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Introduction to Relativity in N Dimensional Space

Compton Effect New Approach

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Preface

Arthur Holly Compton, in 1923, observed that high energy rays of a known wavelength λ interacting with atoms, are scattered through an angle θ and emerge at a different wavelength λ^* related to θ. Compton combined Einstein's Special Relativity and De Broglie's Hypothesis to derive the scattering formula, known today as "Compton's Equation" or "Compton Effect"

$$\lambda^* - \lambda = \lambda c \cdot (1 - \cos(\theta))$$

In order to confirm that equation, Compton, made an experiment. The results of the experiment match the equation and Sir Compton received the Nobel Prize for his achievements, in 1927.
In 1991, I noticed that Sir Compton's Equation may be wrong. It took me about 20 years to complete the proof that Sir Compton was wrong. The correct conclusion is just amazing,

The original "Compton Equation" speaks only about the wavelength shift. And does not supply any information about the electron involved in the collision
The correct equation , replaces the wrong one, contain a lot of information about the electron speed and direction, energy and momentum.

$$\lambda^* - \lambda = \lambda c \cdot (1 - \cos(\theta)) = \lambda c \cdot \left(1 - \sqrt{1 - \left(V/c\right)^2}\right) = \lambda c \cdot \left(1 - \sqrt{1 - \beta^2}\right)$$

Abbreviations

c	speed of light
m_0	rest mass
m	moving mass
$\vec{V}$	velocity
$\vec{P}=m\vec{V}$	moment
$\vec{\beta}=\vec{V}/c$	
$\lambda_c=\dfrac{h}{m_0 c}$	Compton wavelength
$\lambda_e=\dfrac{h}{m\cdot\vec{V}}=\dfrac{h}{\vec{P}}$	De Borglie wavelength

$f_c\cdot\lambda_c=c \quad f\cdot\lambda=c \quad f^*\cdot\lambda^*=c \quad f_e\cdot\lambda_e=c$

Introduction

The detail of the photon-electron interaction is not known. Electrons behave at low speed as a particle; the photon was always a wave. And no one had an idea about what's happens when a wave collide with a particle. Significant breakthrough in formulating the rules that describe photon-electron interaction was achieved by "DE BROGLIE Hypothesis". DE BROGLIE notices that particle behave like waves and found the appropriate formulation to his hypothesis. Many experiment have been done to prove "DE BROGLIE Hypothesis" The most important experiment is "Compton Effect". In this experiment, the photon-electron collision is almost, elastic, not the case in other experiments, the elastic collision conserve energy and momentum must obey Relativity and Quantum Mechanic at the same time.
What bothered me was the fact that I have not found any clue to Relativity in "Compton's Equation". So, my conclusion was that something is wrong in that "Equation", and it took me about 20 years to find the mistake. In order to distinguish between the wrong an the correct Equation, The name of the new equation will be "Mourici-Compton Equation" , (the experiment is still Compton's Expriment
And the new " Equation" is completely different

$$\lambda^*-\lambda=\lambda c\cdot\left(1-\cos(\theta)\right)=\lambda c\cdot\left(1-\sqrt{1-\left(V/c\right)^2}\right)=\lambda c\cdot\left(1-\sqrt{1-\beta^2}\right)$$

With the "Mourici-Compton Equation" , It is very easy to explain time dilation, twin paradox, length-contraction, velocity transformation , Uncertainty principle.

