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Compact 3D electro-optic sampling beam position monitor

Monday 11 August 2025 16:00 (2 hours)

RadiaBeam and University of Colorado Boulder have developed a 3D beam position monitor based on the well-established electro-optic sampling (EOS) technique, enabling non-interceptive, ultrafast position monitoring of high-intensity femtosecond beams. Based on the initial prototype of the 2D EOS-BPM, using 1 pair of crystals, installed at SLAC FACET-II, this 3D design has undergone several iterations. A fully functional prototype was manufactured and bench tested using Off-Axis Parabolic (OAP) mirrors to focus the laser on 2 sets of 2 crystals. However, due to the difficulty of working with OAPs and the offset of the crystal pairs, a new EOS-BPM was developed using an axicon lens to shape the laser into an annulus at the crystal plane. This dramatically simplifies the setup, reduces its footprint, and provides full 3D information from a single laser beam. Once installed, the EOS-BPM can yield the full 3D centroid positioning of two bunches in a wakefield accelerator, or the tilt of a beam used to power a light source. Under ideal conditions, simulation-based estimates show temporal and transverse resolution for the beam centroids of a two-bunch wakefield accelerator beam of order 50 fs and 1 µm, respectively.

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No

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

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I have read and accept the Privacy Policy Statement

Yes

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