Contribution ID: **137** Type: **Contributed Oral**

Observation of Skewed Electromagnetic Wakefields in an Asymmetric Structure Driven by Flat Electron Bunches

Monday, 7 November 2022 14:15 (15 minutes)

Relativistic charged-particle beams which generate intense longitudinal fields in accelerating structures also inherently couple to transverse modes. The effects of this coupling may lead to beam break-up instability, and thus must be countered to preserve beam quality in applications such as linear colliders. Beams with highly asymmetric transverse sizes (flat-beams) have been shown to suppress the initial instability in slab-symmetric structures. However, as the coupling to transverse modes remains, this solution serves only to delay instability. In order to understand the hazards of transverse coupling in such a case, we describe here an experiment characterizing the transverse effects on a flat-beam, traversing near a planar dielectric lined structure. The measurements reveal the emergence of a previously unobserved skew-quadrupole-like interaction when the beam is canted transversely, which is not present when the flat-beam travels parallel to the dielectric surface. We deploy a multipole field fitting algorithm to reconstruct the projected transverse wakefields from the data. We generate the effective kick vector map using a simple two-particle theoretical model, and particle-in-cell simulations provide further insight for realistic particle distributions.

Acknowledgments

The authors acknowledge insightful discussions and contributions from S. Baturin. This work is supported by the U.S. Department of Energy, Office of High Energy Physics, under Contracts DE-SC0017648 (UCLA), DE-SC0018656 (NIU), and DE-AC02-06CH11357 (ANL).

Primary authors: LYNN, Walter (UCLA); XU, Tianzhe; ANDONIAN, Gerard (UCLA / RadiaBeam); GWANGHUI, Ha; MAJERNIK, Nathan; PIOT, Philippe (Northern Illinois University); POWER, John; ROSENZWEIG, James; WHITEFORD, Charles (Argonne National Laboratory); WISNIEWSKI, Eric (Argonne National Laboratory); DORAN, Scott (Argonne National Laboratory)

Presenter: LYNN, Walter (UCLA)

Session Classification: WG4: Beam-Driven Acceleration

Track Classification: Working Group Parallel Sessions: WG4 Oral: Beam-Driven Acceleration