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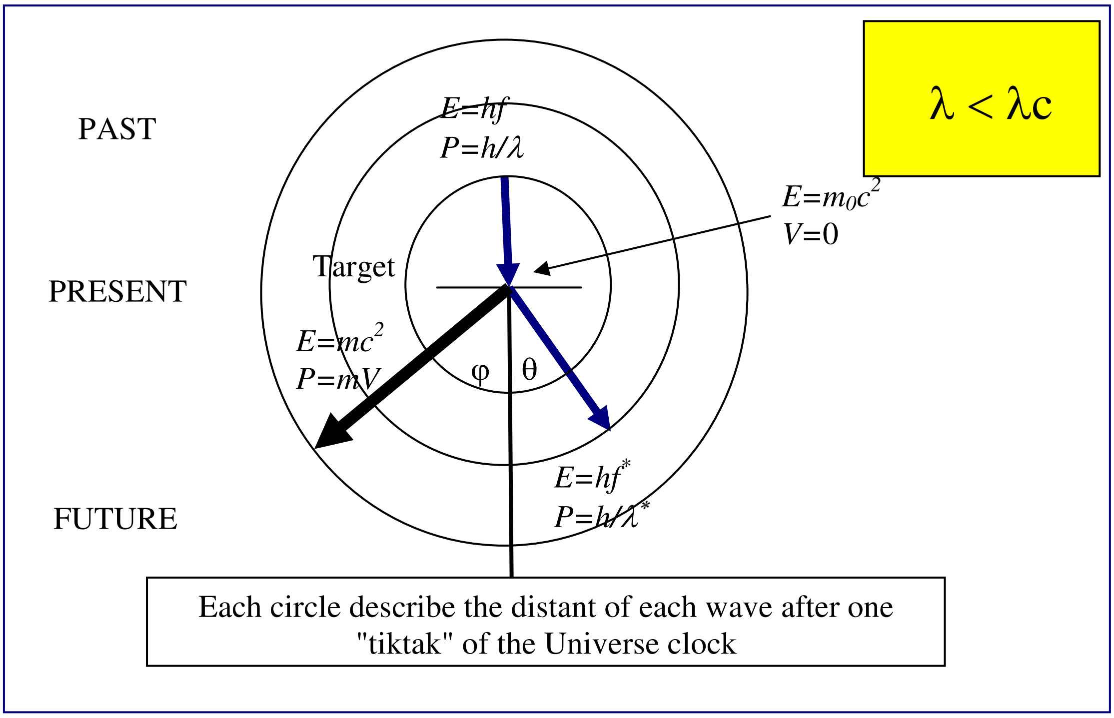
Chapter 1

Compton's Experiment

In order to understand the derivation of the -"Mourici-Compton Equation", Compton's experiment will be described briefly (of course, Details on the development of Compton's formula and the experiment, he has done can be found on Wikipedia, so I do not expand here)

Compton's experiment layout is described below.



In Compton Experiment, photon with wavelength λ collide with an electron at rest. The scattered photon has a longer wavelength λ^* and therefore have lower energy. The photon is deflected, and continues to move with a new angel θ. The electron that was at rest, after collision, is deflected from its course in the opposite direction at an angle φ

Derivation of Compton Equation

	Before collision	After collision
The energy of incident photon	$h \cdot f$	$h \cdot f^*$
The energy of electron	$m_o \cdot c^2$	$m \cdot c^2$
The wavelength of the photon	λ	λ^*
The momentum of electron	0	$m \cdot \vec{V}$

The energy of the system before collision, $E_{PAST} = hf + m_o c^2$

The energy of the system after collision, $E_{FUTURE} = hf^* + mc^2$

From the principle of conservation of energy

1]
$$hf + m_o c^2 = hf^* + mc^2$$
$$hf - hf^* + m_o c^2 = mc^2$$

Remember that $P = \frac{hf}{c} = \frac{h}{\lambda}$

from the principle of conservation of linear momentum along x and y axis, we have

2]
$$\frac{hf}{c} + 0 = \frac{hf^*}{c}\cos(\theta) + mV\cos(\phi)$$
$$hf - hf^*\cos(\theta) = mcV\cos(\phi)$$

3]
$$0 = \frac{hf^*}{c}\sin(\theta) - mV\sin(\phi)$$
$$hf^*\sin(\theta) = mcV\sin(\phi)$$

