

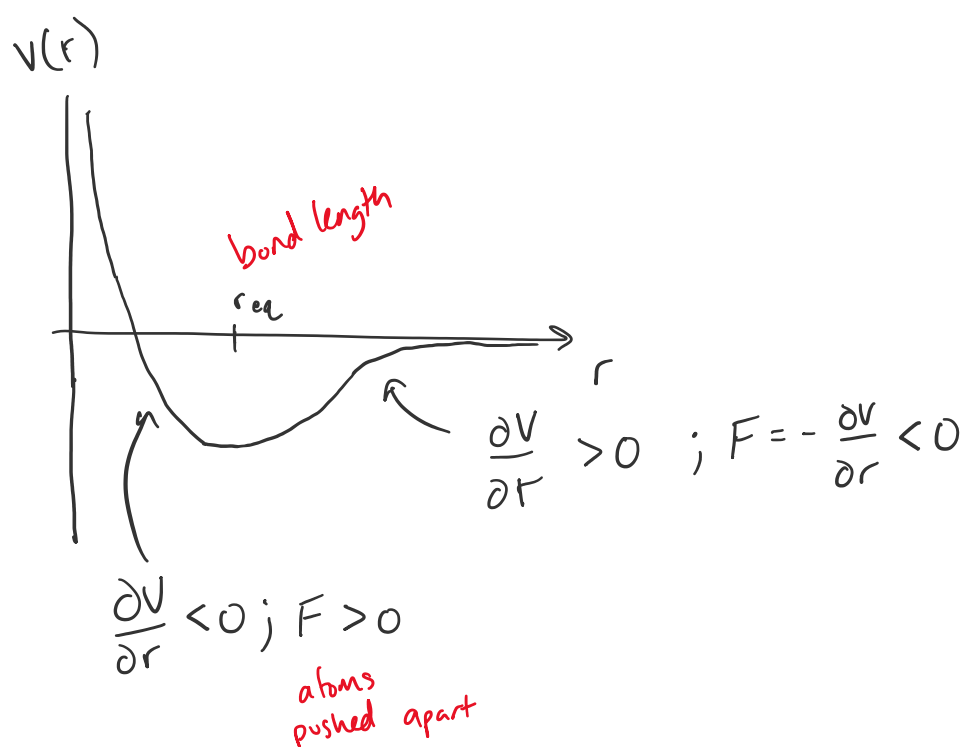
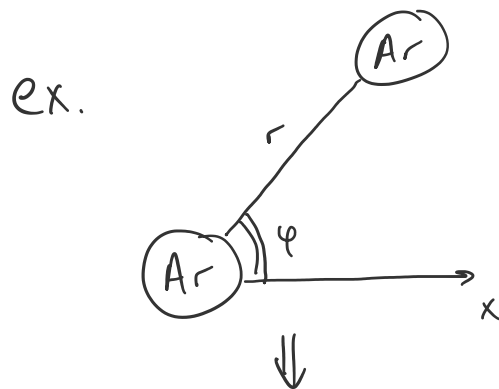
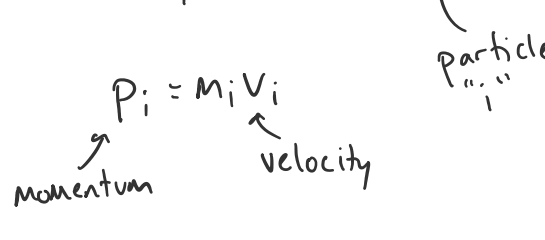
Lecture 4

Monday, August 28, 2023 10:00 AM

Today = Why go quantum... and music

Hamiltonian KE PE

In Classical Mechanics (CM) $H = E = \sum_i \frac{p_i^2}{2m_i} + V(x_i)$

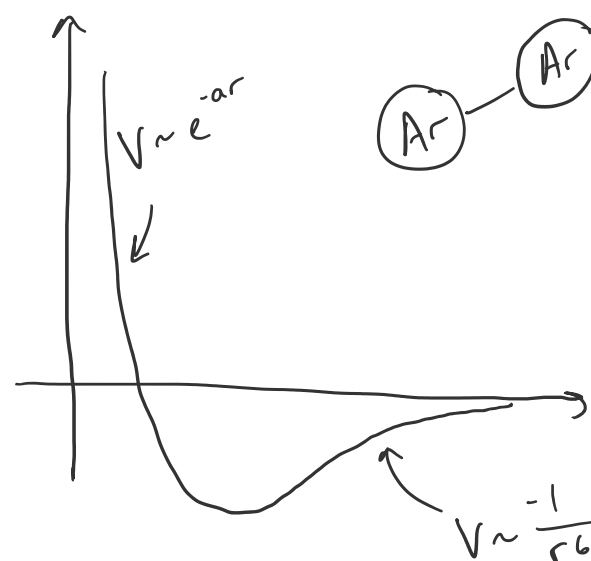


If $r > r_{eq}$, then Ar atoms attract
 If $r < r_{eq}$, then Ar atoms repel

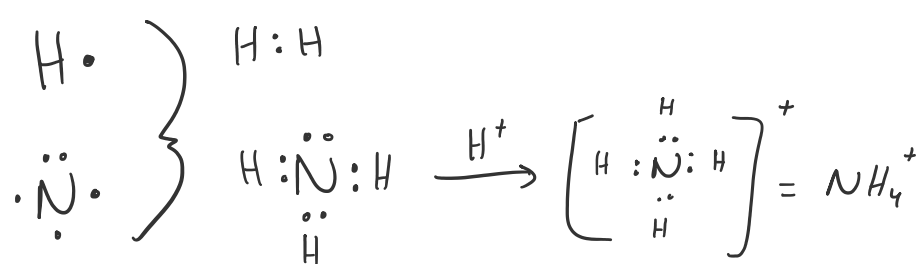
Problems w/ Classical Mechanics:

① Classical objects that accelerate/decelerate emit energy (radiation)
 Spirals into nucleus in a few fs (10^{-15} seconds)

② Where does $V(x_i)$ come from?
 Do QM, solve not $F=ma$, but $H\Psi = E\Psi$



Early 1900s = GN Lewis



e^- get paired to make bonds. Why? Spin!

1925 Heisenberg: 2 kinds of variables in nature

1) a & b are independent $\Rightarrow \Delta a \cdot \Delta b = 0$
 spread

2) a & b are conjugate $\Rightarrow \Delta a \cdot \Delta b \neq 0$
 Both cannot have precise values at same time!

ex. music! Duration of a note (t) & pitch of a note are conjugate variables

(Fourier ~ 1780 $\Delta t \cdot \Delta \nu = \frac{1}{4\pi}$)

