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Field measurements of a short period helical superconducting undulator

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Superconducting undulators (SCUs) may be capable of generating stronger magnetic fields at shorter periods than can be achieved using permanent magnet undulators. Therefore, the range of x-ray wavelengths that an XFEL facility can generate for users could be expanded by exploiting SCU technology.
Prototyping work is ongoing at STFC to build a helical superconducting undulator (HSCU) with 13 mm period and 5 mm magnetic gap designed for future XFEL facilities. As part of this work, a test cryostat has been built to cool 325 mm long prototype magnets to 4 K and to measure the field profile of the HSCU using a cryogenic Hall sensor. The magnetic field measurements are necessary to confirm the peak-to-peak field quality and trajectory wander of an electron beam through the device. These quantities must be measured to understand the impact of the HSCU on the FEL radiation output. The trajectory wander can be minimised through the use of field integral corrector coils at either end of the HSCU coil.
We present here a description of the test cryostat and the results of the magnetic field measurement regime performed on the prototype HSCU coil.

Footnotes

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