

Lasing and Polariton Condensation

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Abstract

Research on polaritons in semiconductor microcavities have shown that polaritons undergo spontaneous coherence. Evidence include both real-space and momentum-space narrowing, first-order coherence, and onset of linear polarization above a particle density threshold. For polaritons in a potential trap, we find two distinct transitions that are qualitatively different at various densities. At low density in the trap, the polaritons remain in the strong coupling regime while going through the threshold for the onset of coherence. At higher density, there is a different threshold behavior which occurs at weak coupling, with or without the trap. The transition at lower density can therefore be identified as Bose-Einstein condensation while the transition at higher density can be identified with ordinary photon lasing.