

# Hosing of a long proton bunch induced by an electron bunch

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We study hosing that we observe as a centroid oscillation of a long relativistic charged particle bunch induced by an electron bunch. In the experiment we use a long proton bunch. We introduce misalignment between the trajectories of the bunches, therefore the effect of initial seed wakefields on the proton bunch is not axi-symmetric. As a consequence, the proton bunch centroid starts to oscillate. Results show that hosing occurs at the same time as self-modulation (SM) and takes place in the plane of electron bunch misalignment, while SM is observed in the perpendicular plane. Both the phase of the modulation and of the centroid oscillation along the bunch are reproducible. The measured frequencies of the centroid oscillation and of the modulation are equal to the plasma frequency.