Experiments with $^3$He in 10% uniaxially compressed aerogel: the superfluid phase diagram

NIKOLAY ZHELEV, ROBERT BENNETT, ERIC SMITH, Cornell University, JOHANNES POLLANEN, WILLIAM HALPERIN, Northwestern University, JEEVAK PARPIA, Cornell University — Entraining $^3$He in aerogel provides a way to introduce disorder in the otherwise ideal quantum fluid. Motivated by the recent prediction that uniaxially compressed aerogel can stabilize the anisotropic A phase over the isotropic B phase, we use a torsional oscillator technique to measure the superfluid phase diagram of $^3$He entrained in 10% axially compressed, 98% porous aerogel. We observe that a broad region of the temperature-pressure phase diagram is occupied by the metastable A phase. The reappearance of the A phase on warming from the B phase, before superfluidity is extinguished at $T_c$, is in contrast to its absence in uncompressed aerogel. We also find that the anticipated alignment of the angular momentum vector by compression is not observed.