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## Recent Work

### Title

Experiment and simulation of non-linear structures in electron clouds

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Experiment and simulation of non-linear structures in electron clouds\*

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We discovered an unexpected effect while studying electron clouds in ion beams. (Our goal is to understand electron sources and accumulation in positively-charged beams, determine effects on the beam, and find mitigation mechanisms. We use simulations and the HCX experiment, with 1 MeV, 180 mA  $K^+$  ion beams.) Experiments show oscillations in the current to a clearing electrode in a drift region between quad magnets when we do not suppress copious electron emission from the linac end wall. WARP PIC code simulations not only show the clearing electrode oscillations, but also show oscillations in the density and radial position of electrons drifting upstream through the last quadrupole magnet. The simulations show electrons increase in density as they stagnate at a quadrupole magnet. Non-linear structures are launched, growing to electron line charges exceeding the ion beam line charge.

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