

Physics 102, March 17, 2014

Welcome back!



Owe you

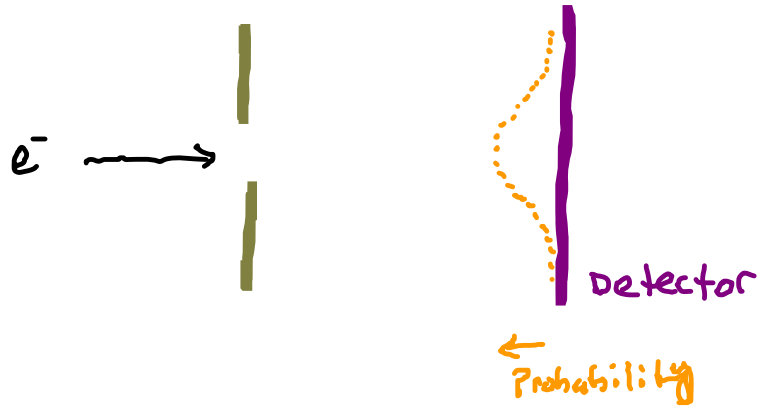
Essay 7 Entries + RANKING assignments
RANKING compilation of Essay 6

Essay 8 on web ... due next Monday

What the bleep do we know (in recitation + BB)

Quantum uncertainty

$\psi^2 \longrightarrow$ Probability



H atom



1s orbital



2s orbital



2p orbital

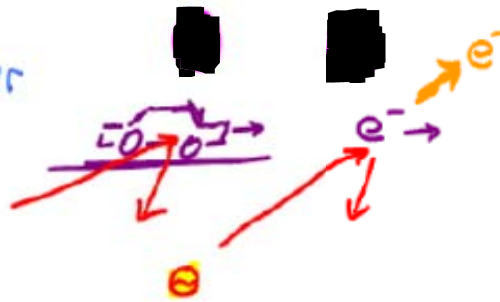


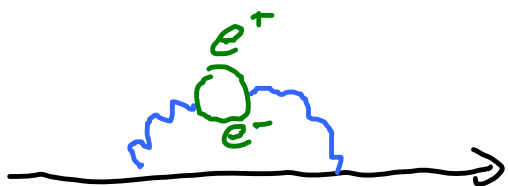
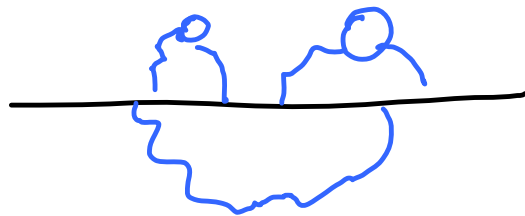
Heisenberg's
uncertainty
Principle
~1927

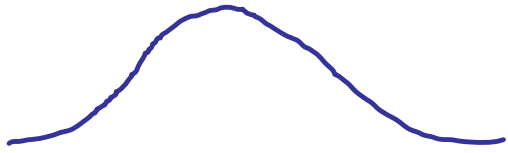
$$\Delta x \Delta p \geq \frac{h}{2\pi}$$
$$\Delta E \Delta t \geq \frac{h}{2\pi}$$

