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Resonant ultrasound spectroscopy: an odyssey in measurement science[1]

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Elastic moduli are among the most fundamental attributes of a solid, connecting to physics, thermodynamics, metallurgy, non-destructive testing, and more and determine the very bottom of the phonon dispersion curve. They have the most symmetry content of any thermodynamic susceptibility (e.g.heat capacity doesn't have any). New measurement techniques are central to the advancement of science. One emerging strategy, made possible today by the accessibility of powerful personal computers, is the development of instrumentation that *requires* massive computational power to produce otherwise unobtainable results of which resonant ultrasound spectroscopy (RUS), an elastic modulus measurement technique, is one example. We describe here the development and some examples of successes of RUS.

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