PHENOMENOLOGICAL THEORY OF AN EXCITON CONDENSATION IN CRYSTALS OF DIFFERENT DIMENSIONS

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S u m m a r y

The density distribution function and the structure factor for the exciton condensed phase in 1D, 2D, and 3D systems are founded as functions of the exciton pumping, exciton lifetime, exciton-exciton annihilation rate, fluctuations of the exciton density, and other system-dependent parameters. It is shown that, at a small exciton lifetime, the condensed phase does not appear even at large exciton densities because the system is a nonequilibrium one. It is shown that the effect of a finite value of the exciton lifetime may be important in the 2D case due to a super-radiant decay of excitons in low-dimensional structures. The Fourier transform of the density-density correlation function (structure factor) has a sharp maximum at a some value of the wave vector, which evidences for a strong spatial correlation in the system. In 2D case, the light scattering by a crystal with the condensed phase will be observed in the form of a concentric circle. The study of this scattering by a 2D crystal with the exciton condensed phase may be a powerful method of obtaining an information about the condensed phase.