Squaring (2) and (3) and then adding, we get

4]
$$m^2V^2c^2 = \left(hf - hf^*\cos(\theta)\right)^2 + \left(hf^*\sin(\theta)\right)^2$$
$$m^2V^2c^2 = (hf)^2 + (hf^*)^2\cos^2(\theta) - 2(hf)(hf^*)\cos(\theta) + (hf^*)^2\sin^2(\theta)$$
$$m^2V^2c^2 = (hf)^2 + (hf^*)^2 - 2(hf)(hf^*)\cos(\theta)$$

Squaring equation (1), we get

5]
$$m^2c^4 = m_o^2c^4 + (hf)^2 + (hf^*)^2 - 2(hf)(hf^*) + 2m_oc^2\left[hf - hf^*\right]$$

Subtracting (4) from (5), we get

6]
$$m^2c^4 - m^2V^2c^2 = m_o^2c^4 + 2(hf)(hf^*)\left[\cos(\theta) - 1\right] + 2m_oc^2\left[hf - hf^*\right]$$

According to the theory of relativity

7]
$$m = \frac{m_o}{\sqrt{1 - \frac{V^2}{c^2}}} \qquad m^2\left(1 - \frac{V^2}{c^2}\right) = m_o^2$$

Or

8] $$m^2c^2 - m^2V^2 = m_o^2c^2$$

Multiplying both sides by c^2, we get

9] $$m^2c^4 - m^2V^2c^2 = m_o^2c^4$$

Using equation (9) equation (6) becomes

10] $$\begin{aligned}
&0 = 2(hf)(hf^*)[\cos(\theta) - 1] + 2m_oc^2[hf - hf^*] \\
&2(hf)(hf^*)[1 - \cos(\theta)] = 2m_oc^2[hf - hf^*] \\
&\frac{h}{m_oc^2}[1 - \cos(\theta)] = \frac{f - f^*}{f \cdot f^*} = \frac{1}{f^*} - \frac{1}{f} \\
&\frac{c}{f^*} - \frac{c}{f} = \lambda^* - \lambda = \frac{h}{m_oc}[1 - \cos(\theta)] \\
&\lambda^* - \lambda = \frac{h}{m_oc}[1 - \cos(\theta)]
\end{aligned}$$

Or Compton shift

11] $$\begin{aligned}
&\Delta\lambda = \lambda^* - \lambda = \frac{h}{m_oc} \cdot (1 - \cos(\theta)) = \lambda_c \cdot (1 - \cos(\theta)) \\
&\lambda_c = \frac{h}{m_oc}
\end{aligned}$$

Where λc is called the Compton wavelength of the electron.

Compton's conclusion where:

1. The wavelength of the scattered photon λ^* is greater than the wavelength of incident photon λ.
2. $\Delta\lambda$ is independent of the incident wavelength.
3. Δ λ have the same value for all substance containing free electron

But there is another set of conclusions, And the question is what are the correct conclusions, the conclusion represented above or the new set that will be represented now

Chapter 2

The alternative set of conclusions

Compton's conclusion from his experiment was,

1] $$\lambda^* - \lambda = \lambda c \cdot (1 - \cos(\theta))$$

The Correct "Equation"

What I did is not trivial to mathematicians.
Compton equation was separate into two parts one part describes the wavelengths before impact **(past)** and the second after impact **(future)**

2] $$\lambda = \lambda_c \cdot \cos(\theta) \qquad \lambda^* = \lambda_c$$

Now I declare a new physical law The New Law is

Law of photon electron interaction

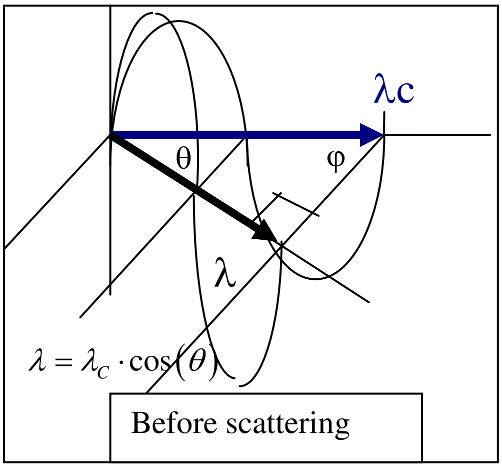
- After photon-electron elastic interaction, the photons wavelength λ^* and Compton's wavelength λc, have the same wavelengths,

