results of the 2-D DGUN, and POISSON simulations.

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