## IPAC'24 - 15th International Particle Accelerator Conference



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## Transmission characteristics of dark current in UED

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The high gradient of the photocathode radio-frequency electron gun (RF gun) increases the potential for field emission from the metal surface. Consequently, emitted electrons escaping from the RF gun result in the generation of a dark current, thereby degrading the gun's performance. A thorough investigation into the dark current phenomenon within the accelerator structure plays a crucial role in assessing the performance of the RF cavity and cathode, ensuring the accelerator operates under normal conditions. This paper focuses on establishing a transport matrix for off-axis particles in the RF gun and solenoid. This matrix predicates that field-emitted electrons tend to deviate from the center of the cathode. The study delves into both transverse and longitudinal dynamics characteristics of particles. By numerically tracking the path of dark electrons, we achieved a notable alignment between theoretical prediction and simulation results.

## Footnotes

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## **Region represented**

Asia

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