Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Polaritons in Organic Microcavities: The Effect of Phonons on the Dicke Model JUSTYNA CWIK, JONATHAN KEELING, University of St Andrews — We study the effect of vibrational excitations on the condensation of polaritons. Recently, a lot of attention has been focused on microcavities based on organic semiconducting materials since, unlike their inorganic counterpart, they provide a suitable environment for the formation of a room temperature Bose-Einstein condensate. In order to model such materials we add terms to the usual Dicke Hamiltonian to account for the coupling of each two-level system to vibrational excitations (phonons). A mean field treatment, at zero temperature, gives us insights into the phase diagram of the Hamiltonian. In particular, we discuss the origin of the first order phase transition between two superradiant states which occurs as the coupling between the phonons and two-level systems is varied. An extension of the mean field treatment leads to the discussion of the equilibrium luminescence spectrum in the presence of phonons. We also present the way in which these results are modified at finite temperature.

Justyna Cwik
University of St Andrews

Date submitted: 06 Nov 2012 Electronic form version 1.4