Size Really DOES matter

Say goodbye to the
deterministic
universe





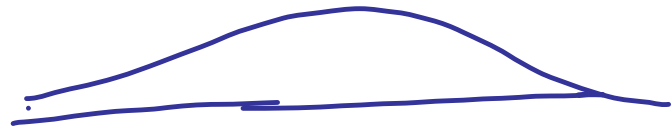


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$\sum P_i$



~



The Journey into Inner Space

Nuclear physics



By the way, the word
'nuclear' is pronounced

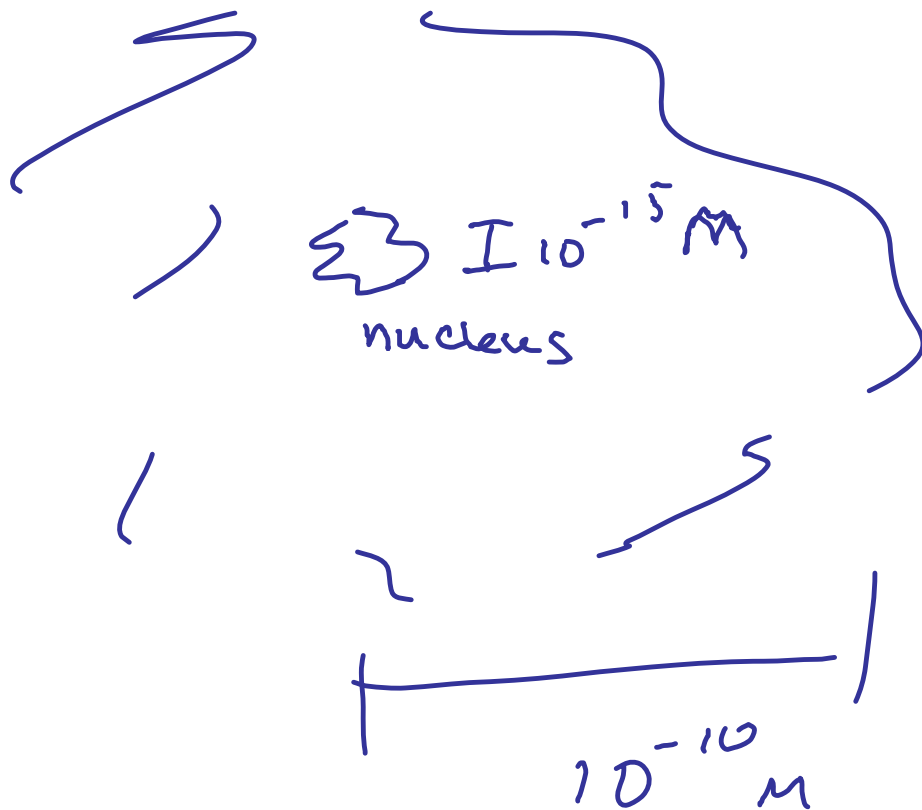
nūk-lē-ər

and not

nūk-ū-lər.

Got that Mr.
President!?

