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## Observation of skewed electromagnetic wakefields in an asymmetric structure driven by flat electron bunches

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Charged-particle beams with intense longitudinal fields in accelerating structures inevitably couple to transverse modes, potentially causing beam break-up instability. To maintain beam quality in applications like linear colliders, addressing this coupling is crucial. Flat-beams, featuring highly asymmetric transverse sizes, can delay the initial instability in slab-symmetric structures. However, this only serves as a temporary solution. In exploring the hazards of transverse coupling, our experiment focuses on a flat-beam near a planar dielectric lined structure. Measurements unveil a novel skew-quadrupole-like interaction when the beam is canted transversely, absent when the flat-beam is parallel to the dielectric surface. Using a multipole field fitting algorithm, we reconstruct transverse wakefields and generate an effective kick vector map through a theoretical model and particle-in-cell (PIC) simulations for realistic particle distributions.

### Footnotes

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**Primary author:** LYNN, Walter (University of California, Los Angeles)

**Co-authors:** WHITEFORD, Charles (Argonne National Laboratory); WISNIEWSKI, Eric (Illinois Institute of Technology); ANDONIAN, Gerard (University of California, Los Angeles); HA, Gwanghui (Northern Illinois University); ROSENZWEIG, James (University of California, Los Angeles); POWER, John (Argonne National Laboratory); MAJERNIK, Nathan (SLAC National Accelerator Laboratory); PIOT, Philippe (Northern Illinois University); DORAN, Scott (Argonne National Laboratory); XU, Tianzhe (SLAC National Accelerator Laboratory)

**Presenter:** LYNN, Walter (University of California, Los Angeles)

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