Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

The parametric oscillation threshold of semiconductor microcavities[1] MICHIEL WOUTERS, Universiteit Antwerpen, IACOPO CARUSOTTO, BEC-CNR and Dipartimento di Fisica, Universita di Trento — Since its first experimental observation a few years ago, triply resonant optical parametric oscillation (OPO) in continuously pumped semiconductor microcavities in the strong coupling regime has attracted a lot of attention not only in view of applications to integrated nonlinear optics devices, but also from the point of view of fundamental physics. A most important property is in both cases the behaviour of the OPO around the threshold: because of the third-order nature of the excitonic nonlinearity, a much richer variety of behaviours can be observed as a consequence of the interplay of parametric oscillation and optical bistability effects. In the present talk, we classify the different behaviours in terms of the continuous or discontinuous switching to the OPO state, akin to respectively a second or a first order phase transition, and we characterize the properties of the quantum fluctuations as the threshold is approached as a function of the pump, signal and idler frequencies.

[1]M.W. is financially supported by the FWO Vlaanderen

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Date submitted: 20 Nov 2006 Electronic form version 1.4