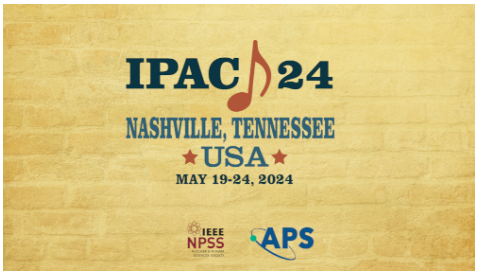

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The design of a 2.3-cell X-band photocathode RF electron gun

Wednesday, 22 May 2024 16:00 (2 hours)

Recent advancements in electron beam compression methods have enabled the production of ultrashort electron beams at the sub-femtosecond scale, significantly expanding their applications. However, the temporal resolution of these beams is primarily limited by the flight time jitter, especially during their generation in photocathode RF electron guns. This paper explores the dynamics of electron beams within different cell structures of the photocathode RF electron gun and introduces a novel RF cavity design. This design enables the electron beam's output energy and the flight time within the gun to remain unaffected by microwave phase jitter simultaneously. Moreover, the power coupler of this RF cavity has been optimized for high efficiency. Our results indicate that this design not only stabilizes ultrashort electron beams but also paves the way for novel advancements in ultrafast science.

Footnotes

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