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Probing active plasma lenses

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Active plasma lenses are a key component for advanced accelerator concepts due to their high, tunable gradients (short focal length), radial symmetry (focusing in both planes) and compact design. A detailed characterization of their properties is inevitable in order to fully decipher and control the relevant plasma processes and bring active plasma lenses up to current accelerator standards in terms of stability, repeatability and quality.

Here experimental results from a recent measurement campaign at the Mainz Microtron addressing these questions are presented. Plasma lenses of 1mm diameter and 7mm to 15mm length with directly measured gradients of up to 900T/m, have been used. Results on their influence on electron bunch emittance and their measured magnetic field linearity will be shown, which are linked and constitute crucial studies to determine the achievable lens quality.

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