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## Slice Emittance Preservation and Focus Control in a Passive Plasma Lens

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Strongly focusing plasma lenses have been proposed to mitigate chromatic aberrations in the high-strength focusing systems needed to accommodate the small beam sizes associated with plasma-based accelerators and collider final foci. Active plasma lenses focus using the azimuthal magnetic field generated by an electric discharge through a plasma. Emittance preservation with such lenses has been shown for low-charge bunches under certain conditions, but their compatibility with high-brightness beams, which are needed for applications but are likely to generate a beam-quality-spoiling plasma wakes, has not. Passive plasma lenses are a promising route for focusing high-brightness beams, as a plasma wake is required to generate the transverse fields required for focusing. Operation of such passive plasma lenses has been experimentally demonstrated, but their ability to preserve beam quality has not. In this work, we show experimentally that passive plasma lenses can preserve FEL-quality transverse slice emittance while focusing two orders of magnitude more strongly than quadrupole magnets.

**Author:** Dr BJÖRKLUND SVENSSON, Jonas (Lund University)

**Co-authors:** KANEKAR, Advait Laxmidas (DESY/UHH); FOSTER, Brian (DESY); PEÑA, Felipe (University of Oslo and Ludwig Maximilian University of Munich); LOISCH, Gregor (Deutsches Elektronen-Synchrotron DESY); JONES, Harry (DESY); OSTERHOFF, Jens (Lawrence Berkeley National Laboratory); Dr WOOD, Jonathan (DESY); BEINORTAITE, Judita (FLASHForward, DESY, UCL); BOULTON, Lewis; HUCK, Maryam (DESY); GARLAND, Matthew James; WING, Matthew (UCL); GONZALEZ CAMINAL, Pau (DESY, Universität Hamburg); D'ARCY, Richard (University of Oxford); Dr SCHRÖDER, Sarah (Lawrence Berkeley National Laboratory); WESCH, Stephan (Deutsches Elektronen-Synchrotron DESY)

**Presenter:** Dr BJÖRKLUND SVENSSON, Jonas (Lund University)

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