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Interaction of a BEC with Dipole Barriers MIRCO SIERCKE, CHRIS ELLENOR, FAN WANG, JAN HENNEBERGER, MATT PARTLOW, AEPHRAIM STEINBERG, University of Toronto — Over the past few years cold atoms have become a remarkable and versatile test bed for many areas of physics, including condensed matter, quantum computation and atom optics. One advantage of testing theories in cold-atom systems is that it is possible to create a wide variety of potentials, to modify them in real time, and to carry out measurements of quantities which are often impossible or very difficult to measure in other systems. We will discuss several experiments involving the scattering of atoms from a Bose-Einstein condensate off of time- dependent and time-independent dipole barriers. In particular, condensates incident on barriers may be used to shed light on the still controversial question of tunneling times. A direct measurement of the Büttiker-Landauer time[1]is possible, via directly modulating the barrier height; measurements of weak-measurement or Larmor times are possible by coupling to internal degrees of freedom of the atoms[2]; and studies of the effects of quantum measurement may be performed in several ways. The present status of these experiments will be presented.

[1]M. Büttiker and R. Landauer, *Pysical Review Letters* **49** (23), 1739 (1982).
[2]A. Steinberg, *Journal of the Korean Physical Society* **35**(3), 122(1999).

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