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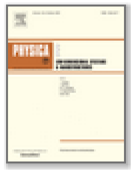

Induced coherent macroscopic states of excitons and biexcitons in a microcavity-embedded $Zn_{1-x}Cd_xSe$-type quantum well

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Abstract

The conditions of induced and spontaneous Kosterlitz–Thouless-type Bose–Einstein condensation (BEC) of excitons and biexcitons in a microcavity-embedded quantum well are discussed. As an example the $Zn_{1-x}Cd_xSe/ZnSe$ quantum well is considered, where the HH-exciton electronic structure consisting of four types of excitons – $E(x)$, $E(y)$, A_1, A_2 is taken into account. A polarized strong pump pulse with the frequency in the polariton region induces the BEC of polaritons and biexcitons. The biexciton is formed from the above-mentioned four types of excitons. The coherent polariton and biexciton concentration were obtained. It was proved that if the cavity photon mode $E_{ph}(0)$ is below the exciton resonance $E_{ex}(0)$, the biexciton is always polarized. If $E_{ph}(0)>Eex(0)$ and the pump frequency is in the electron–hole transition region, optical nonactive A_1, A_2 HH-excitons can be accumulated and spontaneous Kosterlitz–Thouless-type BEC of biexcitons and "dark" excitons can occur.