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## Plasma-based spatiotemporal synchronization and alignment of electron and laser beams

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Advanced particle accelerators and their applications rely on exact synchronization and alignment of laser pulses with respect to charged particle beams. Prominent examples are pump-probe experiments with free electron lasers and plasma photocathode accelerators.

The presentation discusses a novel technique which harnesses enhanced plasma recombination glow from impact ionization from laser-triggered plasma sparks. Spatial as well as temporal transitions triggered by this interaction allow for synchronization and alignment of ultrashort electron beams and laser pulses with few or even sub-fs accuracy and  $\mu\text{m}$ -level spatial sensitivity. This system was developed as integral diagnostics for the E210 campaign at FACET via a simple and robust layout, which may find application in a wide range of conventional as well as plasma-based accelerator setups.

[1] A. Knetsch, T. Heinemann, P. Scherkl et al., to be submitted

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