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First magnetic field penetration results of multilayer samples and A15 materials for the use in SRF applications

Sunday 1 June 2025 14:00 (2 hours)

Superconducting radiofrequency cavities made of bulk Nb are reaching their theoretical limits in the maximum accelerating gradient, Eacc, where Eacc is limited by the maximum magnetic field, B, that can be applied on the surface of the accelerating cavity wall. To increase Eacc, the maximum B field, Bmax, which can be applied to the surface, must also be increased. The A15 materials or multilayer structures are the potential solution to increase Bmax., Since coating and RF testing of full size RF cavities is both expensive and time consuming, one need to evaluate new ideas in superconducting thin films quickly and at low cost. A magnetic field penetration experiment has been designed and built at STFC Daresbury Laboratory to test superconducting samples (< 100 mm ⌧). The facility produces a parallel DC magnetic field, which applied from one side of the sample to the other similar to that in an RF cavity. The facility applies an increasing magnetic field at a set temperature to determine the field of full flux penetration which can give an insight into the quality and structure of the superconducting structure.

Footnotes

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