

Supersolidity vs Quantum Plasticity in solid helium

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Seven years after Kim and Chan's discovery of a rotation anomaly in solid helium, the interpretation of the observed phenomena in terms of supersolidity remains controversial. J. Beamish's group has shown that the rotation anomaly is accompanied by an elastic anomaly: when the TO period increases, the shear modulus decreases, due to the unpinning of dislocations from ³He impurities. Could the observed phenomena be only due to this softening? In some experiments this is probably true but not in some others, especially the recent study by Kim's group of oscillators under dc-rotation.

I will shortly describe our elastic measurements in high quality crystals containing no impurity¹ and our more recent comparison of TOs filled with either single crystals or polycrystals². The latter illustrate the difficulty we encounter when trying to attribute rotation anomalies in solid helium to supersolidity or to changes in elastic properties.

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¹X. Rojas, A. Haziot, V. Bapst, H. J. Maris, S. Balibar, PRL **105**, 145302 (2010)

²A. Fefferman, X. Rojas, A. Haziot, S. Balibar, J. West, and M.H.W. Chan, to be published (2011)