Uncertainty principle - Bohr model

CAVEAT

* Theory/model can not change natural system
* Theory/model can only explain natural phenomenon
* Theory/model evolves with human understanding and time.

Time frame

1) Bohr's model was proposed ~1913, based on pioneering work of i) Thomson, ii) Rutherford and iii)

Although, Bohr's models was incredible at that time but it was a great success to overcome the concept of "Electron orbit" proposed by Rutherford and also to explain "Atomic Spectra"

Theory of atomic physics was developed based on Bohr's idea.

The nobel prize in Physics 1922 was awarded to Neils Bohr for his service towards atomic structure.

2) 1924: wave particle duality - de Broglie
He received nobel prize in 1929 for his discovery of the wave nature of electron.

3) 1926: Schrödinger proposed mathematics for wave mechanics.

*1933: Schrödinger and P.A.M. Dirac received nobel prize for the discovery of new productive forms of atomic theory.

4) 1927: Heisenberg derived a mathematical form of uncertainty relation.

*1932: He received nobel prize in Physics "for his creation of quantum mechanics ...."

Consequence of uncertainty principle

Mass of $\bar{e}$: $9'1 \times 10^{-28}$ g; Velocity of $\bar{e}$ in Bohr orbit: $\approx$ $2'2 \times 10^{8}$ cm/sec

Bohr orbit: 1'058 Å

Momentum of $\bar{e}$: 2×10^{-19} g cm/sec

If we're to estimate momentum within 1%.

$\Rightarrow \Delta v \cdot m < 2 \times 10^{-21}$

$\Rightarrow \Delta x > \frac{6'6 \times 10^{-27}}{2 \times 10^{-21}} \simeq 330$ Å

Bohr's orbits are inexact

300 times more than the diameter (1'05Å).