Lecture I : The two-body problem of trapped ultra-cold atoms.

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Many of the ideas and techniques developed in low-energy nuclear physics have turned out to be very useful for obtaining the spectrum of two strongly interacting atoms in a harmonic oscillator. This "universal spectrum" is obtained analytically, and compared with experimental results. The following topics (in lecture 1) will be covered:

a) The effective range expansion and the deuteron.
b) The zero-range pseudopotential.
c) Feshbach resonance and adjustable scattering length.
d) Two atoms in a shallow harmonic oscillator: the role
of the "irregular solution". Comparison with experiment.