

## Nanooptics and photonics

### Generation of pulses of excitonic condensed phase in coupled quantum wells at steady pumping

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A high density system of indirect excitons in a double quantum well heterostructure becomes unstable in a certain range of pumping with respect to the creation of islands of the condensed phase. It is shown that such islands may move if driven by an external potential.[1,2] This report proposes an idea of a generator of traveling pulses of the excitonic condensed phase functioning at steady pumping. [3]

Detailed analysis of the studied system revealed that there exists a region of the average exciton density where both the uniform exciton distribution and the separate islands could be stable at a steady pumping. This fact opens a possibility of a design in which pulses of brightly luminescent islands would be periodically generated traveling through the space.

The setup of the proposed generator includes a narrow highly illuminated region and the broad moderately illuminated region that supports the propagation of islands of the condensed phase. Simulation predicts that despite of the steady pumping, islands are formed periodically in time at the boundary of these regions and move due to the external potential bias. The calculations are based on the model of high density excitonic systems approbated by explanation of multiple experiments.

The generation of pulses occurs if both the uniform and the non-uniform solutions for the exciton density exist in the propagation region. The range of the pumping intensity and the threshold for the potential bias for the generation are determined.

1. *V.I. Sugakov* Ordered structures of exciton condensed phases in the presence of an inhomogeneous potential // Journ. of Phys.: Cond. Mat.-2009.-**21**.-27.-275803.
2. *O. Dmytruk and V. Sugakov* Movement and amplification of exciton condensed phase pulses and interaction between pulses in semiconductor quantum wells // Phys. Let A.-2012.-**376**.-44.-2804 – 2807.
3. *Vitaliy Mykhaylovskyy, Volodymyr Sugakov, Igor Goliney* Excitation of pulses of excitonic condensed phase at steady pumping," *J. Nanophoton.*-2016.- **10**.-3.- 033504