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Investigating the stability of a GeV-class laser wakefield accelerator using few-cycle shadowgraphy and polarimetry

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Wakefield acceleration of electrons to energies in the GeV range has been performed with a multitude of methods e.g. laser driven, particle driven or by a combination of the two. The overall improvement of the stability in terms of energy, pointing and emittance marks the path from acceleration to an accelerator. The injection process hereby plays a central role.

Using few-cycle microscopy to observe the evolution of the plasma wave's shape already gives a pristine insight into the laser-plasma interaction. Furthermore, using polarimetry the magnetic fields of the accelerated electron bunch and of the wakefield itself are accessible. The interplay of the laser pulse's evolution and the generated magnetic fields will be presented in this talk together with their role during the injection and accelerating process.

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