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High-resolution quad-channel picoammeter: characterization and commissioning

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To address the high demand for precise low current measurements at the Sirius accelerator and its beam-lines, a quad-channel high-resolution Ethernet picoammeter has been designed*. The instrument can measure currents ranging from picoampere to milliampere across eight selectable ranges, featuring integrated ADCs enabling sample rates of up to 2 ksp/s and synchronization capabilities. This work aims to describe the design, characterization, and calibration results of the instrument. Special attention will be given to evaluating trigger latency, synchronization outcomes, as well as the device's installation and commissioning at beam-lines, particularly for critical applications like on-the-fly scanning experiments. Furthermore, we will explore the interplay between trigger period, digital filter bandwidth, and front-end analog bandwidth to optimize signal-to-noise ratio in specific applications.

Footnotes

*M. M. Donatti, F. H. Cardoso, L. Y. Tanio, Development of a quad-channel high-resolution digital picoammeter for beam diagnostics. 2024 JINST 19 C03028. [DOI:10.1088/1748-0221/19/03/C03028]

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