Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Ultracold molecules based on two-electron atoms GAEL REINAUDI, KLEJDA BEGA, TANYA ZELEVINSKY, Columbia University — Ultracold diatomic molecules offer exciting possibilities for studies of novel states of matter, quantum information, and precision measurements. Two-electron-atom based molecules are particularly promising for precision measurements, such as variations of the proton-electron mass ratio. They are expected to be efficiently produced via photoassociation on singlet-triplet transitions. Heteronuclear molecules based on the two-electron alkaline-earth-like atoms are likely to have a reasonably large dipole moment, and are interesting for quantum information and studies of long-range interactions in ultracold quantum gases. We present the construction of an experimental apparatus to cool, trap, and manipulate either single or mixed species of two-electron atoms (Sr, Yb) in an optical lattice, as well as the most efficient pathways to ultracold molecule formation with these species.

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Date submitted: 13 Apr 2009 Electronic form version 1.4