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## Precision current measurement and calibration system for the APS-U unipolar magnet power supplies

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The APS Upgrade (APS-U) multi-bend acromat storage ring requires 1000 high-stability unipolar magnet power supplies. A precision current measurement and calibration system has been developed to independently measure the power supply output current to ensure the accuracy and repeatability of the supplies. The measurement system uses custom commercial DCCT current transducers along with APS-U-designed electronics. The calibration system is designed to perform on-demand calibration of all 1000 DC measurement channels simultaneously using a single current reference source instrument. The calibration system includes a precision current multiplier and impedance buffer based on a novel use of DCCT technology that provides a local precision calibration current for up to 6 DCCTs in series through multi-turn low impedance calibration windings. All system components have been received and passed acceptance testing; the full system is currently being installed in the new storage ring and full-scale evaluation will begin in early 2024. This paper describes the system design and presents preliminary test results.

### Footnotes

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North America

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