

Earnshaw's theorem

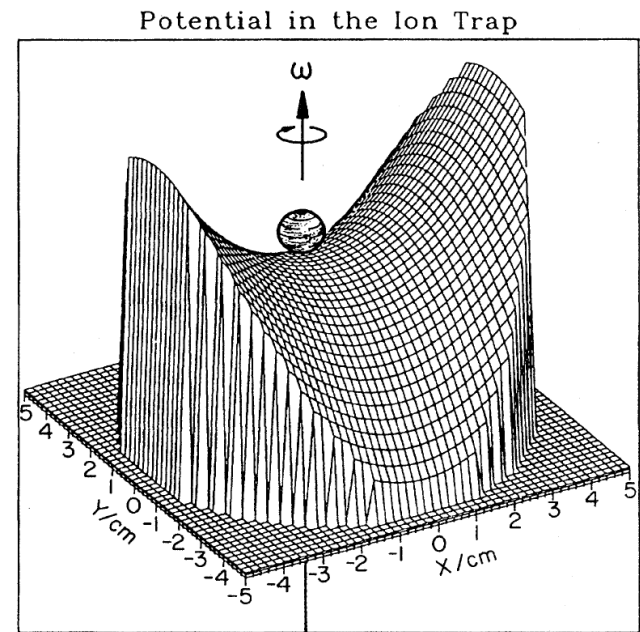
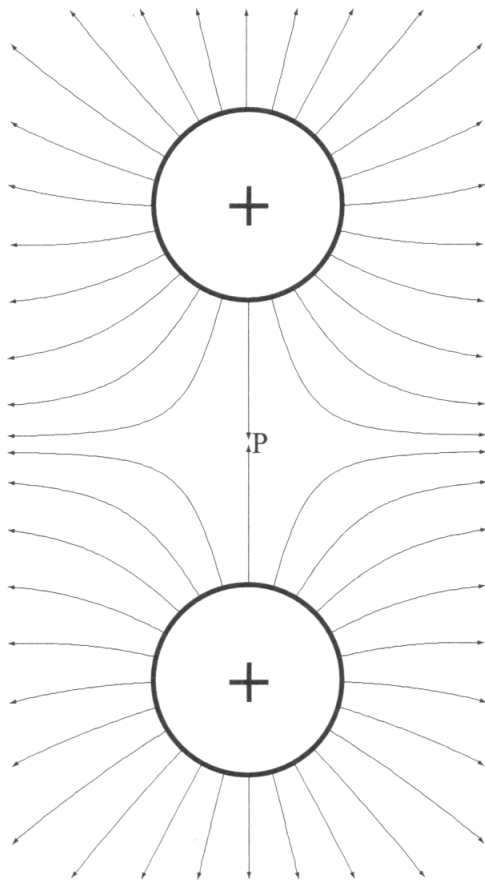
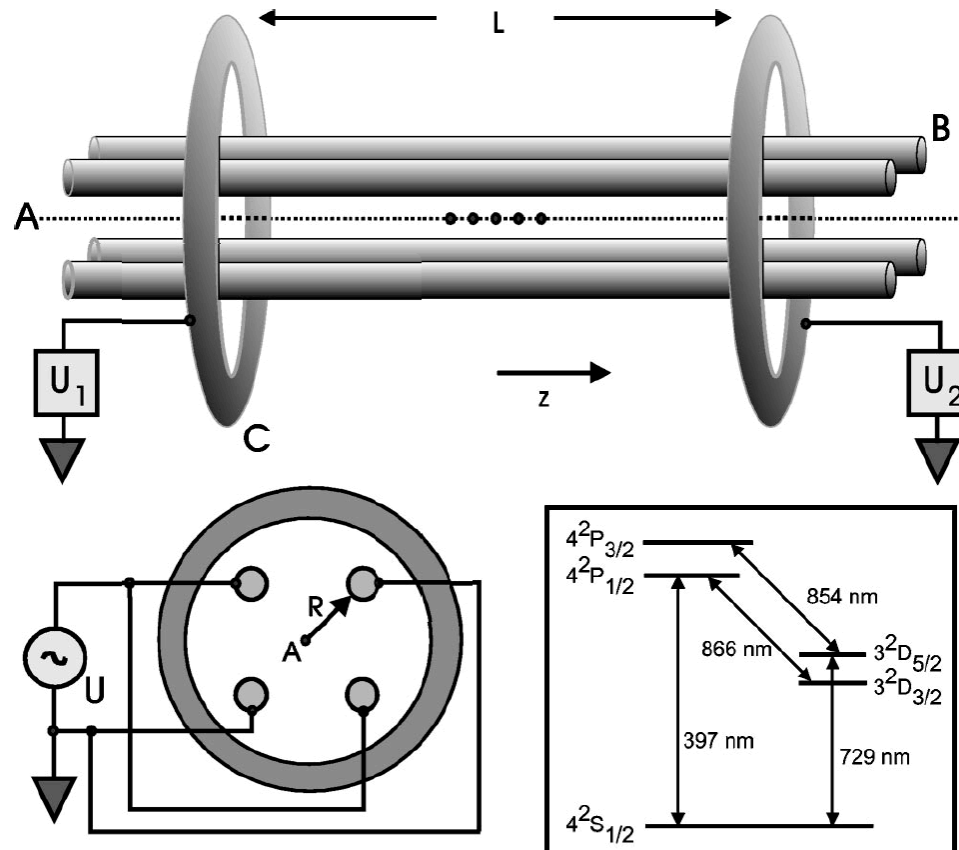


