Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Magnetic Chains Assembled with Atomic Precision CYRUS F. HIRJIBEHEDIN, CHRISTOPHER P. LUTZ, ANDREAS J. HEINRICH, IBM Research Division, Almaden Research Center — We report the first study of small magnetic chains constructed and studied *in-situ* with atomic precision. By positioning Mn atoms one at a time with an STM, we are able to follow the low energy excitation spectrum of the chain as it changes dramatically with length. The low energy spectra of chains built from an odd number of atoms display a spin-flip excitation similar to that of a single Mn atom. In even-length chains the spin flip excitation is absent and is replaced by an excitation at higher energies that splits into three distinct modes in a magnetic field. We interpret these results as direct evidence of the antiferromagnetic coupling of the individual atomic spins. Quantitative comparison of our results with the Heisenberg model allows us to directly obtain the coupling strength J$\sim$6meV between atomic spins and suggests that the total spin of the individual Mn atoms on the surface is 5/2.

Cyrus F. Hirjibehedin
IBM Research Division, Almaden Research Center

Date submitted: 29 Nov 2005 Electronic form version 1.4