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Upgraded multiprobe sample inserts for thin film SRF cavity development

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Optimization of thin film (TF) coating parameters for producing SRF cavities requires rapid testing of superconducting properties. A dedicated multiprobe facility built at Daresbury Lab, based on a liquid He free cryocooler, allows us to perform such measurements. The facility has vacuum tubular inserts where the sample probe is loaded and cooled with He gas. The experimental inserts were either newly built or upgraded: (1) A DC resistance experiment allows measurements of critical temperature (T_c) and residual resistance ratio (RRR) on nonconductive substrates (e.g. sapphire). A newly designed insert allows better temperature control and easier sample change. (2) A new insert for magnetic field measurements of T_c on both conductive and nonconductive substrates. (3) An existing insert for planar magnetic field penetration experiments was significantly redesigned. It operates at lower temperatures (>5.5 K), parallel magnetic fields <600 mT, increased sensitivity and enables measurements of field of full flux penetration (Bfp) and T_c on various substrates: copper and sapphire, the latter of which was impossible to measure with an older design.

Footnotes

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Primary author: SEAL, Daniel (Cockcroft Institute)

Co-authors: BENJAMIN, Christopher (Science and Technology Facilities Council); BURT, Graeme (Lancaster University); WILSON, James (Science and Technology Facilities Council); SMITH, Liam (Science and Technology Facilities Council); LEICESTER, Nathan (Cockcroft Institute); MALYSHEV, Oleg (Science and Technology Facilities Council); VALIZADEH, Reza (Science and Technology Facilities Council)

Presenter: BENJAMIN, Christopher (Science and Technology Facilities Council)

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