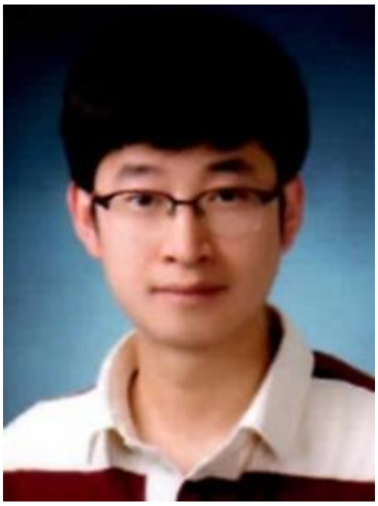
TRR 142
Tailored Nonlinear Photonics

TRR Guest Scientist Lecture / Seminar

Date/Time: Thursday, 29.11.2018 / 12:15 Uhr
Location: TU Dortmund University
Otto-Hahn-Str. 4
Room P1-02-110



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Direct transfer of light's orbital angular momentum onto non-resonantly excited polariton superfluid

Abstract:

Recently, exciton-polaritons in a semiconductor microcavity were found to condense into a coherent ground state much like a Bose-Einstein condensate and a superfluid. They have become a unique testbed for generating and manipulating quantum vortices in a driven-dissipative superfluid. Here, we generate exciton-polariton condensate with non-resonant Laguerre-Gaussian (LG) optical beam and verify the direct transfer of light's orbital angular momentum to exciton-polariton quantum fluid. Quantized vortices are found in spite of large energy relaxation involved in non-resonant pumping. We identified phase singularity, density distribution and energy eigenstates for the vortex states. Our observations confirm that non-resonant optical LG beam can be used to manipulate chirality, topological charge, and stability of non-equilibrium quantum fluid. These vortices are quite robust, only sensitive to the OAM of light and not other parameters such as energy, intensity, size or shape of the pump beam. Therefore, optical information can be transferred between photon and exciton-polariton with ease and the technique is potentially useful to form the controllable network of multiple topological charges even in the presence of spectral randomness in solid state system.

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