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Electro-Optical Diagnostics at KARA: First Two-Bunch Measurements and Enhancing the Sensitivity

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At the KIT storage ring KARA (Karlsruhe Research Accelerator), two electro-optical (EO) diagnostical setups are implemented: An EO near-field monitor within the beam pipe in vacuum as a tool for longitudinal bunch profile measurements and an EO far-field setup to measure the temporal profile of the coherent synchrotron radiation (CSR).

The EO near-field monitor performs very well in single-shot turn-by-turn measurements during single-bunch operation and over the years. The design has been optimized to be prepared for measurements in multi-bunch operation. This contribution provides first tests of the monitor during two-bunch operation with minimum 2 ns bunch spacing. Challenges like crystal heating due to an increased beam current are discussed and strategies for mitigation are presented.

For the EO far-field setup, to keep the crucial high signal-to-noise ratio, a setup based on balanced detection is under commission. Therefore, simulations are performed for an optimized beam path and the setup is characterized. In this contribution, the upgraded setup and first measurements are presented.

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