

# Re: electron

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*Source:* <http://sci.tech-archive.net/Archive/sci.physics/2005-04/msg04075.html>

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- *From:* "patrick" <networkone@xxxxxxxxxx>
  - *Date:* Thu, 28 Apr 2005 18:50:36 +0100
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"Bjoern Feuerbacher" <feuerbac@xxxxxxxxxxxxxxxxxxxxxxxxxxxx> wrote in message [news:d4r4r9\\$ah\\$1@xxxxxxxxxxxxxxxxxxxxxxxxxxxx](mailto:news:d4r4r9$ah$1@xxxxxxxxxxxxxxxxxxxxxxxxxxxx)

> patrick wrote:

>> ----- Original Message -----

>> From: "Bjoern Feuerbacher" <feuerbac@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>

>> Newsgroups: sci.physics

>> Sent: Thursday, April 28, 2005 10:59 AM

>> Subject: Re: electron

>>

>>

>>

>>>patrick wrote:

>>>

>>>[snip]

>>>

>>>

>>>

>>>>Bjoern

>>>>In Beiser Concepts of Modern Physics (an old edition) is done a

>>>>calculation for the electron in Hydrogen atom.

>>>>

>>>>How? What line of reasoning does he use in the calculation?

>>>>

>>>>

>>>>

>>>>>The average x postion is shown to be a constant over time.

>>>>>

>>>>>Averaged over what?

>>>>>

>>>>>

>>>>> This is his calculation:

>>>>> Considering only the x coordinate:

>>>>>  $x\_average = \int x \Psi \Psi^* dx$  where  $\Psi$  is the normmalized wave function.

>>>>>

>>>>> Does the integral run only over x or over the whole volume? You wrote the first, but I suspect it should be the second.

>>>>>

Re: electron

> If yes, that's the expectation value of x, in general written as  $\langle x \rangle$ .  
>  
>  
>> For a quantum number n and energy  $E_n$  the time dependant wave function  
>>  $\Psi_n = \psi_n \exp\{-2\pi i E_n t / h\}$ .  
>> He substitutes  $\Psi_n$  into  $x_{\text{average}}$  and gets  
>>  $x_{\text{average}} = \text{Integral}\{x \Psi_n \Psi_n^*\} dx$   
>>  $= \text{Integral}\{x \psi_n \psi_n^*\} dx$   
>>  
>> which is constant since  $\psi_n$  and  $\psi_n^*$  are functions of position only.  
>  
> Yes, the expectation value of the position of the electron does not depend  
> on time.  
>  
>  
>> The electro

Re: electron