Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Unconditional polarization qubit quantum memory at room temperature[1] MEHDI NAMAZI, CONNOR KUPCHAK, BERTUS JORDAAN, REIHANEH SHAHROKHSHAHI, EDEN FIGUEROA, State Univ of NY- Stony Brook — The creation of global quantum key distribution and quantum communication networks requires multiple operational quantum memories. Achieving a considerable reduction in experimental and cost overhead in these implementations is thus a major challenge. Here we present a polarization qubit quantum memory fully-operational at 330K, an unheard frontier in the development of useful qubit quantum technology. This result is achieved through extensive study of how optical response of cold atomic medium is transformed by the motion of atoms at room temperature leading to an optimal characterization of room temperature quantum light-matter interfaces. Our quantum memory shows an average fidelity of 86.6 $\pm$ 0.6% for optical pulses containing on average 1 photon per pulse, thereby defeating any classical strategy exploiting the non-unitary character of the memory efficiency. Our system significantly decreases the technological overhead required to achieve quantum memory operation and will serve as a building block for scalable and technologically simpler many-memory quantum machines.

[1]The work was supported by the US-Navy Office of Naval Research, grant number N00141410801 and the Simons Foundation, grant number SBF241180. B. J. acknowledges financial assistance of the National Research Foundation (NRF) of South Africa.

Mehdi Namazi
State Univ of NY- Stony Brook

Date submitted: 30 Jan 2016 Electronic form version 1.4