

Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Generation of mesoscopic entangled states in a cavity coupled to an atomic ensemble GOR NIKOGHOSYAN, University of Ulm, MICHAEL HARTMANN, Technische Universität München, MARTIN PLENIO, University of Ulm — The creation of mesoscopic entangled states is one of the fundamental challenges in quantum optics since they are very useful as resources for optical quantum information, quantum metrology, and super-precision lithography. In the present work (arXiv:1111.6047v1) we propose a novel system for the efficient production of optical NOON states based on the resonant interaction of a pair of quantized cavity modes with an ensemble of atoms. We show that in the strong-coupling regime the adiabatic evolution of the system tends to a limiting state that describes mesoscopic entanglement between photons and atoms which can easily be converted to a purely photonic or atomic NOON state. We also demonstrate the remarkable property that the efficiency of our scheme increases exponentially well with the cavity cooperativity factor, which gives efficient access to high number NOON states. The experimental feasibility of the scheme is discussed and its efficiency is demonstrated numerically.

Gor Nikoghosyan
University of Ulm

Date submitted: 31 Jan 2012

Electronic form version 1.4