Experimental report

04/01/2021

Proposal: 5-31-2750 **Council:** 4/2020

Title: Investigating Radial Dependence of Field and Current Distribution ina Superconducting Niobium Wire

Research area: Physics

This proposal is a new proposal

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Samples: Niobium Wire

Instrument	Requested days	Allocated days	From	To
D33	2	1	17/09/2020	18/09/2020

Abstract:

Applying Ampere's law to a superconducting wire where the resistance is propotional to the local field results in a square root dependence of the self field with radius. Previous results, integrating over the full sample, are somewhat ambiguous. Scanning a very thin aperture over the radius will make the situation much clearer. SANS rocking curves will reveal the extent of the self-field adding to the applied field by broadening the rocking curve.

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With full polarization analysis and pinhole transmission imaging we were able to map the depolarization of the beam as a function of the horizontal position along a vertical wire of diameter 1 mm. With increasing applied field we were able to observe the expulsion of a small internal field from the bulk (applied previously with a field of opposing sense) followed by the increasing diamagnetic moment and finally the full penetration of vortices above Bc1 of 600G.

The experiment was a success. Analysis is on going.