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Latest dark current studies of rf photocathode gun of Delhi Light Source

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The Delhi Light source is a pre-bunched Free Electron Laser facility to generate coherent THz radiation. The electron beam is generated from a normal conducting 2.6 cell RF photocathode (PC) gun operated at 2860 MHz. The RF gun is powered by a high power RF source for a duration of 4 μs at 10 Hz repetition rate. The dark current during the operation of the RF gun has been found to be substantially high with increasing forward powers (above 3 MW) even after prolonged RF conditioning. Dark current measurements has been done with an in-house developed faraday cup with an objective to understand the possible primary dark current source from locations at the PC that witnesses high accelerating fields. The measurements include the study of solenoid field variation to understand the dark current energies and effect of its steering to understand the possible dark current locations. Simulations to make inference from the measurements has been done assuming different radial position of dark current emitters at the PC surface. The details of the measurements, simulation results and the inference drawn are discussed in the paper.

Footnotes

Paper preparation format

LaTeX

Region represented

Asia

Funding Agency

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