dimensional confinement of electrons, there are also important differences: QDs cannot be separated from their surrounding solid state matrix. Therefore the interaction between QDs and the light pulse is always many particle problem. Many-body interactions lead not only to the spectral excitation induced shift (EIS) and deformation of the absorption line, but also to excitation induced dephasing (EID). In our work comprehensive analysis of RO in QD is presented accounting for aforementioned effects. The bifurcation and essentially anharmonic regimes in RO in QD exposed to the monochromatic field have been predicted. The dependence of the period of RO on the QD depolarization has been revealed. The EID results in multiple frequencies in the signal spectrum and defines the switching time of the oscillation frequency.

P2.33
Low power photonic crystal all-optical switch
A Eshaghi, M M Mirsalehi, A R Attari
Ferdowsi University of Mashhad (Iran)

The required power of a nonlinear optical device is commonly too high. This is mainly due to the small values of nonlinear effects in the existing optical materials. Nonlinear effects can be enhanced in systems working with slow group velocities. Therefore, these systems have the potential of requiring less power. In this paper, using a photonic crystal (PC) coupled cavity waveguide (CCW) which supports slow light, a low power PC switch is introduced and analyzed. The proposed switch is a drop filter made of a square lattice of rods with Kerr nonlinearity. The Kerr coefficient is assumed to be $n_2 = 1.5 \times 10^{-17}\ m^2/W$ which corresponds to GaAs. The radius of the rods is $r=0.2a$, where a is the lattice constant. The CCW is created by reducing the radius of every fourth rod to $r/3$. The reduction of group velocity results in lowering the required power density to 0.9W/μm and a switching length of $20a$. This value is lower than the corresponding values reported in the literature. The switching operation is accomplished by tuning the input wave intensity. In the linear regime, where the input intensity is low and the nonlinear effects are negligible, the switch output is the upper port of the CCW drop filter. By intensifying the input wave, the refractive index increases due to the Kerr effect, hence the resonant frequency of the cavities is reduced. This results in transferring the input signal to the lower port and performing the switching operation.

P2.34
Alike, but not the same: Symmetries and many-body effects in highly charged quantum dots
M Ediger[1], G Bester[2], A Badolato[3], P Petroff[3], K Karrai[4], A Zunger[2], R E Warburton[1]
[1] Heriot-Watt University (UK)
[2] National Renewable Energy Laboratory (USA)
[3] University of California (USA)
[4] Ludwig-Maximilians-Universität (Germany)

Controlled charging of single semiconductor quantum dots with either electrons or holes is a very powerful tool to probe the energy level structure and Coulomb interactions. We have taken this experiment to a new level: we are able to control the charge on a single dot from 6 holes to 8 electrons simply with a gate voltage. We report here optical transitions from highly positively to highly negatively charged excitons in a deep confinement InAs quantum dot and interpret the spectra with an atomistic calculation.