Spectral line Hα.

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Abstract

Speeds of electrons and protons in atoms are small. For example: An electron moving at a speed $\mathbf{v_e = 0{,}003c}$ creates spectral line **Hα.** Accurate electron speeds are given in the table in this article. Confirmation of Doppler´s principle in hydrogen for Balmer line **Hα.**

Introduction

Through the work of Max Planck, Albert Einstein, Louis de Broglie, Arthur Compton, Niels Bohr, and many others, current scientific theory holds that all particles also have a wave nature (and vice versa).[1] This phenomenon has been verified not only for elementary particles, but also for compound particles like atoms and even molecules. For macroscopic particles, because of their extremely short wavelengths, wave properties usually cannot be detected.[2] Wave–particle duality is an ongoing conundrum in modern physics. Most physicists accept wave-particle duality as the best explanation for a broad range of observed phenomena; however, it is not without controversy.

Theory

Wave - particle duality elegantly incorporates kinetic energy in direction of movement (as particle or wave in the direction of movement) and kinetic energy against directions of movement (as wave against the spread of directions of movement) in relations the kinetic energy by [3] p**.** 51-52 :

Calculation of the kinetic energy of a particle moving at the velocity of v :

$$T_{\mathrm{kin}} = \frac{mc^2}{\cos^2 \vartheta} \left[\ln\left|1 - \frac{v}{c}\cos\vartheta\right| + \frac{\frac{v}{c}\cos\vartheta}{1 - \frac{v}{c}\cos\vartheta} \right]$$

while ϑ isn't $\frac{\pi}{2}$, $\frac{3\pi}{2}$

For $\vartheta = 0°$ we have the kinetic energy in the direction of motion

$$T_{\mathrm{kin}_d} = mc^2 \left[\ln\left|1 - \frac{v}{c}\right| + \frac{\frac{v}{c}}{1 - \frac{v}{c}} \right]$$

For $\vartheta = 180°$ we have the kinetic energy against the direction of motion

$$T_{\mathrm{kin}_{ad}} = mc^2 \left[\ln\left|1 + \frac{v}{c}\right| - \frac{\frac{v}{c}}{1 + \frac{v}{c}} \right]$$

Kinetic energy of electron

$T_{kin\ id} = mc^2$ [ln |1-v/c|+ (v/c) / (1-v/c)]   in direction of motion of electron,
where v is velocity of electron.

Kinetic energy of electron
$T_{kin\ ad} = mc^2$ [ln |1+v/c|- (v/c) / (1+v/c)]   against direction of motion of electron,
where v is velocity of electron.

Albert Einstein , who, in his search for a Unified Field Theory , did not accept wave-particle duality, wrote: [4]

> This double nature of radiation (and of material corpuscles)...has been interpreted by quantum-mechanics in an ingenious and amazingly successful fashion. This interpretation...appears to me as only a temporary way out...

The pilot wave model, originally developed by Louis de Broglie and further developed by David Bohm into the hidden variable theory proposes that there is no duality, but rather a system exhibits both particle properties and wave properties simultaneously, and particles are guided, in a deterministic fashion, by the pilot wave (or its " quantum potential ") which will direct them to areas of constructive interference in preference to areas of destructive interference . This idea is held by a significant minority within the physics community. [5]

When in this idea we will replace the "quantum potential" by "electromagnetic potential" (or by " interference of electromagnetic waves"), the idea will be acepted large majority of physicists.

In 1900 Max Planck hypothesized that the frequency of light emitted by the black body depended on the frequency of the oscillator that emitted it, and the energy of these oscillators increased linearly with frequency (according to his constant h, where E = hν).

Theoretical Planck´s oscillator we can replace with circulating electron along ellipse around the nucleus of an atom between two Bohr´s energy levels, while electron moving alternately with acceleration and deceleration. This electron really blinks. When an electron moves at the speed of a higher Bohr energy levels (from afnucleus) to lower (towards perinucleus) radiates spectral lines of certain thickness. (real blinks) For example, spectral line Halfa 656.281 + - 1.4 nm. From the thickness of the spectral lines we can easily identify the smallest (in afnucleus) and largest (in perinucleus) the speed of the electron around the nucleus of an atom, taking into account the kinetic energy of the electron in the direction of movement and against the movement if we know that according to the Doppler principle is the lowest wavelength (highest frequency) and against the direction of motion of the electron is a wavelength of the highest (lowest frequency).

