

Abstract Submitted  
for the DAMOP09 Meeting of  
The American Physical Society

**State Preparation for Rare-Earth Ion Based Quantum Memory**

ELIZABETH GOLDSCHMIDT, Joint Quantum Institute, SARAH BEAVAN, Australia National University, MATTHEW EISAMAN, JINGYUN FAN, Joint Quantum Institute, MICHAEL HOHENSEE, Harvard University, ZACHARY LEVINE, National Institute of Standards and Technology, LUDWIG MATHEY, SERGEY POLYAKOV, Joint Quantum Institute, ALAN MIGDALL, alan.migdall@nist.gov — We report progress in using spectral hole-burning in praseodymium doped yttrium orthosilicate to prepare an ensemble of Pr ions with a spectral distribution optimized for use in a Duan-Lukin-Cirac-Zoller-type (DLCZ) quantum-repeater scheme. We are studying the feasibility of this spectral hole-burning scheme for the DLCZ protocol and computationally optimizing parameters including the Rabi frequencies of the hole-burning fields and the pulsing parameters. We are experimentally studying the time required to reach steady state for each of the steps of the hole-burning sequence and find that this time differs for the various steps when all other parameters are kept the same. We discuss our computational and experimental progress toward implementing this state preparation scheme and our plans for further work.

Elizabeth Goldschmidt  
Joint Quantum Institute

Date submitted: 22 Jan 2009

Electronic form version 1.4