$$\lambda^* = \lambda_C$$

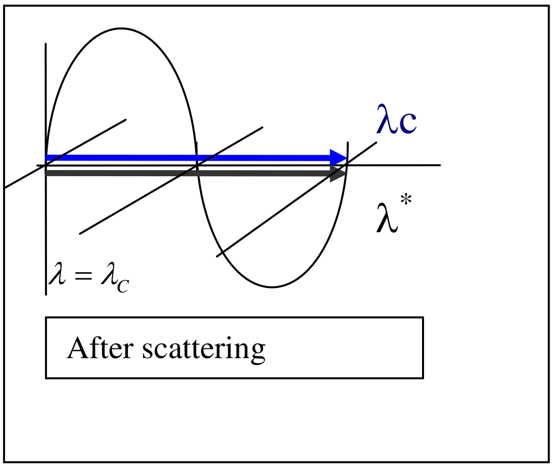
- In order to equalize their wavelengths ($\lambda^* = \lambda c$) The photon change its direction with an angel θ , such that :

$$\lambda = \lambda_C \cdot \cos(\theta)$$

The figures below describe the position of the waves , before and after photon electron interaction.



Before scattering



After scattering

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And what about φ ????????

Compton did not check the electron shift angle φ. The angle does not appear in his Equation. The equation that relate θ to φ can be found somewhere online and is given by Eq 3. Or can be eliminated from chapter 1 , eq (2),(3)

3]

$$ctg(\varphi) = \left(1 - \frac{h \cdot f}{m_0 \cdot c^2}\right) \cdot ctg\left(\frac{\theta}{2}\right)$$

And from Eq 2 and Eq 3

$$ctg(\varphi) = \left(1 - \frac{h \cdot f}{m_0 \cdot c^2}\right) \cdot ctg\left(\frac{\theta}{2}\right)$$

$$ctg(\varphi) = \left(1 - \frac{h \cdot f}{m_0 \cdot c^2}\right) \cdot ctg\left(\frac{\theta}{2}\right) = \left(1 - \frac{h}{m_0 \cdot c} \cdot \frac{f}{c}\right) \cdot ctg\left(\frac{\theta}{2}\right) = \left(1 - \lambda c \cdot \frac{f}{c}\right) \cdot ctg\left(\frac{\theta}{2}\right)$$

$$ctg(\varphi) = \left(1 - \frac{\lambda c}{\lambda}\right) \cdot ctg\left(\frac{\theta}{2}\right)$$

$$ctg(\varphi) = \left(1 - \frac{1}{\cos(\theta)}\right) \cdot ctg\left(\frac{\theta}{2}\right)$$

The Intermediate result is astonishing, **all the physical constants vanished** and the physical expression becomes entirely geometric.

And the end result of identity solution is

(trigometric solution is presented in full in Appendix to this article)

4]

$$\varphi + \theta = \pi/2$$

This result is amazing

The angle between the photon and the electron after scattering is always π/2

Relativity and Compton Equation

As claimed before, In Compton's experiment, the photon electron collision is elastic and is conserving energy and momentum
The momentum vector scheme is ,

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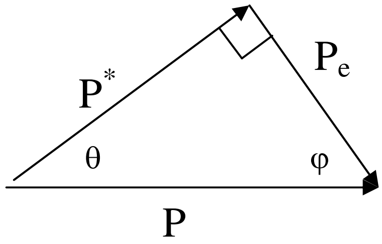


Using Quantum and Relativity
One can find the exact meaning of scattering angles θ and φ using triangular law of cosines

