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Upgraded Accuracy and Reliability for Insertion Device Magnetic Measurements at the Advanced Photon Source*

There have been upgrades to all subsystems of the insertion device magnetic measurement system: the Hall probe, the moving coil, the stretched rotating coil, and the stretched single-wire system. The noise levels and reproducibility of measurements have been improved considerably so that no statistics are needed in integral measurements. Only one measurement is enough and two scans are made usually just for confirmation. Issues with zero drifts are avoided by the use of numerical integration instead of analog integrators. A previous limitation in Hall probe measurement accuracy arose from errors in the position measurement; synchronization with the encoder has been improved so that skipped and double-counted points are recognized and corrected. The present reproducibility in the rotating stretched-coil field integral measurements is ~ 0.1 G-cm for a 4-m-long coil. The Hall probe reproducibility, as represented by the RMS error in the difference between two consecutive scans, is ~ 0.7 G for a peak field of 0.8 T.

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