

## Jury Member Report – Doctor of Philosophy thesis.

**Name of Candidate:** Anton Baranikov


**PhD Program:** Physics

**Title of Thesis:** Dynamic polariton condensation in organic microcavities

**Supervisor:** Prof. Pavlos Lagoudakis

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

**Name of the Reviewer:** Luis Viña

<p>I confirm the absence of any conflict of interest</p> <p>(Alternatively, Reviewer can formulate a possible conflict)</p>	<p><b>Signature:</b></p>  <p><b>Date: 29-09-2019</b></p>
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*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 thesis is very well organized in six Chapters that include: an introduction, a general discussion on polaritons with especial attention to their strong coupling and condensation and a review of the similarities and differences in inorganic vs. organic materials, the novel results on vibron-mediated polariton condensation under quasi-resonant excitation, the demonstration of a polariton amplifier in organic microcavities, followed by the demonstration of all-optical polariton devices in organic materials and a summary together with an outlook. The manuscript is well written, with an appropriate introduction and review of the state of the art. The topic is interesting and timely since the community is looking for alternatives to obtain low-cost, high-efficiency alternatives to present lasers. The student employs the adequate experimental techniques and methods to investigate and demonstrate the polariton condensation and amplification together with the achievement of all-optical devices. The results are competitive and relevant at international level, as can be inferred also from the publications derived from this thesis work. The way of possible applications of organics lasers based on microcavities is also somehow further facilitated thanks to the results of this work. So far, the results have been published in high quality international physics journals, such as "*Nature Photonics*" and "*Polyhedron*".

#### 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*