APSA Advanced Photon Science Alliance 先端光量子科学アライアンス 談話会

UT-PSC Photon Science Center of the University of Tokyo 光量子科学研究センター セミナー

東京大学 G-COE プログラム－未来を拓く物理科学結集教育研究拠点－

G-COE Seminar

Nonequilibrium Phase Transitions of 2D Polaritons in Planar Semiconductor Microcavities

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日 時 ： 平成 21 年 11 月 17 日(火) 13:30-14:30

場 所 ： 東京大学工学部8号館 314A 輪講室

Abstract

Many intriguing nonlinear effects have been observed recently in semiconductor microcavities[1-6]. The fundamental physics of many-body bosonic systems together with possibility of practical applications attract a growing interest to this field. In this talk I plan to discuss threshold-like renormalizations of polariton luminescence diagram[6-8].

For the case of pump frequency slightly above the lower polariton (LP) resonance, strong positive feedback between the driven polariton mode and the scattered 'signal' appears as soon as the pump intensity reaches the threshold of instability. Consequently, the polariton system enters the regime of blow-up, with an eventual formation of macroscopically coherent state of the nonlinear polariton system[9]. Collective effects manifest themselves, for example, in a pronounced hysteresis in the driven LP mode population drawn as a function of pump. This effect has been recently observed experimentally[10] in the population kinetics of pumped and scattered lower polaritons under a nano-second-long pulsed resonant excitation.

The multistability of coherent cavity-polariton field for a given external cw-pump has been recently predicted[11]. A very interesting situation may happen in case of strictly linearly polarized pumping: on reaching the critical pump intensity, the polariton field may switch to being polarized either right- or left-circularly, with equal probabilities. I plan to compare these predictions with the recent experimental results.

References

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