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Analysis of Methods to Excite Head-Tail Motion Within the Cornell Electron Storage Ring NAOMI GENDLER, Reed College, MIKE BILLING, JIM SHANKS, Cornell University — The main accelerator complex at Cornell consists of two rings around which electrons and positrons move: the synchrotron, where the particles are accelerated to 5 GeV, and the Storage Ring, where the particles circulate a ta xed energy, guided by quadrupole and dipole magnets, with a steady energy due to a sinusoidal voltage source. Keeping the beam stable in the Storage Ring is crucial for its lifetime. A long-lasting, invariable beam means more accurate experiments, as well as brighter, more focused X-rays for use in the Cornell High Energy Synchrotron Source (CHESS). The stability of the electron and positron beams in the Cornell Electron Storage Ring (CESR) is important for the development of accelerators and for usage of the beam in X-ray science and accelerator physics. Bunch oscillations tend to enlarge the beam's cross section, making it less stable. We believe that one such oscillation is "head-tail motion," where the bunch rocks back and forth on a pivot located at the central particle. In this project, we write a simulation of the bunch that induces head-tail motion with a vertical driver. We also excite this motion physically in the storage ring, and observe a denite head-tail signal. In the experiment, we saw a denite persistence of the drive-damp signal within a small band around the head-tail frequency, indicating that the head-tail frequency is a natural vertical mode of the bunch that was being excited. The signal seen in the experiment matched the signal seen in the simulation to within an order of magnitude.

Naomi Gendler
Reed College

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