Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Generating Entangled Spin States for Quantum Metrology by Single-Photon Detection ROBERT MCCONNELL, HAO ZHANG, Massachusetts Institute of Technology, Cambridge, MA 02139, USA, SENKA CUK, University of Belgrade, Pregrevica 118, 11080 Belgrade, Serbia, JIAZHONG HU, Massachusetts Institute of Technology, Cambridge, MA 02139, USA, MONIKA SCHLEIER-SMITH, Stanford University, Stanford, CA 94305, USA, VLADAN VULETIC, Massachusetts Institute of Technology, Cambridge, MA 02139, USA —
We present a proposal and latest experimental results on a probabilistic but heralded scheme to generate non-Gaussian entangled states of collective spin in large atomic ensembles by means of single-photon detection. One photon announces the preparation of a Dicke state, while two or more photons announce Schrödinger cat states. The entangled states thus produced allow interferometry below the Standard Quantum Limit (SQL). The method produces nearly pure states even for finite photon detection efficiency and weak atom-photon coupling. The entanglement generation can be made quasi-deterministic by means of repeated trial and feedback.

Robert McConnell
Massachusetts Institute of Technology, Cambridge, MA 02139, USA

Date submitted: 31 Jan 2014 Electronic form version 1.4