Radially Compressed Silica-Aerogel

K. Y. Fang, J. Pollanen, and W. P. Halperin

Anisotropic quasi-particle scattering from high porosity silica aerogel has been predicted to modify the phase diagram of superfluid ^{3}He. Specifically, anisotropy induced by axial stretching is predicted to stabilize the "polar" phase in superfluid ^{3}He.[1] Previous studies on radially deformed cylindrical aerogels did not indicate a region of stable polar phase. However, the orientation of the orbital angular momentum vector perpendicular to the cylinder axis was observed.[2] Using optical birefringence, we have investigated the structural anisotropy of aerogels prepared by two different methods. In the first method, anisotropy was induced by radial compression of an initially homogeneous isotropic aerogel. The second method produces radial compression during the growth and drying stages. The growth induced anisotropy is axial. The anisotropy axis in mechanically compressed aerogel has both axial and radial components, and they are inhomogeneously distributed throughout the gel.

1. Aoyama, K. and Ikeda, R. (2007). "Strong-coupling effects in superfluid ^{3}He in aerogel". Physical Review B 76, 104512.
2. Elbs, J., Bunkov, Yu. M., Collin, E., Godfrin, H., and Volovik, G. E. (2008). "Strong Orientational Effect of Stretched Aerogel on the 3He Order Parameter". Physical Review Letters 100, 215304.

Section: Quantum Fluids, Helium-3, Helium-4

Keywords: Aerogel