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Experimental investigation of hosing instability mitigation

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Beam-driven plasma wakefield accelerators (PWFAs) allow for high gradient acceleration of electron beams and hence are promising candidates for compact and cost-efficient drivers of applications demanding high brightness beams. One of the main challenges in these accelerators is to control beam-plasma instabilities with rapid growth rates which are induced by the strong transverse components of the wakefields. The hosing instability, a growing transverse oscillation of the beam centroid caused by inhomogeneities in the focusing wakefields, was predicted to set severe limits on the possible acceleration distance in PWFAs. Several methods have been proposed to damp or even suppress the growth of the particle deflections in the affected beam and thus prevent beam-break-up. Here, we present preparations and simulation studies aiming at the experimental investigation of hosing suppression mechanisms at the PITZ facility.

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