

All-optical emittance measurement of LWFA electron beams

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The emittance of an electron bunch is a fundamental property, which characterizes its quality in terms of applications. Nowadays, electron beams from laser wakefield accelerators have matured to even drive free electron lasers. Characterizing these beams in terms of emittance is still challenging, as single-shot measurements are required. However, widely used techniques like a pepper-pot mask aren't sensitive enough. Here, we employ the scheme described by A. Seidel et al. (PRAB 24, 012803 (2021)) to measure the emittance of electron bunches from a laser wakefield accelerator in an all-optical way. In this talk, we present the first experimental results showing an improvement of more than one order of magnitude compared to pepper pot measurements.

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