

Study on Transverse Emittance Measurement of Electron Beams from the Thermionic Cathode RF-gun

Transverse emittance is one of the important properties of charged particle beams, which indicates a beam transverse size and its convergent and divergent features. This research focuses on emittance measurements of electron beams that are generated from a 1.6 S-band thermionic cathode RF-gun at the Plasma and Beam Physics Research Facility, Chiang Mai University. Dynamic simulations of electron beams from the RF-gun exit to the experimental station are performed using the computer program PARMELA. Simulation results are used as the support information to develop an emittance measurement setup by utilizing the Quadrupole-scan technique. The experimental setup consists of a quadrupole magnet with a maximum gradient of 7.09 T/m, a fluorescent screen, a CCD camera, and an image capture card installed in a PC computer. The emittance values obtained from the measurements and from the simulation results are comparable and will be reported in this contribution. This work has been supported by the CMU Junior Research Fellowship Program, the Science achievement Scholarship of Thailand, and the Department of Physics and Materials Science, Faculty of Science, Chiang Mai University.

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