Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

$^{138}Ba^{+}$ Ion-Photon Entanglement using Ultrafast Pulses CAROLYN AUCHTER, TOM NOEL, BORIS BLINOV, University of Washington — We present preliminary evidence of entanglement between the ground state of a trapped $^{138}Ba^{+}$ ion and the polarization state of the photons it spontaneously emits. The spontaneously emitted photons result from weak excitation by short ($\sim$40 ns) pulses of resonant CW laser light of the ions initially prepared in a single Zeeman ground state. This protocol is facilitated by the presence near the trap of an integrated electrode that allows ground state spin flips to be driven in under a microsecond. We also present our work toward improved entanglement fidelity by employing ultrafast pulses from a mode-locked Ti:Sapphire laser for ion excitation, with the ultimate goal of doing remote entanglement of barium ions in distant traps. Barium is a particularly good candidate for such research due to the relatively long wavelength of the transitions involved, which makes it suitable for fiber optic transmission over long distances.

Carolyn Auchter
University of Washington

Date submitted: 28 Jan 2013 Electronic form version 1.4