$\frac{v}{c}$	**Front of electron** $\left[ln\lvert 1-\frac{v}{c}\rvert + \frac{\frac{v}{c}}{1-\frac{v}{c}}\right]$	**Behind of electron** $\left[ln\lvert 1+\frac{v}{c}\rvert - \frac{\frac{v}{c}}{1+\frac{v}{c}}\right]$
Electron **0,002717146** **It is in the direction of motion (id)**	**3,70485**5771252357587813986763267e-6 **1,8931773275045679448456130994356 eV** **Lambda$_{id}$ (v/c=0,002717146) = hc/E$_{k,id}$ = =654,900051928391151030938994 nm** **4,577682**6115258921719509259975895**e+14 Hz** **1,893177**3275045679448456130994356 **eV**	
Electron **It should be in the direction of motion (id)** The core of the spectral line **Hα**	**3,704856065018122815706535948504e-6** **Lambda$_{id}$ = c/ f$_{max}$= 654,9 nm** **4,5776829744999236524660253473813e+14 Hz** **1,8931774776185590593983814322796 eV**	
Electron **It should be against the direction of motion (ad)** The core of the spectral line **Hα**		**3,6890835289347249992492175652666e-6** **1,8851177285881014565911509806897 eV** **Lambda$_{ad}$ = c/ f$_{min}$= 657,7 nm** **4,5581945871978105519233693173179e+14 Hz** **1,8851177285881014565911509806903 eV**

Electron **0,0027212042** **It is against the direction of motion (ad)**		**3,6890835**634754294760932629961125e-6 **1,8851177**4623836441662325901903 53 **eV** **Lambda$_{ad}$ (v/c= 0,0027212042)=hc/ E$_{k,ad}$ =** **= 657,699993841987869470 nm**
Electron average speed **0,0027191751** For the **wings**[4] of spectral line **Hα** **(id)** and **(ad)**	**3,7**104012971124629780821510682521e-6 **1,89**601108527427807723966669181 09 **eV** **Lambda$_{id}$ (v/c= 0,0027191751)=hc/ E$_{k,id}$ =** **=653,92124535655764172783570 nm**	**3,68**359393295041666391908315789 12e-6 **1,88**231255092496679241598777242 52 **eV** **Lambda$_{ad}$ (v/c= 0,0027191751)=hc/ E$_{k,ad}$ =** **=658,68 nm**

Conclusion:

Lambda$_{ad}$ (v/c= 0,0027212042)=hc/ E$_{k,ad}$ = 657,699993841987869470 nm = Lambda$_{ad}$ = c/ f$_{min}$= 657,7 nm against the direction of motion of electron, moving with speed v = 0,0027212042c. Electron is in perinucleum. Frequency 4,577682611525892171950925997589 5**e+14 Hz**

Lambda$_{id}$ (v/c=0,002717146) = hc/E$_{k,id}$ =654,900051928391151030938994 nm = Lambda$_{id}$ = c/ f$_{max}$= 654,9 nm in the direction of motion of electron moving with speed v = 0,002717146c. Electron is in afnucleum. Frequency 4,5581945871978105519233693173179e+14 Hz.

The **wings**[6] of spectral line **Hα** are **1 nm**. (**658,68 nm – 657,7 nm =0,98 nm, 654,9 nm - 653,92 nm = 0,98 nm).**

Comparison

Official physics: H_{alpha} **:** $E_3 - E_2 = -1{,}51eV - (-3{,}40eV) = 1{,}89eV$

LV:

1,8931774776185590593983814322796 eV, **654,90nm** The core of the spectral line **Hα**

1,8931773275045679448456130994356 **eV**

1,8851177285881014565911509806897 eV **Lambda**$_{ad}$ **= c/** f_{min}**= 657,7 nm** The core of the spectral line **Hα**
1,8823125509249667924159877724252 **eV** **Lambda**$_{ad}$ **(v/c= 0,0027191751)=hc/** $E_{k,ad}$ **=658,68 nm** For the **wings**[4] of spectral line **Hα**
1,8960110852742780772396666918109 **eV** **Lambda**$_{id}$ **(v/c= 0,0027191751)=hc/** $E_{k,id}$ **=653,92124535655764172783570 nm** For the **wings**[4]

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