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Coherent phenomena in semiconductor microcavities[1]

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Monolithic semiconductor microcavities are platforms for understanding many-body interactions, cavity quantum electrodynamics and are analogues of ultracold atoms, giving rise to polaritonic Bose condensation. Detuning between cavity mode and exciton mode (of the quantum well absorber) varies their coupling, resulting in an avoided-crossing when in resonances. Two-dimensional coherent spectroscopy isolates photonic, excitonic, polaritonic, biexcitonic and bipolaritonic contributions, which are coherently controlled to determine their interactions and measure their dephasing times. Polarization and detuning dependences reveal uncoupled biexcitons, separate from bipolaritons. The presence of biexcitons suppresses the emission of the polaritons. Interactions between polaritons and biexcitons indicate a polaritonic Feshbach behavior.

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