Torque Magnetometry in the 60 T Long Pulse Magnet

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Introduction

A set of novel torque magnetometers has been developed to explore diamagnetism in the phases on either side of the upper critical field of cuprate and pnictide superconductors.

Experimental

The torque magnetometers work on the capacitative technique; the cantilevers are quartz or mylar, depending on the size of the single-crystal samples. The stiffness and inertia of the cantilevers were optimized to the pulse durations available in the 60 T Long Pulse magnet. Temperatures from 500 mK to 40 K were to be employed.

Results and Discussion

The cantilevers and samples were prescreened in the 65 T short-pulse magnets and in the initial day in the 60 T Long Pulse magnet. The results were very promising (hysteresis loops and de Haas-van Alphen oscillations were observed) and a set of cantilever/sample combinations was selected for detailed angle- and temperature-dependent studies. Unfortunately the latter experiments were halted by the failure of the 60 T Long Pulse Magnet after one shot.

Conclusions

The technique is very promising for future experiments. It is hoped that these will continue after restoration of the magnet.

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