

Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Bose-Einstein Condensation of Dark-State Polaritons MICHAEL FLEISCHHAUER, Technische Universitaet Kaiserslautern, JOHANNES OTTERBACH, RAZMIK UNANYAN — We propose and theoretically analyse a mechanism for Bose-Einstein condensation of stationary dark-state polaritons (DSP) [1]. DSP's are quasi-particle arising in the Raman interaction of light with three-level Λ -type systems. They are the basis of such phenomena as ultra-slow and stationary light. In contrast to exciton-polaritons, for which condensation has recently been observed [2], they have a long intrinsic lifetime, can be created with a three-dimensional quadratic dispersion profile, thus alleviating the need of resonators, and have a dynamically variable effective mass. Due to the very small effective mass the condensation temperature can be several orders of magnitude larger than that of atomic vapors. We introduce stationary dark-state polaritons, propose methods for their incoherent generation, and analyze their thermalization. Finally potential methods for an experimental verification of condensation will be discussed.

- [1] M. Fleischhauer and M.D. Lukin, PRL **84**, 5094 (2000);
F. Zimmer *et al.* arXiv:0712.0060
- [2] J. Kasprzak *et al.* Nature **443**, 409 (2006)

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Date submitted: 01 Feb 2008

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