

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Stepan Baryshev

PhD Program: Physics

Title of Thesis: Photon correlations of optically trapped polariton condensate

Supervisor: Professor Pavlos Lagoudakis

Co-supervisor: Dr. Anton Zasedatelev

Name of the Reviewer: Professor Nikolay A. Gippius

I confirm the absence of any conflict of interest

(Alternatively, Reviewer can formulate a possible conflict)

Date: 25-10-2022

The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.
- The relevance of the topic of dissertation work to its actual content
- The relevance of the methods used in the dissertation
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
- The relevance of the obtained results to applications (if applicable)
- The quality of publications

The summary of issues to be addressed before/during the thesis defense

Thesis consists of the Introduction, the four Chapters, Summary and Bibliography containing 196 references. It is well structured and illustrated. Chapter 2 is devoted to PL spectra of gold-stabilized carbon chains, the exciton and trion transitions based on the edge electronic states in the chains are discussed. The rest of the thesis discuss the statistical properties of the PL of localized condensates of cavity polaritons. The title of dissertation work is relevant of to its actual content.

The methods used in the dissertation are discussed in each chapter and they are relevant to thesis topic. Methods used to obtain reported results are modern and are directly related to the tasks of the thesis. They are presented with appropriate details in the text of dissertation.

The scientific significance of the results obtained and their compliance with the international level and current state of the art is proved by the publications in high rank journals (Phys.Rev.Lett., Phys. Rev.Applied, Nano Letters,...)

The large part of the thesis is devoted to the investigation of photon statistical properties (the Hong-Ou-Mandel effect) in optically trapped polariton condensates. The magnitude of the HOM effect was shown to depend on the polarization of the condensate.

The results underlying this dissertation are published in high-impact journals directly related to the field of research.

To summarize, this a solid work and I recommend this thesis to the defense.

Provisional Recommendation

I recommend that the candidate should defend the thesis by means of a formal thesis defense

I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report

The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense