

FORMATION OF THE EXCITON CONDENSED
PHASES IN DOUBLE QUANTUM WELLS
IN THE PRESENCE OF EXTERNAL
HARMONIC POTENTIAL

*V.I. Sugakov*¹, *V.V. Tomylko*², *A.A. Chernyuk*¹

¹Institute for Nuclear Research,
Nat. Acad. of Sci. of Ukraine
(47, *Prosp. Nauky, Kyiv 03680, Ukraine*),

²Taras Shevchenko National University of Kyiv
(2, *Prosp. Academician Glushkov, Kyiv 03022, Ukraine*)

S u m m a r y

The properties of structures of the spatial distribution of indirect excitons in semiconductor double quantum wells in the presence of an external harmonic potential for excitons are investigated. The calculations indicate that if the radiation density exceeds some threshold value, the structures of the exciton density distribution appear. The appearance of islands is explained by the existence of the exciton condensed phase and the non-equilibrium state of the system due to the finite lifetime of excitons and the presence of a pumping. As the pumping increases, the distribution of excitons acquires the form of concentric rings which are divided into separate islands of the exciton condensed phase, and then the structure transforms into continuous rings. At the further increase in the intensity of the external excitation, the condensed phase with inclusions of the gaseous phase islands (antiislands) emerges. It is shown that enlarging the depth of the potential trap allows one to observe the exciton condensation at lower intensities of the pumping. The dependence of the structures on the depth and the radius of the potential and on the pumping intensity is found.