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Electron scattering & high resolution spectroscopy from cold atoms in an AC-MOT ANDREW MURRAY, MATTHEW HARVEY, University of Manchester — A new revolution in atomic physics has arisen due to the ability to precisely control the external motion of atoms using laser forces. By using high resolution continuous wave lasers it is possible to reduce & compress the momentum of an atomic beam, & to trap & cool these atoms to produce a high density cloud of cold atoms in a magneto optical trap (MOT). The temperature of the atoms can be further reduced to sub-micro-Kelvin levels using a variety of techniques, so as to form a Bose Einstein Condensate (BEC). Here we discuss a new type of atom trap (the AC-MOT) which allows the magnetic fields produced by the trap to be switched off >300 times faster than with a conventional MOT [1]. Electron scattering & high resolution laser experiments can then be performed from cold atoms with virtually no loss (apart from the normal processes associated with background gases). Results from potassium ionization will be presented, together with a discussion of new types of precision scattering experiments that can be performed using these cold targets.

[1] M Harvey and A J Murray Phys Rev Lett 101 173201 (2008)

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