Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Excitation and photo-ionization of ultra-cold potassium atoms in the AC-driven magneto optical trap (AC-MOT)[1] JOHN AGOMUO, ANDREW MURRAY, MATTHEW HARVEY, University of Manchester, UK — The operation of a new cold atom trap (the AC-MOT) and its application in photoionization experiments is described. Ionization of cold K atoms in the AC-MOT is discussed, the ionization proceeding in a stepwise fashion using a combination of infra-red radiation with that from a blue diode laser. A significant limitation of magneto optical trapping (MOT) techniques has been the requirement to eliminate the magnetic fields prior to the interaction occurring. To address this, the AC-MOT was invented in Manchester. This is a pulsed trap, so that the magnetic fields are completely eliminated prior to the electron interaction. Low energy electrons can then be extracted from laser photoionization. In this work, the potassium is cooled to ∼0.25mK. Photoionization proceeds by a stepwise route, atoms excited by the trapping laser at ∼766nm being ionized by radiation at ∼448nm. Both fluorescence from the atoms and the ion yield are used to determine details of the interaction. These techniques are being studied since it then is possible to create cold electron bunches of high coherence. A detailed description of the AC-MOT, its operation and application will be presented. A new cold electron source being built in Manchester will also be discussed.

[1]I wish to acknowledge the financial support from Tertiary Education Trust Fund Nigeria and Nigerian Defence Academy Kaduna

John Agomuo
University of Manchester, UK

Date submitted: 13 Nov 2013 Electronic form version 1.4