Seminarankündigung

Dienstag, 27. November 2018
17:15 Uhr

WSI, Seminarraum S 101

"Cavity polaritons with atomically thin crystals"

Condensation of bosons into a macroscopic quantum state belongs to the most intriguing phenomena in nature, which became accessible in open-dissipative, exciton-based solid-state systems at elevated temperatures. Semiconducting monolayer crystals have emerged as a new platform for studies of strongly bound excitons and exciton-polaritons [1] in ultimately thin materials. We discuss the formation of a bosonic condensate driven by excitons hosted in an atomically thin layer of $MoSe_2$, strongly coupled to light in a solid-state resonator [2]. Polariton condensation manifests by a superlinear increase of emission intensity from the hybrid polaritons. The mode experiences a collapse of the emission linewidth, a core sign of temporal coherence. With increasing pump power, we observe a blueshift of our resonance which originates from particle interaction with free excitons in the uncondensed reservoir states. We observe a significant spin-polarization in the injected polariton condensate, a clear sign for valley-selective condensation in our crystal.

In turn, high fidelity spin-selective, as well as valley-coherent injection of valley exciton-polaritons is demonstrated via resonant, non-linear spectroscopy. In contrast to previous experiments based on excitons in bare $MoSe_2$ monolayer crystals, valley polarization and coherence can be retained to a very high degree the $MoSe_2$ polariton-system. As a consequence, valley selective polariton currents emerge in the expanding polariton cloud, a manifestation of the optical valley Hall effect in the hybrid light-matter system.

[1] C. Schneider et al. Nature Communications 9, 2695 (2018)
[2] M. Waldherr et al. Nature Communications 9, 3286 (2018)

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