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MicroTCA.4-based BPM and orbit feedback systems at Sirius

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Sirius, a new ultra-low emittance (0.28 nm.rad) synchrotron light source, is currently under development at the Brazilian Synchrotron Light Laboratory (LNLS). Sirius's beam position monitor (BPM) and fast orbit feedback (FOFB) systems will adopt MicroTCA.4 infrastructure for its electronics and communication.

Sirius's most stringent BPM specification is the electron beam position monitoring noise over a 0.1 Hz - 1 kHz bandwidth, which should be less than 80 nm RMS. Together with an overall loop latency of less than 50 us throughout 500 meters of storage ring's circumference and proper subsystems' response bandwidth, this specification will make it possible to reach a closed-loop 0 dB crossover frequency of 1 kHz, at least doubling the performance of present day similar systems.

The position data from all BPMs in the MicroTCA.4 crate must be sent to FPGA-based boards called FOFB processors, which will distribute electron and photon BPM data to all other FOFB processors located in other crates and calculate orbit correction setpoints to be sent to the steering magnets' power supplies. All data transmission in this system is latency critical, therefore the system topology must be carefully chosen to avoid limitations on day-zero and future performance. This presentation will show the work already done for the BPM electronics as well as the proposed system architectures for reaching low-latency data transmission in a MicroTCA.4-based system.

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