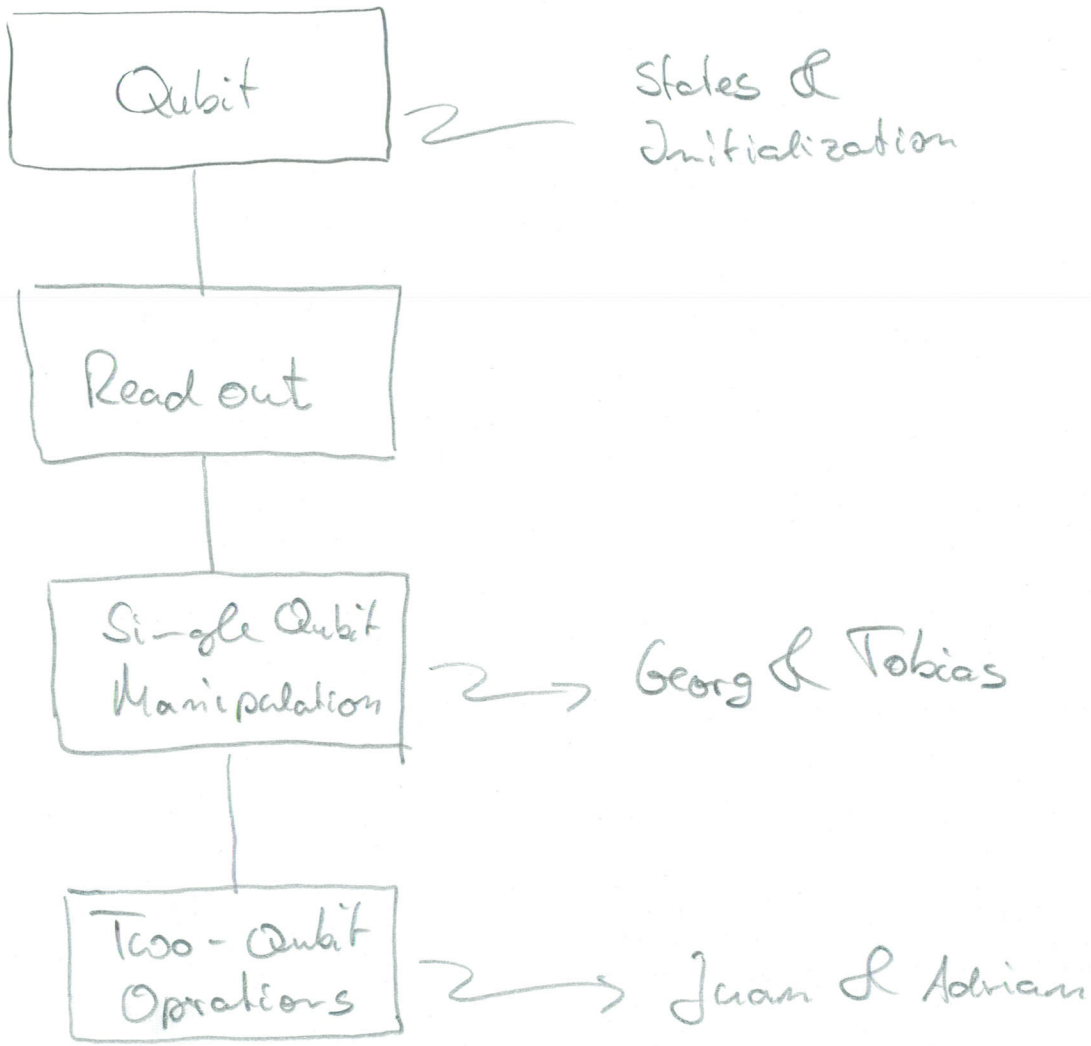
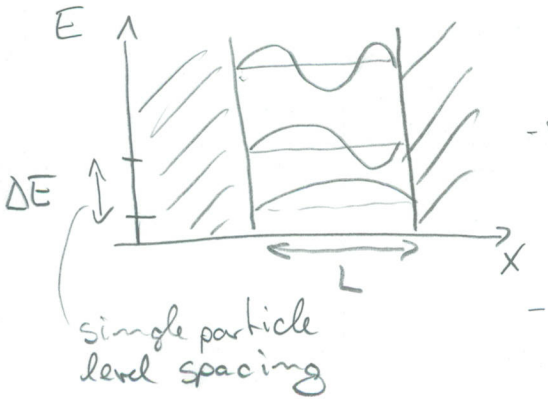
Quantum Information Processing with Quantum Dots



- charge in a 3D, 2D, or 1D potential

What determines the energy of an electron in a box (1D)?

