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Signatures of Superfluid Phases in Torsion Pendulum Experiments on He-3 Confined in Uniaxially Compressed Silica Aerogel[1]

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Embedding superfluid He-3 into the random matrix of porous aerogel has proven to be a practical way to introduce disorder in the otherwise absolutely pure system. "Dirty" He-3 confined in aerogel exhibits markedly different properties compared to the bulk fluid. I present data from an experiment in which a deliberate anisotropy has been induced in the aerogel sample. A 98% open silica aerogel, grown in a cell within the head of a torsion pendulum, is compressed by 10% along the pendulum's axis. Through observing the pendulum's period shift and dissipation (Q^{-1}), we map out the modification of the superfluid phase diagram by anisotropic disorder [1]. Data for Q^{-1} of the pendulum in both the superfluid phases cannot be fully explained by the existing theoretical framework, and as such should motivate new models for the interaction of the superfluid and the aerogel network [2].

This experiment was done in collaboration with R.G. Bennett, E.N. Smith, J. Pollanen, W.P. Halperin and J.M. Parpia.

[1] R. G. Bennett et al., Phys. Rev. Lett. **107**, 235504 (2011).
[2] N. Zhelev et al., arXiv:1308.4724 [cond-mat.supr-con].

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