Séminaire exceptionnel

C2N - site de Marcoussis

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Salle R. Planel, bâtiment D1

Light matter interaction between a 2DES and a photonic cavity: quantum Hall polaritons

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Light-matter interaction has played a central role in engineering and manipulating new states of matter. For instance, reversible coupling of excitons and photons in a microcavity has been used to study condensation and superfluidity of cavity polaritons. I will present experiments on a high-mobility two-dimensional electron gas (2DEG) embedded inside a microcavity, combining the physics of correlated many-body states of a 2DEG with the methods of cavity quantum electrodynamics. Tuning the cavity into resonance with the electron gas when magnetic field Bz > 0, we exhibit strongly correlated polariton modes that show unique signatures of both integer and fractional quantum Hall effects. We demonstrate that the polarization dependent normal-mode splitting of quantum Hall polaritons provides a direct way to measure the spin-polarization of quantum Hall states, which constitutes a powerful method to complement transport spectroscopy with the advantages of a minimally invasive local probe. The system is potentially of interest for realizing strongly correlated photonic systems since it may be possible to exploit strong electron density dependence of 2DEG-polariton splitting to enhance polariton-polariton interactions.

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