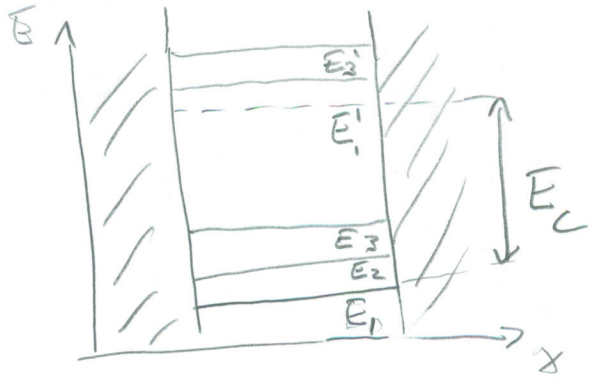


- particle in a 1D box

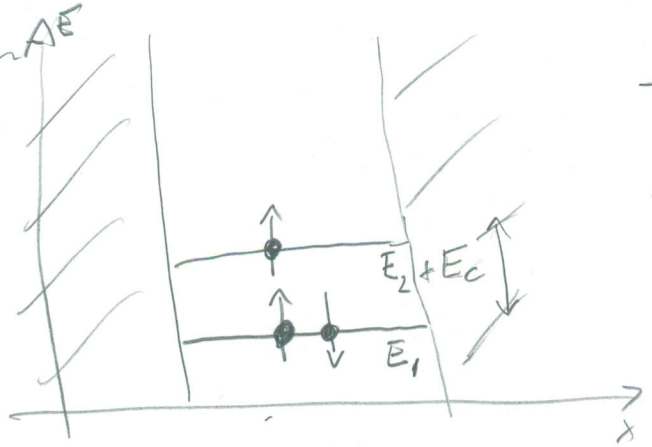
$$E_n = \frac{h^2}{8m}\frac{n^2}{L^2}$$

- shape of potential is determined by electrostatic interaction of charge with confining fields

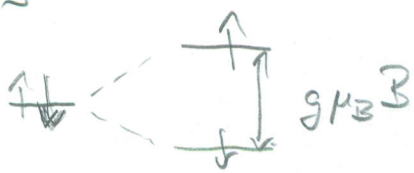
- charging energy: $E_C = \frac{q^2}{2C} > \Delta E$ for small C



- spin ΔE



- Pauli Principle
- energy difference in filling two parallel (Triplett) or two anti-parallel (Singlett) spins



Zeeman-Effect

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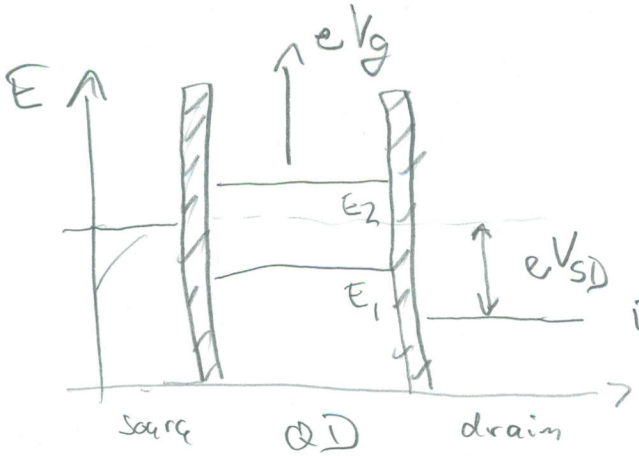
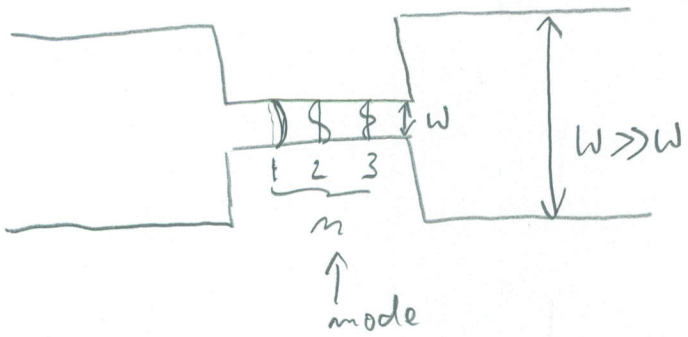


E_F: Fermi energy

Quantum Point Contact:

top view in real space



↑ mode

↳ energy of mode depends on width of channel