



SFB/TRR 21 - Seminar

14. December 2015, Stuttgart

Rainer Mahrt

(IBM Research - Zurich Research Laboratory)

Polariton Condensation in a Polymer: Towards Quantum Simulation

Johannes Plumhof¹, Lijian Mai¹, Darius Urbonas¹, Fabio Scafirimuto¹, Thilo Stöferle¹, Ullrich Scherf² and Rainer F. Mahrt¹

¹IBM Research Zurich, Säumerstrasse 4, CH-8803 Rüschlikon, Switzerland ²Bergische Universität Wuppertal, Fachgebiet Makromolekulare Chemie, Gaußstraße 20, 42119 Wuppertal, Germany

During recent years polaritonics has emerged as a new field of solid-state physics based on the unique quantum properties of mixed light-matter quasiparticles, so called exciton-polaritons. Recent discoveries of Bose-Einstein condensation (BEC) and superfluidity provide opportunities to harness these coherent quantum effects in a new generation of opto-electronic devices. Until now, BECs have been realized either with laser-cooled gases at nano-Kelvin temperatures or with high-quality semiconductor crystals produced by only a few laboratories worldwide. By utilizing the extremely large oscillator strength, exciton binding energy and saturation density of organic semiconductors we demonstrate BEC at room temperature with an amorphous spin-coated polymer film embedded in a Fabry-Pérot microcavity. Since no crystal growth is involved, our approach radically reduces the complexity of experiments to investigate BEC physics and paves the way for a new generation of opto-electronic devices, taking advantage of the processibility and flexibility of polymers. Furthermore, experiments on cavities with sub-micron sized defects and possible ways towards quantum simulation will be discussed.

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Universität Stuttgart, NWZII, Raum 4.342
Pfaffenwaldring 57, 70569 Stuttgart

