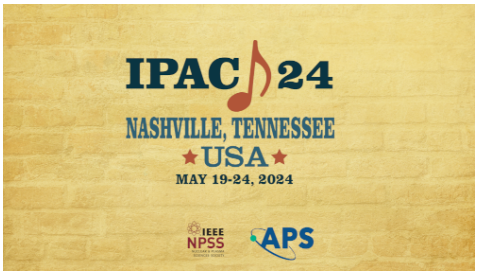

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Evaluation of ultrafast terahertz near-fields for electron streaking

Monday, 20 May 2024 16:00 (2 hours)

THz-frequency accelerating structures could provide the accelerating gradients needed for compact next generation particle accelerators. One of the most promising THz generation techniques for accelerator applications is optical rectification in lithium niobate using the tilted pulse front method. However, accelerator applications are limited by losses during transport and coupling of THz radiation to the acceleration structure. Applying the near-field of the lithium niobate source directly to the electron bunch removes losses due to transport and coupling, yielding a simplified and efficient system. Using electro-optic sampling we have reconstructed the full temporal 3D THz near-field close to the lithium niobate emission face and shown that it can be controlled by manipulating the generation setup. Analysis of the results of this measurement shows an estimated peak field strength of 86 MV/m. A future THz near-field electron streaking experiment is currently planned as a first test of manipulating an electron bunch with the THz near field. Analysis for this planned experiment has yielded an estimated THz near-field kick strength of 23 keV.

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