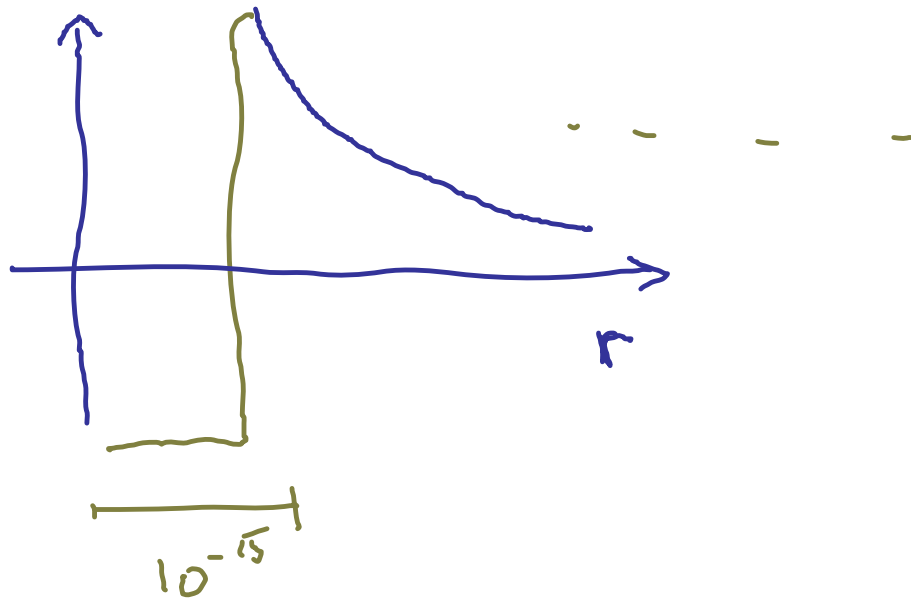




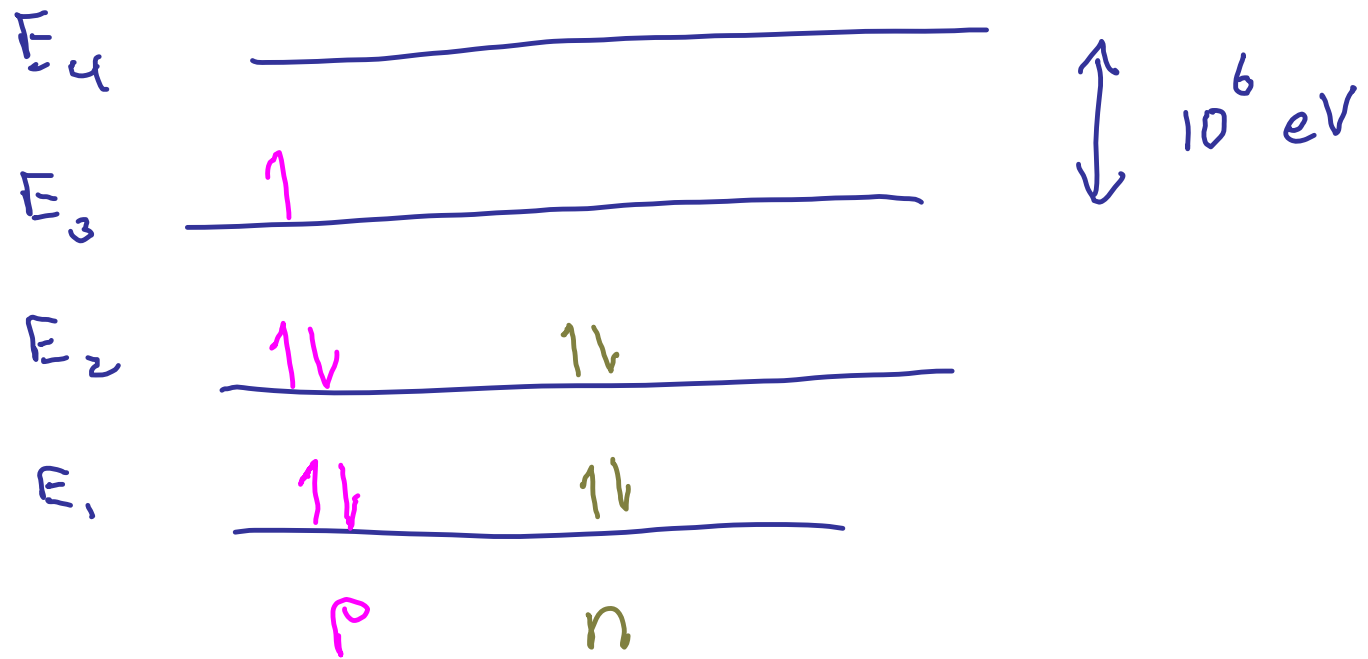
$$+ \xrightarrow{F} +$$

$$F \sim \frac{k q_1 q_2}{r^2}$$

Strong nuclear Force



Attractive Potential } discrete energy levels
"Binding" force } →



(A) # of protons and neutrons

X

Elemental symbol \rightarrow 1 to 1 w/ Z

(Z) # protons, \pm + charges

Z=1 H hydrogen

