

Exciton-Bloch-Equation Approach to Study the Competition Between Exciton-Exciton and Exciton-Light Interaction

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Abstract

In this contribution, we study the competition of exciton-exciton and exciton-light interaction in confined semiconductors in two different regimes: For typical field strengths in non-linear optical experiments, exciton-exciton interaction dominates the dynamics in atomically thin semiconductors, whereas exciton-light interaction is comparably more pronounced in conventional quantum well structures.

We develop an exciton-Bloch-equation approach to theoretically describe resonant and ultrafast non-linear optical phenomena such as Rabi oscillations and -splitting in an interacting exciton gas. Differences in the optical response are traced back to the different strength of many-particle exciton-biexciton transitions at different ratios of Rabi- and excitonic binding energy.