EXCITONS AND EXCITON ASSOCIATED QUASIPARICLES IN QUANTUM DOT

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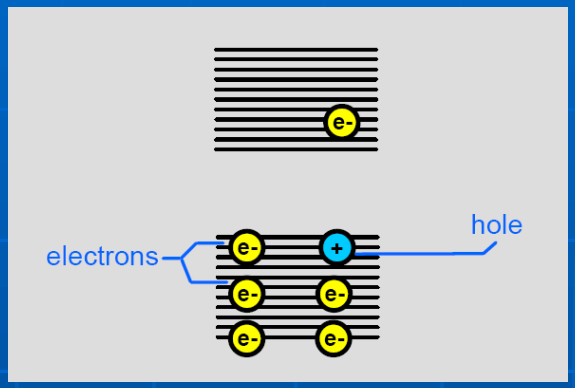
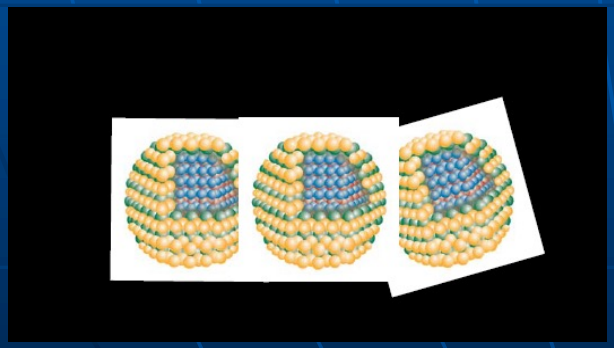
Semiconductors



Quantum Dot

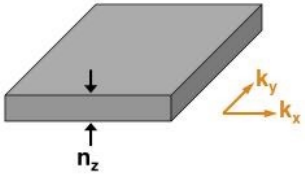


Quantum Confinement in Nanostructures

Confined in:

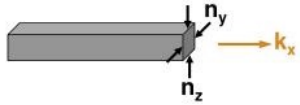
1 Direction: Quantum well (thin film)

