

Abstract Submitted  
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**Shear Modulus Anomaly in Solid Helium<sup>1</sup>** JOHN BEAMISH, JAMES DAY, ALEXANDER SYSHCHENKO, University of Alberta — The search for supersolidity was given impetus by recent experiments in which solid helium appeared to decouple from a torsional oscillator, but other phenomena which characterize superflow have not yet been observed. Both experiments and theory indicate that defects are involved in supersolidity and these should also affect the solid's mechanical behavior. We have measured the shear modulus of solid helium at extremely low frequencies and strains, using a new method, and observe anomalous stiffening at temperatures below 200 mK. It has the same dependence on temperature, measurement amplitude, <sup>3</sup>He impurity concentration and annealing as the torsional oscillator decoupling. This elastic behavior is explained in terms of a dislocation network which is pinned by <sup>3</sup>He at the lowest temperatures but becomes mobile above 100 mK. Moving dislocations appear eliminate the decoupling and disrupt possible supersolidity.

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