densities a transition to a Bose-Einstein(BE)-like a condensate with extended temporal and spatial coherences.[1] In this talk, we review recent results on the confinement of MP and their condensates in micro-structured MCs grown by Molecular Beam Epitaxy. Micrometric static confinement potentials for MPs can be produced by structuring the thickness of the MC layers in-between growth steps. Spatially resolved photoluminescence shows confined states with discrete energy levels for MP confined in the traps. Dynamic lattices for MPs are be produced by modulating the MC using the strain field of a surface acoustic wave (SAW). A SAW propagating on the surface of an (Al,Ga)As polariton MC induces a periodic energy modulation of both the photonic and excitonic polariton components. For SAW wavelengths $<< \lambda_{dB}$, this lateral modulation forms a one-dimensional (1D) moving MP crystal with period and contrast given by the SAW period and amplitude, respectively. [2] 2D MP moving lattices can be formed by interfering two orthogonal SAW beams.[3,4] The latter are, solid-state analogs of optical lattices of cold atoms. They thus form a prototype system for the investigation of many body interactions in non-equilibrium quantum phases as well as for the implementation of functionalities for quantum information processing. [1] J. Kasprzak et al., Nature 443, 409 (2006); [2] E. A. Cerda-Méndez et al., Phys. Rev. Lett. 105, 116402 (2010), Phys. Rev. Lett. 111, 146401 (2013); [3] J. Buller et al., Phys. Rev. B94, 125432 (2016).

José Maria Villas-Bôas

Controling the exciton dynamics in single quantum-dot embeded in a cavity

The strong coupling between quantum dot (QD) and cavity has been subject of intense research in recent years. Many of these studies rely on understanding the avoided crossing seen in the emission spectral of such system, which is usually obtained by pumping the system with a laser above the band gap of the used semiconductor material or in resonance with a higher energy cavity mode. In both cases, the pumping of the cavity and/or QD is treated theoretically as an incoherent pumping [1]. In this work in investigate in more details the coherent pumping of a single QD embed in nanocavity using a external laser. We consider a continuous laser being applied in resonance with the cavity mode and a pulsed laser interacting with the QD. To model our system we use the Jaynes-Cummings model and incoherent losses were take into account by using Lindblad operators. Our results indicate that it is possible to use the continuous laser to prepare the cavity in a coherent state, and use the external laser pulses to control the population inversion of a single QD exciton [2]. The effects of exciton-cavity detuning, the laser-cavity detunings, the pulse area and losses over the QD exciton dynamics are analyzed. We also show how to use a continuous laser pumping in resonance with the cavity mode to sustain a coherent state inside the cavity, providing some protection to the exciton state against cavity loss. We acknowledge financial support of CAPES, CNPQ and FAPEMIG. [1] A. Laucht, N. Hauke, J. M. Villas-Bôas, F. Hofbauer, G. Böhm, M. Kaniber, and J. J. Finley, Phys. Rev. Lett. 103, 087405 (2009); [2] Antonio de Freitas, L. Sanz, and José M. Villas-Bôas, Phys. Rev. B 95, 115110 (2017).

Pavel Usachev

Giant Photoinduced Magnetic Polarons in Europium Chalcogenides

Optical manipulation of the magnetic state of matter is a topic of current interest from the fundamental point of view and due to its high relevance in respect to technological applications. Recently we demonstrated that the light resonant with the EuTe bandgap forms long-living spin polaron states associated with the optical excitations. Europium chalcogenides, which include EuTe, are intrinsic magnetic semiconductors. So far, they have been much less explored in respect to optical manipulation of their magnetic state. A possible reason is that they do not show a near-bandgap photolumenescense that is typical of the dilute magnetic material. Here we demonstrate a new approach to the magnetization of a medium by light irradiation. Using a two-colour pump-probe Faraday rotation technique, we demonstrate that in the EuTe at temperature 5K light generates magnetic polarons with a magnetic moment larger than 600 Bohr magnetons. This is about an order of magnitude larger than magnetic polarons arising in diluted magnetic semiconductors. Because of the giant magnetic moment of a polaron, a modest magnetic field of a few tens of mT leads to a full alignment of polarons. To determine how efficiently the light magnetizes the medium we investigate photoinduced magnetic polarons in several europium chalcogenides as a function of pump intensity and temperature. In EuSe and EuO we detected magnetic polarons with an even greater magnetic moment than in EuTe. Moreover, we prove that the density of photoinduced magnetic polarons in EuSe is much larger. The first observation of giant photoinduced magnetic polarons is extremely important not only from the fundamental point of view but also for practical applications. This work was supported by FAPESP (Project 2016/24125-5), CNPq (projects 401694/2012-7, 307400/2014-0, and 456188/ 2014-2), RFBR (project 16-02-00377) and RSF (project 17-12-01314).

Flavio C. D. Moraes

Time-Dependent Spin Precession Frequency in InGaAs/GaAs Quantum Wells with Mn Delta-Doped Heterostructures

Semiconductor spintronics may have a giant impact on the market of storage and reading devices. Nevertheless, the improvement of actual systems still requires spin injection and magnetic ordering at room temperatures. Heterostructures like (Ga,As)Mn, combining the Mn ferromagnetic properties with the well know technology of III-IV semiconductor structures, are being studied with the propose of increasing the number of spin carriers in semiconductors[1]. The initial problem of low critical temperature may have been solved with the demonstration of TC = 250 K in GaAs by growing delta-Mn-layers[2]. Furthermore, the possibility of data memory was shown in InGaAs/GaAs quantum wells (QWs) adjacent to a delta-Mn-layer, due to the wavefunction overlap of spins carrier inside the quantum well and Mn atoms[3]. Here, we studied the spin dynamics in InGaAs QWs with Mn delta-doping in the barrier grown by MOCVD. Time-resolved Kerr rotation was performed using a tunable mode-locked Ti:sapphire laser with pulse duration of 1 ps and repetition rate of 76 MHz. The time delay (Δt) between pump and probe pulses was varied by a mechanical delay line. The pump beam was circularly polarized by means of a photo-elastic modulator and the probe was linearly polarized and modulated by a chopper. The polarization rotation of the reflected probe beam was detected with a balanced bridge using coupled photodiodes. The sample was immersed in the variable temperature insert of a split-coil superconductor magnet in the Voigt geometry. We observed a time-dependent spin precession frequency for the photo-excited electrons, we associated to the dynamical alignment of the internal effective magnetic field produced by the Mn after optical excitation and successive relaxation. The strong dependence and control of the system magnetization with the experimental conditions will be presented. 1 A. Haury, et al. PRL 79, 511; 2 A. M. Nazmul et al. PRL 95, 017201; 3 M. A. G. Balanta et al. Sci. Rep 6, 24537.

Gian Salis

Control of spin precession by drift and diffusion in a 2D electron gas

Drift and diffusion of spin polarization in a semiconductor two-dimensional electron gas is strongly influenced by spin precession in the effective spin-orbit magnetic field. The non-commuting spin rotations that occur between subsequent scattering events typically lead to rapid spin dephasing, which can be lifted by engineering the spin-orbit interaction to a persistent spin helix (PSH) symmetry [1], or by laterally confining the electron gas to a length scale smaller than the spin-orbit length [2]. If the spin-orbit interaction is linear in momentum, the average precession angle only depends on the distance the electrons travel, irrespective of whether transport occurs by diffusion or by drift. We show that for cubic Dresselhaus spin-orbit interaction, drift and diffusion by same distances lead to spin