Two-dimensional electrons



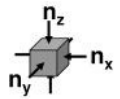
2 Directions: Quantum wire

One-dimensional electrons



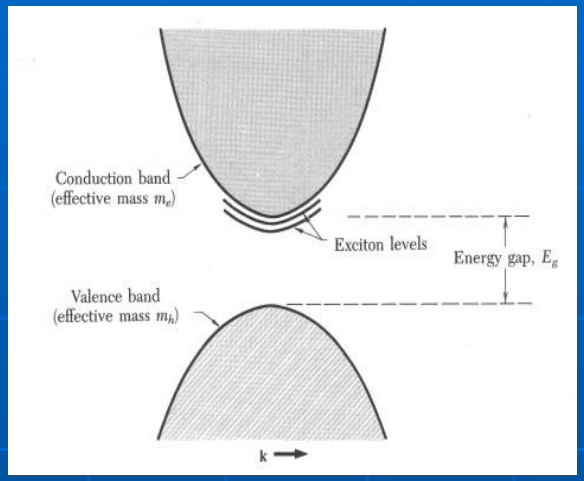
3 Directions: Quantum dot

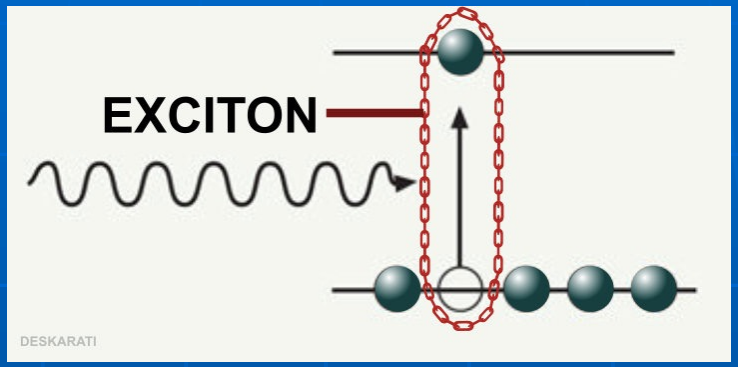
Zero-dimensional electrons

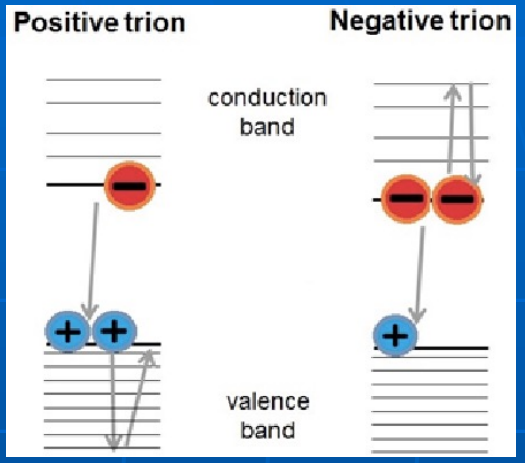


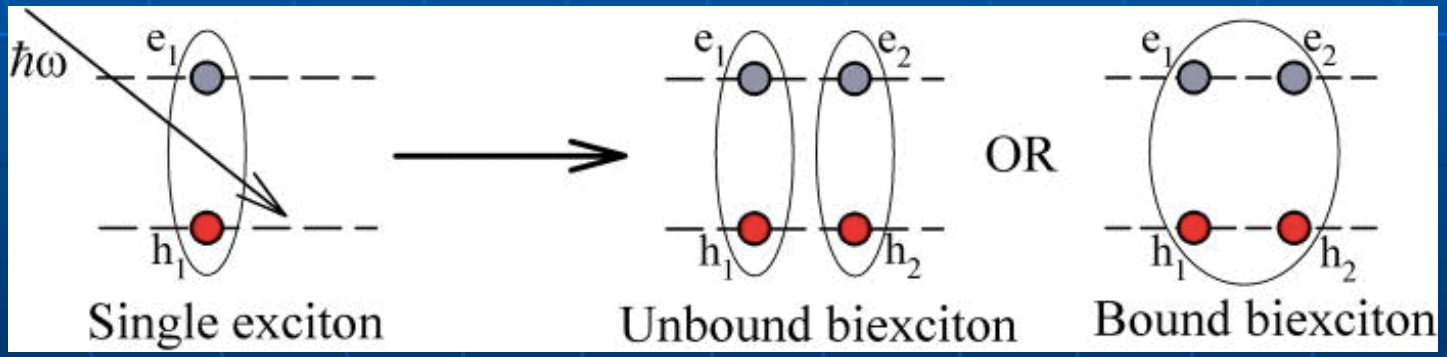
Each confinement direction converts a continuous k in a discrete quantum number n.

Excitons, Biexcitons and Trions

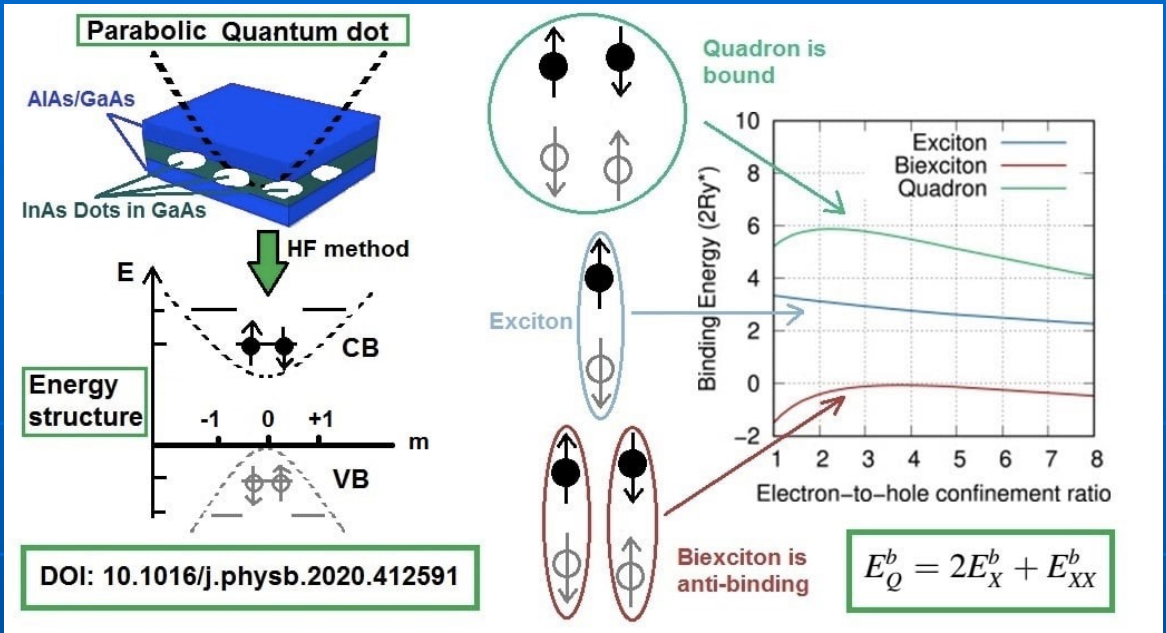








Strongly confined 2D parabolic quantum dot: Biexciton or quadron?



$$H = \sum_p \{\omega^{ex}(p) a_p^+ a_p + \omega^{\gamma}(p) b_p^+ b_p + \Gamma_p (a_p^+ b_p + b_p^+ a_p)$$

$$+ \Omega^c(p) C_p^+ C_p + \sum_{'} S(p-q) a_p^+ a_q (C_{(p-q)} + C_{-(p-q)}^+) + c.c]\}$$