

Abstract for an Invited Paper
for the DAMOP07 Meeting of
The American Physical Society

Trapping Single Krypton Atoms for Radioactive Background Measurements

MICHAEL MASTROIANNI, Union College

We report on the construction of an apparatus for the trapping and detection of single metastable krypton atoms, which will be used to measure krypton contamination in other rare gases by Atom Trap Trace Analysis (ATTA). A beam of atoms excited to the $5s[3/2]_2$ (3P_2) metastable state are decelerated in a Zeeman slowing magnet, and loaded into a magneto-optical trap, where their fluorescence is detected using an avalanche photodiode. We estimate that the system will enable us to measure krypton contamination at the 3×10^{-14} level in three hours of integration, which is close to the level required for proposed astrophysical detectors using liquid rare gases as a scintillation medium. We will discuss the trap loading and detection efficiency, and possible improvements through the use of an optically excited metastable atom source.