

Re: Why is Energy Quantized?

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- *From:* "ica" <icaxavierstanford@xxxxxxxxx>
 - *Date:* 4 May 2005 05:22:29 -0700
-

Bjoern Feuerbacher wrote:

> ica wrote:

>> 1. Why is energy quantized?

>

> You have to be more specific. Energy in general is **not** quantized.

>

> What **is** quantized is the energy of bound particles, and the total
> energy in a wave of a fixed frequency.

>

>

>> What's the deeper mechanism?

>

> For bound particles: the boundary conditions. Just as a rope which
you

> swing up and down can support standing waves only for very specific

> wavelengths (dependent on the boundary conditions you impose upon it,

> i.e. if you hold its ends fixed or let them loose, etc.), a binding

> potential supports only very specific wavelengths for the wave

> function of the bound particle.

>

> For waves, the explanation is much more complicated. It involves the

> quantization of the appropriate field and is also remotely related to

> boundary conditions.

>

>

>> 2. How is the quantization of energy related to the atomic
orbitals?

>

> The atomic orbitals have quantized energy levels.

>

>

>

>> 3. What atomic principle prevented Ultraviolet Catastrophe...

>> or is it independent of the atom?

>

> It is indeed independent of the atom. It is prevented by the
quantization

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- > of energy in electromagnetic waves: you can only generate a wave with
- > at least one photon in it. But the higher the frequency of the wave,
- > the more energy you need to create such a photon ($E = h f$). Hence
- > the higher the frequency, the lower the probability that such a wave
- > is generated.
- >
- >
- > Bye,
- > Bjoern

How can it be independent of the atom. It needs the atom to produce the photon to produce the electromagnetic wave. You said the higher is the frequency of the wave, the more energy must the photon have. Since the photons came from the electron in the orbitals. How come the atoms can't produce high energy electrons or high frequency wave (or photon). Isn't it the frequency of the photon is the difference between certain energy levels of the electrons? In Iron for example. Know what is the frequency of the higher level of the atom and the lowest level. Can't the difference be equal to ultraviolet but only topping in the blue.

When iron produce red light. Which of the 2 orbital differences produced red. But you said other colors are also produced. How come it peak at red.

ica

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• *Follow-Ups:*

- ◆ [Re: Why is Energy Quantized?](#)
◇ *From:* Y.Porat
- ◆ [Re: Why is Energy Quantized?](#)
◇ *From:* Bjoern Feuerbacher

• *References:*

- ◆ [Why is Energy Quantized?](#)
◇ *From:* ica
- ◆ [Re: Why is Energy Quantized?](#)
◇ *From:* Bjoern Feuerbacher
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