

Thesis Changes Log

Name of Candidate: Anton Baranikov

PhD Program: Physics

Title of Thesis: Dynamic polariton condensation in organic microcavities

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Chair of PhD defense Jury: Prof. Nikolay Gippius

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Date of Thesis Defense: 08 November 2019

The thesis document includes the following changes in answer to the external review process.

Dear Jury Members,

I am grateful for your helpful suggestions and comments. Here I provide the answers and the thesis modifications.

Reviewer: Prof. Simone De Liberato

1) *Page 8: RWA should go to the line*

Answer: Corrected

2) *Page 33: The definition of RWA is wrong here. Such an approximation has nothing to do with the detuning but with the strength of the coupling. It is effectively a lowest order perturbation in the strength of the coupling.*

Answer: Indeed, this is true. The following text was added in the manuscript: Under RWA, we drop the Hamiltonian terms containing $\omega_{\text{cav}} + \omega_{\text{exc}}$, since their contribution in the second perturbation theory is negligible ($\sim \frac{\Gamma^2}{\omega_{\text{exc}/\text{cav}}}$). Here we assume that $\Gamma \ll \omega_{\text{exc}/\text{cav}}$, which is typical for organic polariton structures.

Reviewer: Prof. Luis Vina

3) *Ref 3 should be completed quoting also "STIMULATED EMISSION OF RADIATION FROM GaAs p-n JUNCTIONS", Appl. Phys. Lett. 1, 62 (1962); Marshall I. Nathan, William P. Dumke, Gerald Burns, Frederick H. Dill Jr., and Gordon Lasher*

Answer: Corrected.

4) *In page 20, "Indeed, weak bounding energy of elementary..." should read "Indeed, weak*

binding energy of elementary..."

Answer: Corrected.

- 5) *In page 57, "Following the idea of "quasi-resonant" excitation stated in the introduction, we choose the strongest vibronic resonance (~ 200 meV)..." , but in Fig. 3.2(c) two transitions are identified, please, clarify that both V2 and V3 are involved in this process*

Answer: Corrected.

- 6) *Caption of Fig. 4.2: "(b) Energy and momentum resolve emission....", should read "(b) Energy and momentum resolved emission..."*

Answer: Corrected.

- 7) *Fig. 4.8 (b), make clear that the scales for the blue and red curves are not the same, i.e, indicate the adequate scales.*

Answer: The scales for the blue and red curves are the same. For the better comparison between the pure and amplified signals in the reflection configuration, the logarithmic scale is chosen. In order not to saturate the spectrometer, the amplified signal is reduced by a neutral density (ND) filter and the result data (red curve) is multiplied by an appropriate number (corresponding to the ND filter).

- 8) *Fig. 5.3: the d is missing in the last section of the figure (the four pictures in the right low corner)*

Answer: Corrected.

- 9) *When discussing the AND device a reference to the previous work of and AND device with polariton condensates should be given, namely: "Quantum reflections and shunting of polariton condensate wave trains: Implementation of a logic AND gate", Phys. Rev. B 88, 245307 (2013), C. Anton, T. C. H. Liew, J. Cuadra, M. D. Martin, P. S. Eldridge, Z. Hatzopoulos, G. Stavriniadis, P. G. Savvidis and L. Vina*

Answer: Corrected, see page 78.

- 10) *A quote to the work of Hopfield, "Theory of the Contribution of Excitons to the Complex Dielectric Constant of Crystals", Phys. Rev. 112, 1555 (1958), should be given.*

Answer: Corrected, see page 20.

- 11) *General comment: In all figures where is used a false-colour-scale the numerical limits of the scale should be given, in some cases nothing is mentioned and in other is even not adequate to use "Min" and "Max", those values should be given.*

Answer: In the most cases, colour-scale plots are normalized since there is no need to compare them with other ones. The appropriate indication was added in the figure captions. Max and min values were added where necessary,