Abstract Submitted
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Measuring the Speed of Sound in a 1D Fermi Gas[1] JACOB FRY, MELISSA REVELLE, RANDALL HULET, Rice Univ — We report measurements of the speed of sound in a two-spin component, 1D gas of fermionic lithium. The 1D system is an array of one-dimensional tubes created by a 2D optical lattice. By increasing the lattice depth, the tunneling between tubes is sufficiently small to make each an independent 1D system. To measure the speed of sound, we create a density notch at the center of the atom cloud using a sheet of light tuned far from resonance. The dipole force felt by both spin states will be equivalent, so this notch can be thought of as a charge excitation [2]. Once this beam is turned off, the notch propagates to the edge of the atomic cloud with a velocity that depends on the strength of interatomic interactions. We control interactions using a magnetically tuned Feshbach resonance, allowing us to measure the speed of sound over a wide range of interaction. This method may be used to extract the Luttinger parameter vs. interaction strength.

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[2]A. Recati, P. O. Fedichev, W. Zwerger, and P. Zoller, **Phys. Rev. Lett** 90, 020401 (2003).

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