

Abstract Submitted
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Resonant ultrasound spectroscopy for supersolid helium studies¹

GUOXING LIU, J. D. MAYNARD, The Pennsylvania State University — Recent experiments have indicated that the onset of the supersolid state and an increase in the shear modulus of solid helium may be related through a common origin. We have been adapting resonant ultrasound spectroscopy (RUS), which can be used to measure all of a solid's elastic moduli, for use with solid helium. In the RUS technique, a cell with known geometry is fitted with ultrasound drive and receive transducers so that a number (10 - 30) of the cell's natural frequencies may be measured; by analyzing the natural frequencies, all of the elastic moduli of the cell's contents (solid helium) may be determined. For RUS to work, it is essential that the normal modes of the cell be well understood. We have been developing a cell which will maintain robust normal modes when the cell is cycled in temperature and pressure. An important feature is minimizing the amount of epoxy needed for forming a hollow cell for containing the solid helium, since epoxy may not cycle well. Other important features include transducer attachment and the use of an invertible finite element calculation for determining elastic moduli from the measured natural frequencies of a complicated cell.

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