

## Re: "archaic" view of atom structure

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lindas4@aol.com wrote:

> *Earlier today, I was told that the view of an atom as a nucleus with  
> electrons in circular orbits was "archaic".*

It is. It has been replaced in 1926, almost 80 years ago now.

> *As I understand it (I am  
> NOT a "card carrying physicist") this is, indeed a good, simplified  
> view of the basic structure, and thus is useful for teaching and for  
> calculations.*

It is useful for *some* things (e.g. for the spectrum of hydrogen),  
but fails miserably for most other effects.

It can be understood intuitively even by rather young pupils – but  
I think the fact that one has to "unlearn" this model later when  
one studies the *real* description makes it rather inconvenient  
for teaching.

> *In fact, this structure does occur.*

Something similar to this occurs only for very highly excited  
states of atoms (so-called Rydberg states). In atoms in their  
ground states or lowly excited states, or in molecules, this  
picture is simply wrong.

> *For example, it is present in hydrogen and helium atoms.*

Only in their Rydberg states.

> *In atoms with a larger number of  
> electrons, some electrons are forced into larger circular orbits, and  
> some into elliptical orbits. Am I OK so far?*

No.

> *Also, as I understand it, the term "cloud" when used to refer to  
> electrons and their behavior, simply refers to the fact that the*

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- > *electron, unlike a planet in the solar system, does not remain*
- > *constantly in the same orbit,*

No. It has no "orbit" at all!

- > *but moves away from and toward the*
- > *nucleus as it travels around it (we all learned in elementary school*
- > *science that heat will cause this to occur). Thus, the electron would*
- > *look, to an observer, like a fuzzy cloud, and not like a clearly*
- > *defined ring.*

No, this has nothing at all to do with heat. Even at 0 K, the electron should be pictured as a "cloud", not as a ball moving in an orbit.

- > *Would a real "card carrying physicist", hopefully a physics instructor,*
- > *please tell me if I am missing something here?*

Well, I've already been a tutor for students of QM, so I hope you will accept my authority. ;-)

Bye,  
Bjoern