Given: Electrons surround atoms and molecules

Knowing how these electrons were structured may help chemists to know how the atoms will behave

Specifically :

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- which atoms they may combine with

- whether they will want electrons or tend to give them away

-How rigorously they will act

- the relative size of the atom

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-shapes and size of the molecule

-solubility in water, alcohols or oils

-bond strength, type and structure

even obscure properties such as paramagnetism and diamagnetism.

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Problem:

How can we predict where the electron is when it is incredibly small, beyond microscopic and moves at nearly the speed of light?

Answer: ask a mathematical physicist

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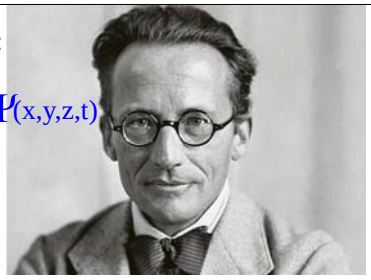
Schrodinger says:

$H\,\Psi(x,y,z,t) = E\Psi(x,y,z,t)$



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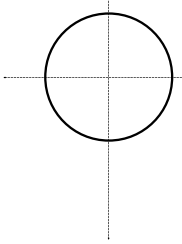

rules for circles:

$R^2 = X^2 + Y^2$

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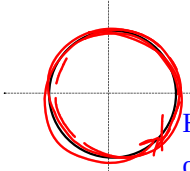

rules for circles:

$R^2 = X^2 + Y^2$

How would you describe an object moving in a circle mathematically?

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Schrodinger says:

$H\Psi(x,y,z,t) = E\Psi(x,y,z,t)$

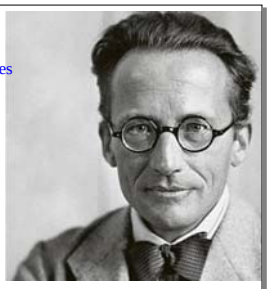
solutions to his equation are composed of 4 variables

n = 1 to oo principal energy level

L = 0 to n-1

m_L = - L to + L

m_S = + - 1/2



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Eigenvectors: equations used to describe the position electrons in space & time
Eigenvalues: solutions to these equations are composed of 4 variables

n = 1 to oo principal energy level

L = 0 to n-1 (sublevel)

m_L = - L to + L (orbital)

m_S = + - 1/2 (spin)

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Where did Schrodinger get all this?

If electrons are found in specific places around the atoms and are NOT in some places, they transistion energy levels through quantum jumps.

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