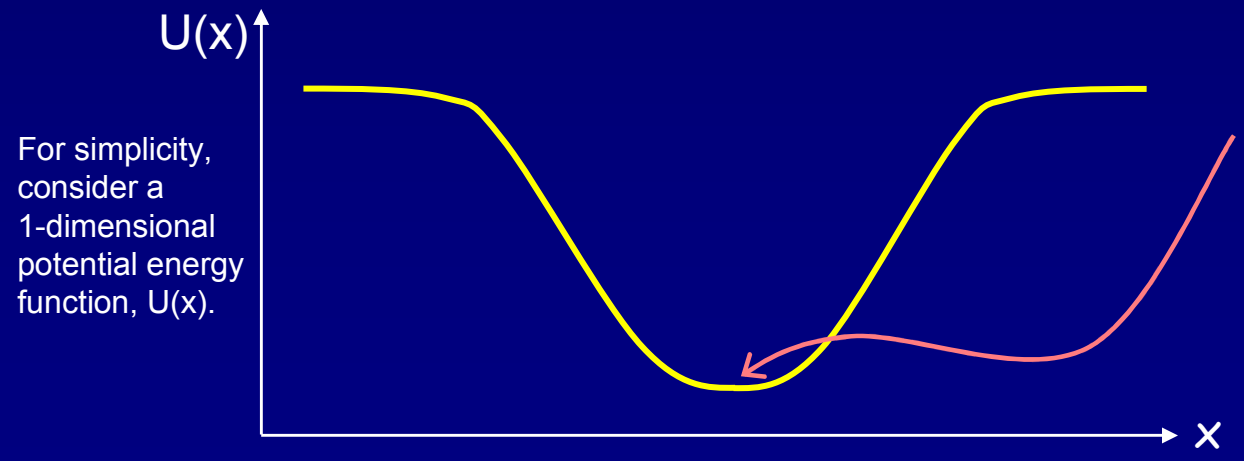
Matter Waves - Quantitative

Having established that matter acts *qualitatively* like a wave, we want to be able to make precise *quantitative* predictions, under given conditions. Usually the conditions are specified by giving a potential energy U(x,y,z) in which the particle is located.

Examples:

- Electron in the coulomb potential produced by the nucleus
- Electron in a molecule
- Electron in a solid crystal
- Electron in a nanostructure 'quantum dot'
- Proton in the nuclear potential inside the nucleus



For simplicity, consider a 1-dimensional potential energy function, U(x).

Classically, a particle in the lowest energy state would sit right at the bottom of the well. In QM this is not possible. (Why?)