5]

$$\vec{P}_e = \vec{P} = m\cdot\vec{V} = \frac{m_0}{\sqrt{1-\beta^2}}\cdot\frac{c\cdot\vec{V}}{c} = \frac{m_0\cdot c}{h}\cdot\frac{h\cdot\vec{\beta}}{\sqrt{1-\beta^2}} = \frac{h}{\lambda_c}\cdot\frac{\vec{\beta}}{\sqrt{1-\beta^2}}$$

$$P^2 = \vec{P}\cdot\vec{P} = P^2 + P^{*2} - 2\cdot\vec{P}\cdot\vec{P}^* = \frac{h^2}{\lambda_c^2}\cdot\frac{\beta^2}{1-\beta^2} = \frac{h^2}{\lambda^2\cdot\lambda^{*2}}\cdot\left(\lambda^{*2}+\lambda^2-2\cdot\lambda\cdot\lambda^*\cos(\theta)\right)$$

$$\frac{\beta^2}{1-\beta^2} = \frac{\lambda_c^2}{\lambda^2\cdot\lambda^{*2}}\cdot\left(\lambda^{*2}+\lambda^2-2\cdot\lambda\cdot\lambda^*\cos(\theta)\right) = \frac{\lambda_c^2}{\lambda^2\cdot\lambda^{*2}}\cdot\left(\lambda^{*2}+\lambda^2-2\cdot\lambda\cdot\lambda^*\left[\frac{\lambda}{\lambda_c}\right]\right)$$

$$\frac{\beta^2}{1-\beta^2} = \frac{\lambda_c^2}{\lambda^2}+\frac{\lambda_c^2}{\lambda^{*2}}-\frac{2\cdot\lambda_c^2}{\lambda_c\cdot\lambda^*} = \frac{1}{\cos^2(\theta)}+1-2 = \frac{1}{\cos^2(\theta)}-1 = \frac{1-\cos^2(\theta)}{\cos^2(\theta)} = \frac{\sin^2(\theta)}{\cos^2(\theta)}$$

$$\vec{\beta} = \sin(\theta) \qquad \frac{\vec{\beta}}{\sqrt{1-\beta^2}} = \frac{\sin(\theta)}{\cos(\theta)} = \tan(\theta) \qquad \sqrt{1-\beta^2} = \cos(\theta)$$

The three equations in the last line are very important items in the dictionary that enable us to find the electron speed and direction using only the photon deflecting angle θ, known as the Relativity Factors

6]

$$\vec{\beta} = \sin(\theta) \qquad \frac{\vec{\beta}}{\sqrt{1-\beta^2}} = \frac{\sin(\theta)}{\cos(\theta)} = \tan(\theta) \qquad \sqrt{1-\beta^2} = \cos(\theta)$$

(For more information read the appendix)

Computing the electron momentum and finding all the links between Quantum Mechanics and Relativity

Considered now the momentum of the electron after Compton's scattering of course we have to use relativistic mass and relativistic speed, the electron Relativistic velocity is V, and the relativistic mass is m

7]

$$\vec{P_e} = m \cdot \vec{V} = \frac{m_0 c \cdot \vec{V}/c}{\sqrt{1 - \frac{\vec{V} \cdot \vec{V}}{c^2}}} = \frac{m_0 c \cdot \vec{\beta}}{\sqrt{1-\beta^2}}$$

$$\lambda_e = \frac{h}{m \cdot \vec{V}} = \frac{h}{m_0 c} \cdot \frac{\sqrt{1-\beta^2}}{\vec{\beta}} = \lambda_c \cdot \frac{\sqrt{1-\beta^2}}{\vec{\beta}} = \lambda_c \cdot \frac{\cos(\theta)}{\sin(\theta)} = \lambda_c \cdot ctg(\theta)$$