FIG. 8. Mechanical analogue model for the ion trap with steel-ball as "particle."

Ion trap for $^{40}\text{Ca}^+$ ions



$^{40}\text{Ca}^+$ ion readout

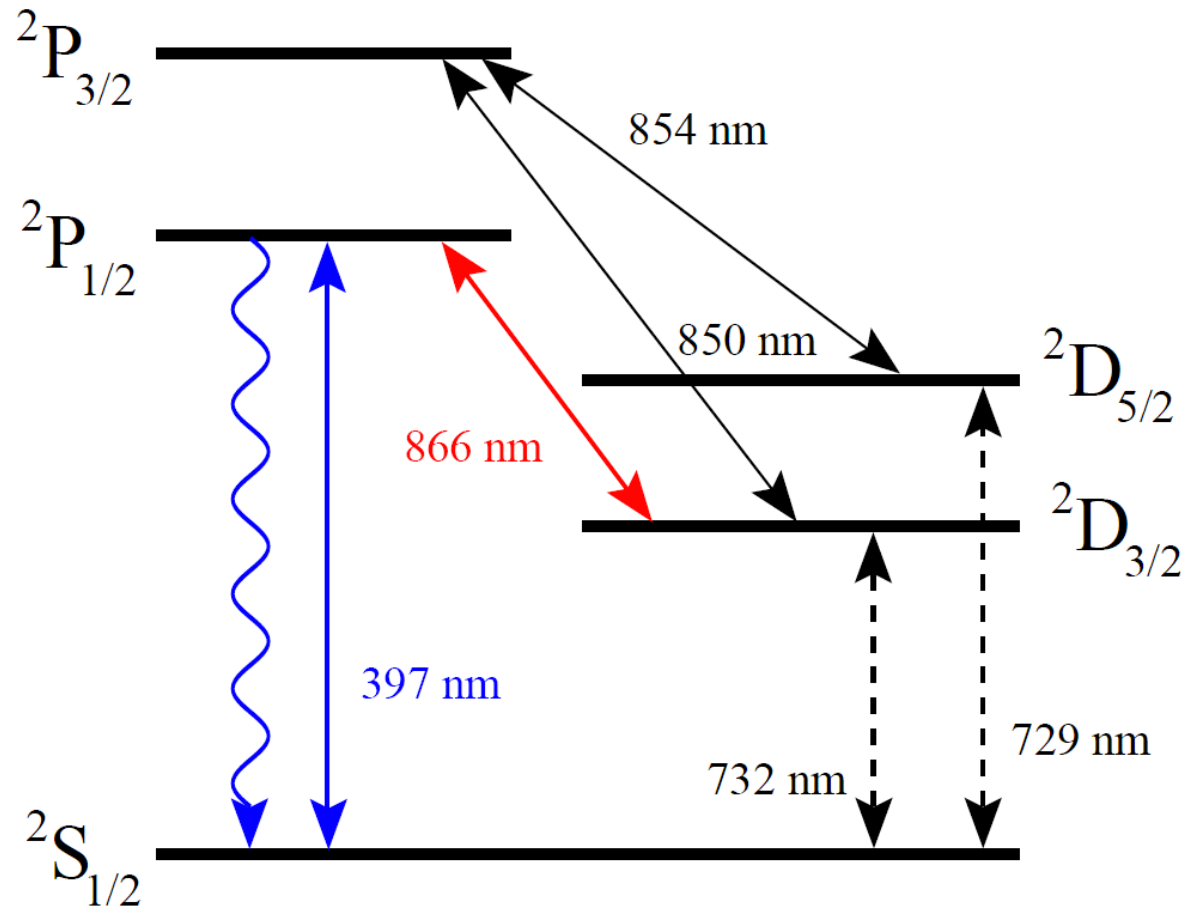
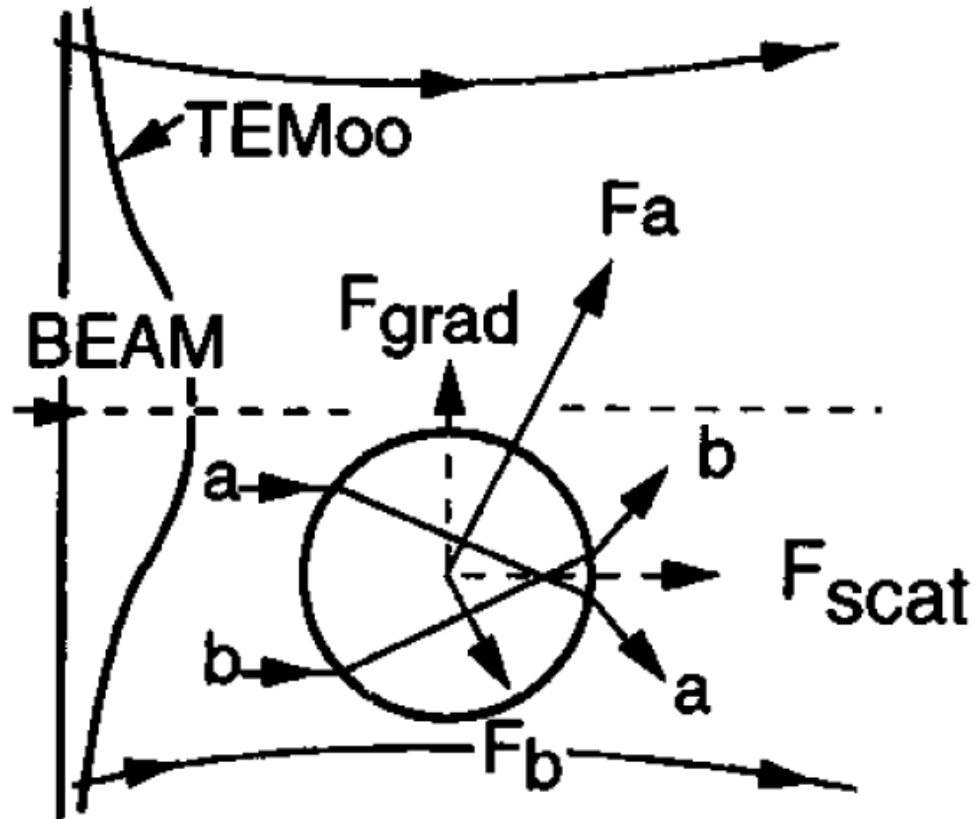
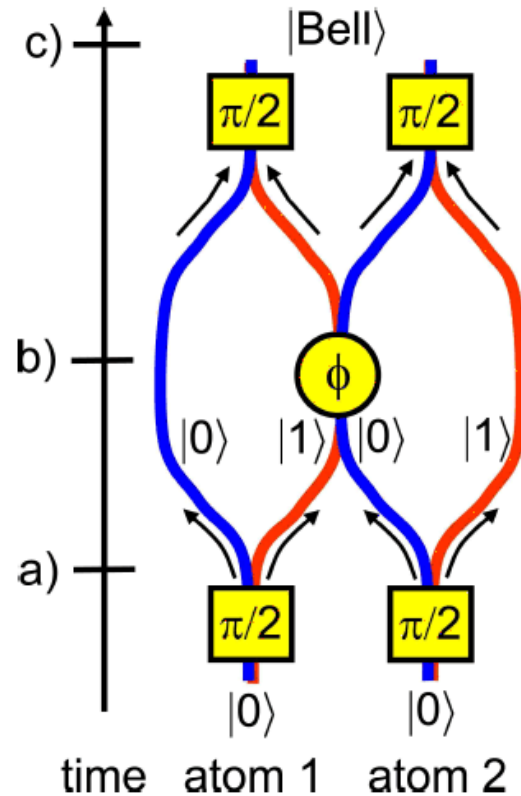
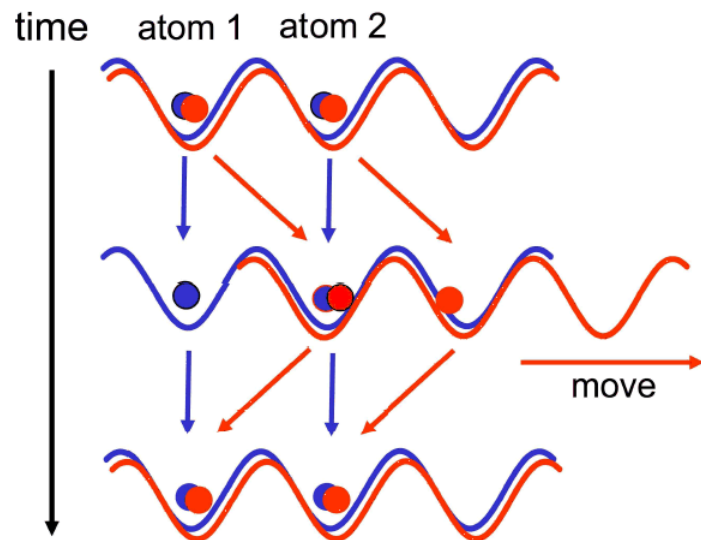


