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Flat beam plasma wakefield accelerator

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Particle beams with highly asymmetric emittance ratios are employed at accelerator facilities and are expected at the interaction point of high energy colliders. These asymmetric beams can be used to drive wakefields in dielectric structures and can be used to drive high gradient wakefields in plasmas. In plasma, the high aspect ratio of the drive beam can create a transversely elliptical blowout cavity and the asymmetry in the ion column creates asymmetric focusing in the two transverse planes. The ellipticity of the blowout depends on the ellipticity and normalized charge density of the beam. Simulations are performed to investigate the ellipticity of the wakefield based on the initial driver beam parameters and the parameter space for the two cases at the AWA and FACET facilities.

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