

## Jury Member Report – Doctor of Philosophy thesis.

**Name of Candidate:** Timur Yagafarov

**PhD Program:** Physics

**Title of Thesis:** Polariton lasing in a dye-filled organic microcavities

**Supervisor:** Prof. Pavlos Lagoudakis

**Date of Thesis Defense:** 8 November 2019

**Name of the Reviewer:** Nikolay A. Gippius

I confirm the absence of any conflict of interest

(Alternatively, Reviewer can formulate a possible conflict)

**Signature:**



**Date: 08-10-2019**

*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

The Doctoral Thesis by Timur Yagafarov is devoted to the investigation of polariton lasing from strongly-coupled organic-based microcavities at room temperature. The topic of the dissertation corresponds to the content of the thesis and are centered on the unique results obtained on the broad lasing tuneability and origin of the blue-shifts in fluorescent dye-filled microcavities. The present state of room-temperature polaritonics is not applicable for the construction of the devices so far, but the results of the presented investigations are important steps towards the future development of organic polaritonics. The physics of the blue-shift phenomena has been addressed both experimentally and theoretically. The measured polarization dependent blue-shift was compared with the suggested model, that can be applied for different organic systems. All results presented in a structured way with detailed considerations on the appropriate methods.

It is worth noting that organic polaritonics area is rapidly developing last decade which can be seen from the reference list, that is why the obtained results are significant for the international science level, and the author's contribution is valuable. The publications in the well-rated journals also justify high quality of the research.

I do not have major remarks concerning the thesis. I have noted that the detuning  $\delta$  and Rabi splitting  $\hbar\Omega_0$  sometime are shown in different units (eV and meV, e.g. in Fig.4.9). I suggest to use the same units for them everywhere (e.g. meV).

#### 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*