Re: What does Planck's constant really mean?

Source: http://sci.tech−archive.net/Archive/sci.physics/2005−06/msg02687.html

- *From*: "Golden Boar" <goldenboar@xxxxxxxxxxx>
- *Date*: 25 Jun 2005 08:31:50 −0700

franklinhu@xxxxxxxxx wrote:
> Planck's constant is said to be the smallest amount of heat which can
> be radiated at the vibration frequency v. (See.
> http://www.hypertextbook.com/physics/modern/planck/) This is in
> accordance with the formula Energy = (any integer value representing
> number of photons) X (Planck's constant 6.63 X 10^−34 J*s) X (frequency
> in cycles/second).
>
> My question is whether this also means that this is also the smallest
> amount of energy difference between any frequencicces. In other words,
> the amount of energy has to be some whole number multiple of 6.63 X
> 10−34. The formula does not place any quantization limits on
> frequencies, so an infinity of frequencies is allowed. This would also
> imply that an infinity of energy amounts would also be allowed. But
> this would seem to be in contradition with the whole idea that energy
> only come in quantized packets.
>
> It would seem that one possible solution is that frequencies would also
> have to be quantisized, meaning that only certain frequencies would be
> allowed and if you were to closely examine a spectra which
> theoretically contained all possible frequencies, you would actually
> see frequency bands corresponding to energy spacings equal to Planck's
> constant.
>
> For example, if we simply the formula by using 1 as the integer amount
> in the formula (energy of a single photon) and assume that the
> frequency is 1 cycle/second, It appears that the seconds terms cancel
> out leaving just Joules which is a measure of energy of 6.63 X 10−34
> Joules. Now the question is, can I modify the frequency to produce any
> arbitrary amount of energy like 6.64 X 10−34 J, or would I have to
> modify the frequency enough to produce another Planck constant worth of
> energy or 13.38 X 10−34 Joules?
>
> If frequency can only come in particular quanta, some rough
> calculations show that the frequency would have to differ somewhere in
> the magnitude of 1 X 10−21 meters for such a small jump to occur. This
> would also imply that this would correspond to the maximum frequency

> possible (based on the smallest possible weavelength of 1X10−21m) or
> about 3 X 10^29 cycles/second. It might also imply that this is the
> smallest possible unit of distance in the universe, since nothing can
> seem to act at smaller distances that this. Going even further into
> speculation, this could mean that space itself is quantized in 1 X
> 10−21 m cubes and explains why we see quantized amounts of energy &
> frequency and why we see Planck's constant. (Lots of speculation, but
> an interesting idea, I think).
>
> There is some experimental evidence from the dropping of neutrons in a
> gravitational field that would suggest that the neutrons cannot take
> arbitrary positions in space, but must drop in specific quanta,
> indicating that space is quantized.
> (See:http://www.users.csbsju.edu/~frioux/neutron/neutron.htm) So this
> is not a wild idea.
> fhuplanck

Planck's constant, h, is a desription of a photon's movement.
Plancks constant, h, has units of kg.m^2.s^−1.

Consider the following equations:

hbar = mC.c
m = mC/rC

Dirac's constant is directly proportional to the speed of light in a vacuum.
Mass is inversely proportional to the Compton radius.

The constant of proportionality, mC, is about 3.517665548e−43 kg.m

You can see that hbar breaks down into 3 components, speed of light, mass and radius.

This means that a photon is moving around a point of origin at the speed of light. It has a mass/energy and a radius which are inversely proportional to each other. The higher the mass/energy, the smaller the radius. The wavelength of the photon is simply the circumference of this radius, and the frequency of the photon is the number of wavelengths travelled by the photon in a second.

You can now see that Planck's constant is the circumference made by a photon moving around a point.

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- ***Follow−Ups***:
    - ***Re: What does Planck's constant really mean?***
        - *From:* Golden Boar

- ***References***:
  - ***What does Planck's constant really mean?***
    - *From:* franklinhu

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