Contribution ID: **100** Type: **Speed talk**

Ultra-fast line-camera KALYPSO for fs-laser based electron beam diagnostics

Friday, 1 October 2021 11:30 (5 minutes)

A very common bottleneck to study short electron bunch dynamics in accelerators is a detection scheme that can deal with high repetition rates in the MHz range. The KIT electron storage ring KARA (Karlsruhe Research Accelerator) is the first storage ring with a near-field single-shot electro-optical (EO) bunch profile monitor installed for the measurement of electron bunch dynamics in the longitudinal phase-space. Using electro-optical spectral decoding (EOSD) it is possible to imprint the bunch profile on chirped laser pulses subsequently read out by a spectrometer and a camera. However, commercially available cameras have a drawback in their acquisition rate, which is limited to a few hundred kHz. Hence, we have developed KALYPSO, an ultra-fast line camera capable of operating in the MHz regime. Its modular approach allows the installation of several sensors e.g. Si, InGaAs, PbS, PbSe to cover a wide range of spectral sensitivities. In this contribution, an overview of the EOSD experimental setup and the detector system installed for longitudinal bunch studies will be presented.

Summary

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Session Classification: Session Beam Diagnostics