Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Scattering and Guiding by Atomic Walls J. Y. VAISHNAV, National Institute of Standards and Technology, Gaithersburg, J. D. WALLS, Harvard University Department of Chemistry, M. APRATIM, Indian Institute of Technology, Kharagpur, E. J. HELLER, Harvard University Department of Physics — We propose the possibility of using a wall of atoms to guide matter waves, e.g. electrons or other atoms, in a manner similar to which a fiber optic guides light. Such walls could be engineered from individual atoms by STM, for instance. We model the atomic wall as a quasi-1D array of scatterers embedded in 2D; our theoretical study reveals the interplay of scattering phenomena with bands and conduction along the array. We discuss the conditions under which straight or curved arrays of atoms can guide a beam focused on one end of the array.

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Date submitted: 26 Dec 2006 Electronic form version 1.4