Modern Atomic Structure

Newtonian Mechanics

Einstein – used to describe behavoir of visable things

$E = mc^2$

Quantum Mechanics

Describes behavior of small things near the speed of light (not visable w/ naked eye)

Duality

particles behave like waves, waves like particles

De Broglí (λ)

1923 – developed eqn for λ of a particle thought particles could have props of waves

① Einstein: $E = mc^2$

② Plank: $E = h\upsilon$

③ Light: $c = \lambda\upsilon$

Let them try

$$\boxed{\lambda = \frac{h}{m\upsilon}}$$

Allowed λ to be predicted

$m \cdot \upsilon$ = momentum

Shrödinger (ψ)

Did math to determine the amplitude (ψ) of a wave relative to space around the nucleus

$$\text{Total } E = \frac{2\pi m e^4}{h^2 n^2}$$

m ← mass of e⁻

e^4 ← charge

n^2 ← distance from nucleus always positive

Heisenburg (uncertainty)	Uncertainty Principle - impossible to know both the exact position + momentum of an object at the same time. $\Delta P \Delta X \geq h$ (uncert. in position; uncertainty in momentum)
Born (probability)	Probability of finding an e^- (e^- cloud) $\|\Psi\|^2$ - square of the amplitude
e^- cloud	• probable location (show overhead ⑨) • math describes it
Quantum Numbers	• The #'s used to describe the behavior (location) of an e^- in an atoms