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Pursuit of the Elusive Supersolid[1] XIAO MI, JOHN D. REPPY, Cornell University — The excitement following the initial report of supersolid behavior for ^{4}He embedded in porous Vycor glass has been tempered by the realization that many of the early supersolid observations were contaminated by effects arising from an anomaly in the elastic properties of solid ^{4}He. In an attempt to separate dynamic elastic effects from a true supersolid signal, we employed a torsional oscillator with two eigen frequencies to study the ^{4}He-Vycor system. We found that frequency dependent elastic signals can entirely account for the observed period shift signals. Although, we conclude that supersolid does not exist for the ^{4}He-Vycor case, the question of its presence in bulk samples remains open. In our current experiments we apply the two-frequency test to bulk samples of solid ^{4}He. Again we find a frequency dependent contribution arising from elastic effects. However, in some cases we also find a small frequency independent contribution, which may indicate the existence of a remnant supersolid phase. Given the history of this subject such results must be treated with caution.

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