

The Beams and Applications Seminar Series

Advanced electron beam phase-space manipulations: experiments, simulations and future plans at Fermilab photoinjectors

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Bldg. 401, Room A-1100
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Host: Kwang-Je Kim

High-brightness beams generated from an electron injector have been used to drive state-of-art light sources, advanced accelerator R&D facilities, colliders and beyond. The precise manipulation of the beam phase-space distribution is often desired to advance the development in the above mentioned fields. In this talk, we report the successful experimental demonstrations of beam manipulations via longitudinal-to-transverse phase-space exchange and the round-to-flat beam transformation. The measurements of phase-space exchange and its application in tailoring beam current profile into sub-ps pulse train to meet the needs of certain applications are presented. Numerical simulations to mimic the experiments are performed and the results are compared with measurements. Finally, the combination of the round-to-flat beam transformation with transverse-to-longitudinal phase-space exchange will enable a full 3-D phase-space manipulation (e.g. emittance repartition); an outlook of such an experiment in planning stage for the Advanced Superconducting Test Accelerator will be presented.

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