Fig. 1. Level scheme of $^{40}\text{Ca}^+$

Optical traps

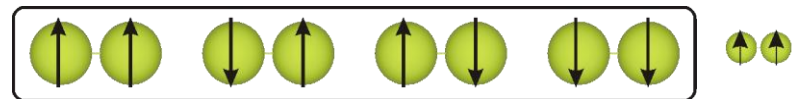
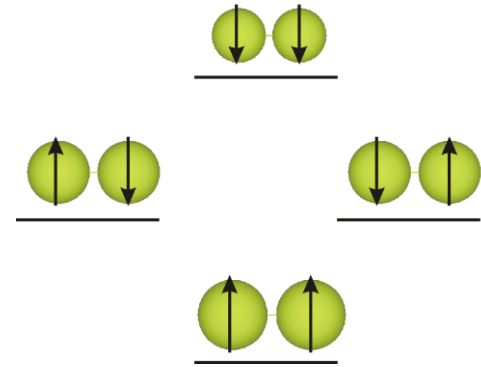


Optical lattice phase gates



Two spin system

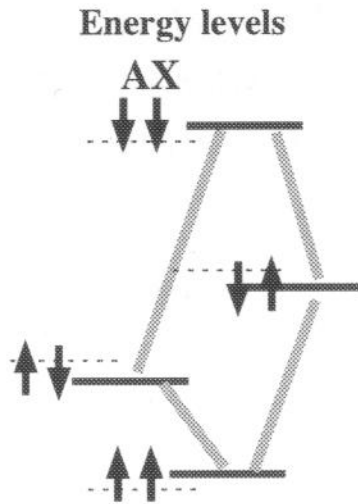
- A homonuclear system of two spin $1/2$ nuclei: four energy levels with nearly equal populations
- Equalise the populations of the upper states leaving a small excess in the lowest level



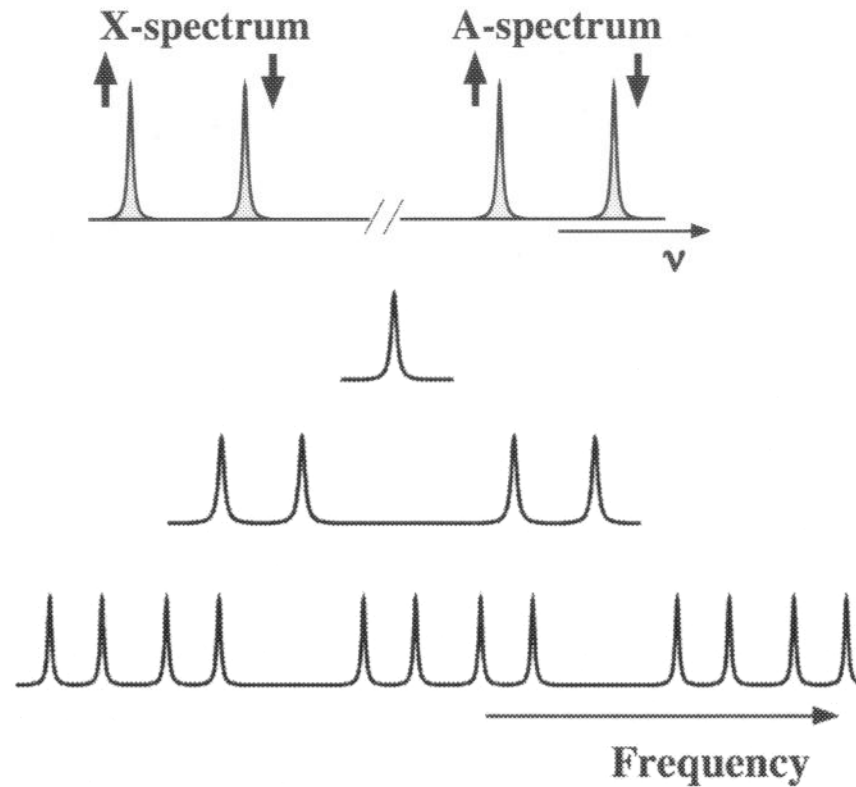
A “pseudo-pure” state

Excess population is exponentially small

NMR levels and spectra



Spectrum



1 qubit

2 qubits

3 qubits

NMR readout