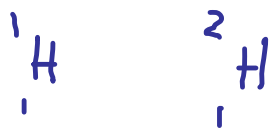
Z=2 He helium

Z=3 Li lithium

⋮

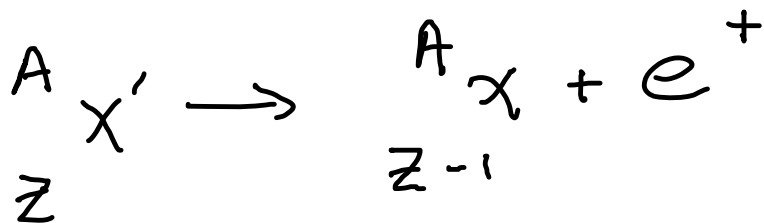
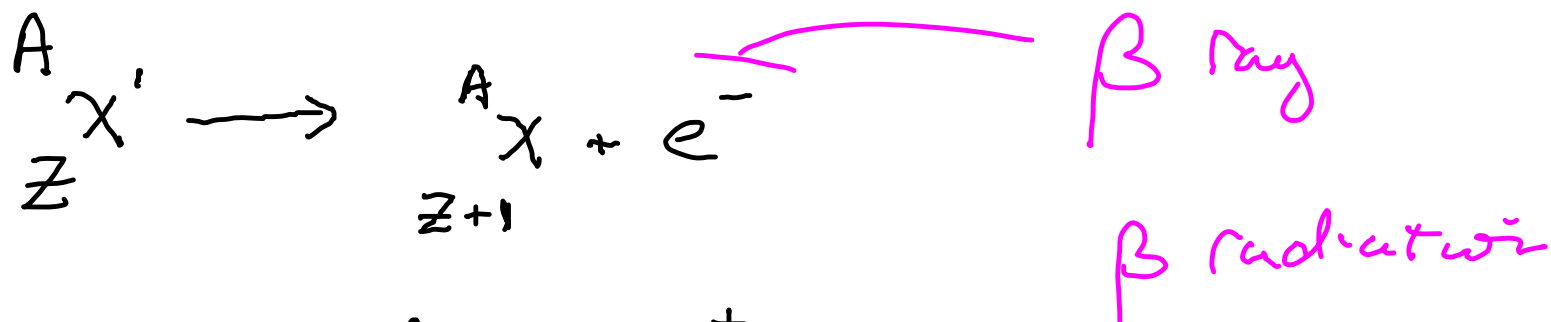
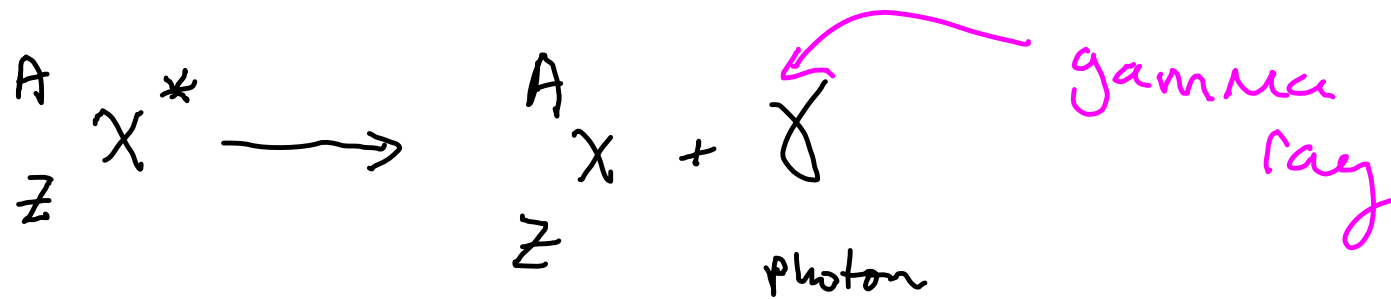
Au gold

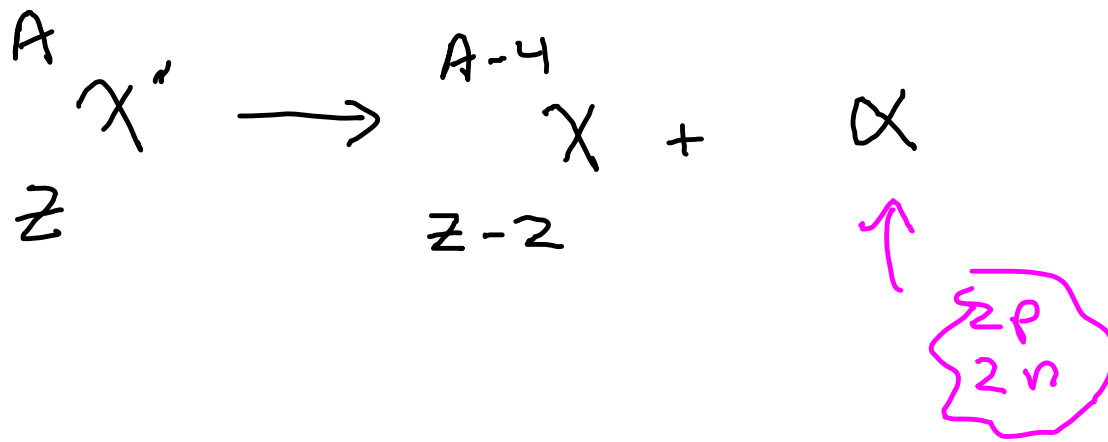
Sn Tin



Same # of Proton, Differing # of Neutrons
Same Z

↑
Isotopes





α -decay
 α -radiation