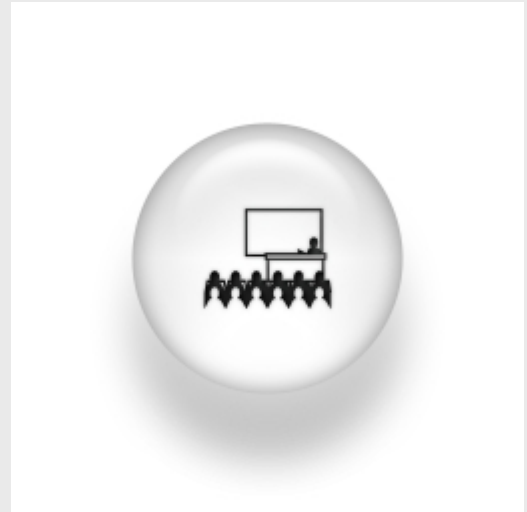


Exciton and Polariton Manipulation Within Semiconductor Microstructures

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A review is presented of the theoretical/modelling constructs as well as experimental techniques used in order to qualitatively and quantitatively describe the dynamics of the exciton and polariton within semiconductor microcavities containing an embedded quantum dot. Subsequent effects such as antibunching, controlled rotations (CROT), as well as the optical parametric amplifier (OPO) are studied. For antibunching effects we look at various pumping techniques of the system and how this will inhibit or promote single photon emission with a full quantization treatment of the field. Also within full field quantization, the spectrum of the OPO is theoretically derived and modelled to include scattering effects between all the modes of the amplifier.