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Novel high-current multichannel ammeter for X-ray Beam Position Monitoring (XBPM) applications

Wednesday 10 September 2025 16:00 (2 hours)

This work presents the development and characterization of PCR4, a novel pico-to-milli ammeter jointly developed by STLab srl and SenSiC GmbH, specifically designed for applications requiring high-current readout, allowing for monochromatic and polychromatic beams measurement. PCR4 features four independent channels, each with 24-bit resolution, a 10 kHz sampling rate, and an ultra-wide dynamic range spanning 9 decades —from 1 pA to 50 mA. The system is optimized for non-destructive white-beam X-ray detection and incorporates an integrated bipolar voltage bias source (-20 V to +20V), facilitating the commissioning of Silicon Carbide (SiC) sensors and allowing pre-installation dark current measurements.
A detailed metrological characterization will be presented, including spectral noise density, linearity, dynamic range, signal-to-noise ratio (SNR), and long-term stability across varying input capacitances. Additionally, the integration of feedback control loops into the system and strategies for further bandwidth extension will be discussed, with the aim of supporting low-latency orbit feedback systems operating at 10 kHz.

Footnotes

Funding Agency

I have read and accept the Conference Policies

Yes

Author: LA ROSA, Niccolò (University of Catania; STLab srl)

Co-authors: TROVATO, Gabriele (Institute for Microelectronics and Microsystems; University of Catania; Istituto Nazionale di Fisica Nucleare, Sezione di Catania; STLab srl); BUCOLO, Maide (University of Catania); Mr AMATO, Andrea (University of Catania); MOSCATO, Samuele (University of Catania; STLab srl); BIRRI, Mario (Paul Scherrer Institute); CAMARDA, Massimo (Institute for Microelectronics and Microsystems; STLab srl; SenSiC GmbH)

Presenter: LA ROSA, Niccolò (University of Catania; STLab srl)

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