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Transverse and Longitudinal Modulation of Photoinjection Pulses at FLUTE

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To generate the electrons to be accelerated, a photoinjection laser is used at the linac-based test facility FLUTE (Ferninfrarot Linac- Und Test Experiment) at the Karlsruhe Institute of Technology (KIT). The properties of the laser pulse, such as intensity, laser spot size or temporal profile, are the first parameters to influence the characteristics of the electron bunches. In order to control the initial parameters of the electrons in the most flexible way possible, the laser optics at FLUTE are therefore supplemented by additional setups that allow transverse and longitudinal laser pulse shaping by using so-called Spatial Light Modulators (SLMs). In the future, the control of the SLMs will be integrated into a Machine Learning (ML) supported feedback system for the optimization of the electron bunch properties. In this contribution the first test experiments and results on laser pulse shaping at FLUTE on the way to this project are presented.

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