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Hosing of a long proton bunch induced by an electron bunch

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We study experimentally hosing [1] of a long proton bunch in plasma in AWAKE. We induce this process with misalignment between the trajectories of a preceding short electron bunch and that of the proton bunch. We observe hosing as transverse oscillation of the proton bunch centroid position in the plane of misalignment at the period of the wakefields. Self-modulation (SM) occurs in the perpendicular plane. The two processes (hosing and SM) are reproducible from event to event. Misalignment to the opposite sides with respect to the given bunch axis leads to the oscillations being in counter phase. The amplitude of oscillation increases with the proton bunch charge [2] and is also affected by the extent of misalignment. We will present the latest experimental results.

[1] D. Whittum et al., Phys. Rev. Lett. **67**, 991 (1991)

[2] C. Schroeder et al., Phys. Plasmas **20**, 056704 (2013)

Primary author: NECHAEVA, Tatiana (Max-Planck-Institut für Physik (DE))

Co-authors: PUCEK, Jan (Max-Planck Institute for Physics); VERRA, livio (CERN); BERGAMASCHI, Michele (Max-Planck-Institut für Physik/CERN); ZEVİ DELLA PORTA, Giovanni; MUGGLI, Patric (Max-Planck-Institut für Physik); AWAKE COLLABORATION

Presenter: NECHAEVA, Tatiana (Max-Planck-Institut für Physik (DE))

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