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Ultra-fast line-camera KALYPSO for electron beam diagnostics

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Synchrotron light sources operate with bunch repetition rates in the MHz regime. The longitudinal and transverse beam dynamics of these electron bunches can be investigated and characterized by experiments employing linear array detectors. To improve the performance of modern beam diagnostics and overcome the limitations of commercially available detectors, we have developed KALYPSO, a detector system operating with an unprecedented frame rate of up to 12 MHz. To facilitate the integration in different experiments, a modular architecture has been utilized. Different semiconductor micro-strip sensors, based on Si, TI-LGAD, InGaAs, PbS, and PbSe with the quantum efficiency optimized at different photon energies, can be connected to the custom designed low noise front-end ASIC operating at megaframerates. The front-end electronics is integrated within a heterogeneous DAQ consisting of FPGAs and GPUs, which allows the implementation of real-time data processing. In this contribution, the performance results and the ongoing technical developments will be presented.

Summary

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