TRR 142
Tailored Nonlinear Photonics

TRR Guest Scientist Lecture / Seminar

Date/Time: 04.05.2016 / 10am
Location: UPB, P8.409

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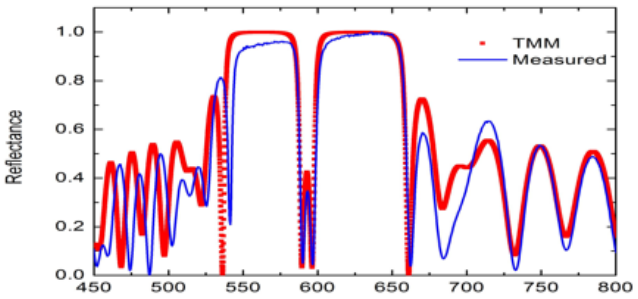
Analogs of Atomic Coherence Effects in Photonic Microstructures

Abstract:

In spite of its discovery in multilevel atoms more than two decades ago, the atomic coherence effect of Electromagnetically Induced Transparency (EIT) remains a vibrant field of study in quantum optics. Besides inducing a spectrally narrow transparency window in an otherwise opaque atomic medium, EIT is also responsible for the giant optical nonlinearities and steep dispersion, which enables ultraslow group velocities of propagation for optical pulses. In this presentation I will discuss manifestation of analogues coherence effects using photonic microstructures. In particular, I will show how coherent coupling between two co-resonant photonic microcavities may be used to achieve all-optical analogs of EIT and Electromagnetically Induced Absorption (EIA). Remarkably, the dispersive response of such coherently coupled microcavities is also similar to the dispersion of coherently driven atomic media, resulting in distortion-free slow and fast light. This represents a viable alternative as several applications based on quantum optical phenomenon of EIT and EIA may be implemented all-optically on chip-scale photonic platforms without being confronted with decoherence.



An EIT-like photonic resonance is obtained by optimizing coupling between two SiO_2 microcavities in a one-dimensional photonic crystal based on a SiO_2/Si_3N_4 Bragg reflector.¶

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