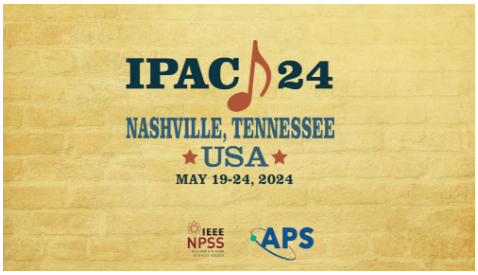

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Research on spatial alignment of laser and electron beam in the generation of ultra-short electron pulses by laser modulation

Sunday, 19 May 2024 16:00 (2 hours)

The utilization of laser modulation techniques shows potential in producing sub-femtosecond electron beams within photoinjector electron guns. The precise spatial alignment between the modulated laser and electron beam is crucial for the stable emission of sub-femtosecond electron beams. In practical applications, inevitable lateral positional fluctuations are present in both the modulated laser and electron beam pulses, resulting in uneven and suboptimal modulation effects of the laser on the electron beam. Photocathode electron guns commonly utilize solenoid focusing for transverse electron beam concentration, inducing transverse phase space coupling and causing the laser-induced transverse jitter in the electron gun to not accurately reflect the transverse jitter of the electron beam. This study seeks to employ coherent lasers and devise a solenoid coil to disentangle the transverse phase space of the electron beam, ensuring that the transverse jitter of the electron beam aligns with the jitter of the modulated laser at the focal point.

Footnotes

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