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Development and applications of CW normal conductivity VHF gun at Tsinghua university

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A 217 MHz VHF gun operating in CW mode is being developed at Tsinghua University, which will be served as the beam source of the high repetition XFEL facilities and high repetition MeV UED. The cavity profile has been optimized to minimize input power, peak surface electric field, peak wall power density, and multipacting. The fabrication of the gun has been completed, and the frequency and quality factor measured in cold test are in good agreement with simulation expectations. During high power conditioning, 75 kW cw RF power was successfully fed into the gun, corresponding to a cathode gradient of 27 MV/m and a gun voltage of 780 keV.Under this condition, the maximum dark current collected by the Faraday cup at the gun exit was 376 nA. To measure and optimize the beam quality, a test beamline was constructed. After preliminary optimization, the 95% projected transverse emittance was 0.161 µrad for 10 pC, 0.429 µrad for 50 pC, and 0.853 µrad for 100 pC. Now one of the guns has been delivered to Shanghai and installed in the SHINE tunnel. Recently, it was operated in CW mode with ˜70 kW input power and generated the first beam successfully.

Footnotes

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Region represented

Asia

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