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Characterizing spin-charge separation in ultracold atoms confined to 1D1 C.Y. SHIH[1], Rice University — One dimensional systems of fermions are predicted by Luttinger liquid theory to have different dispersion relations for spin and charge exci- tations. Evidence of spin-charge separation has been seen in quantum wire tunneling experiments 23. However, independent measurements for spin and charge dispersion were not accessible. Ultracold atoms, how- ever, provide highly tunable system to directly observe this phenomenon using Bragg spectroscopy4 in a 2-D optical lattice. By measuring the momentum transfer from a Raman transition while varying the relative detuning of the two-photon transition, we can measure the dispersion relation ?(k). The two spin states are different hyperfine levels of the atom, and by appropriate choice of detuning, it may be possible to independently measure the spin and charge modes. By exploiting the tunability of interactions via a Feshbach resonance, we have measured the Bragg spectrum for the charge mode.

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