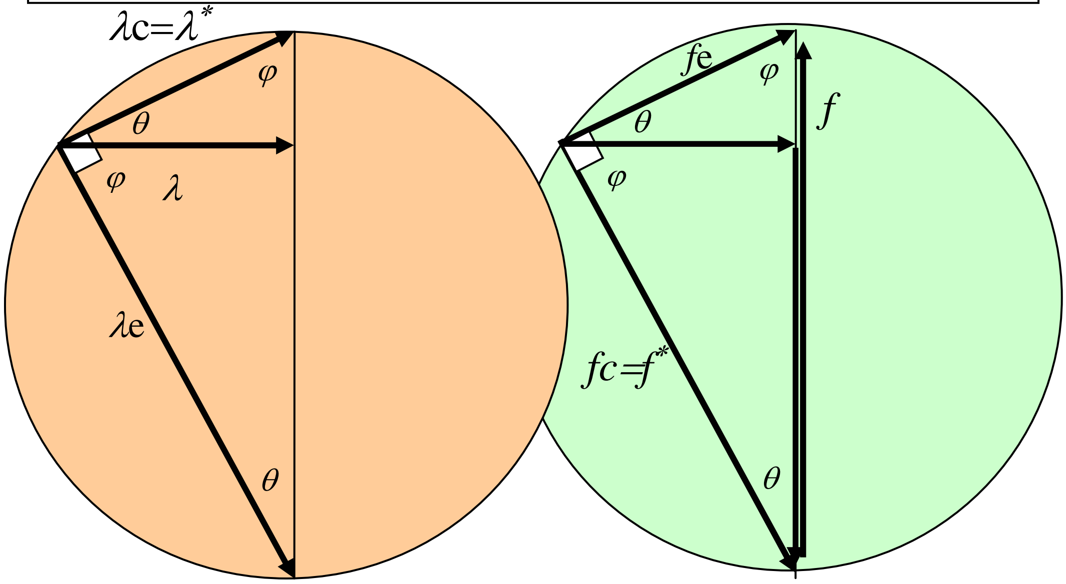
$$f_e = \frac{c}{\lambda_e} = \frac{c}{\lambda_c} \cdot \frac{\vec{\beta}}{\sqrt{1-\beta^2}} = f_c \cdot \frac{\vec{\beta}}{\sqrt{1-\beta^2}} = f_c \cdot \frac{\sin(\theta)}{\cos(\theta)} = f_c \cdot \tan(\theta)$$

What we find is a wavelength and frequency associated with the moving electron that obey relativity, and.

$$\lambda_e \cdot f_e = \lambda_c \cdot f_c = c$$

λe is a kind of a string that change length according to β

All the relations among angels, frequencies and wavelengths



Now we have 4 wavelength and 4 frequencies two for the electron and two for the photon that describe photon electron wavelengths and frequencies before and after collision.

$$\lambda_c,\ \lambda_e,\ \lambda^*,\ \lambda,\ \text{ and } \quad f_c,\ f_e,\ f^*\ f$$

We know from Relativity, that length and mass depend on relativistic velocity β
The circles above help to translate length and mass measured in one frame of reference, and find its length and mass in another frame of reference.

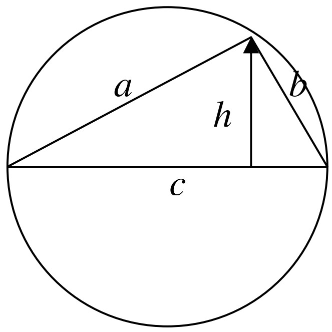
Every change in speed cause to a change in direction, since $\frac{V}{c} = \beta = \sin(\theta)$

That the reason why Time Space is curved

Introduction to
Relativity in N Dimensional Space

Pythagoras theorem and Relativity

No one can believe that Pythagoras's theorem is important to Relativity
In Pythagoras theorem we can find two important equations



Pythagoras' theorem

1] $a^2 + b^2 = c^2$

2] $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{h^2}$

From **Pythagoras' theorem** and the picture above that contains two big circles it can easily shown, that,

from left circle

$$\frac{1}{\lambda_c^2} + \frac{1}{\lambda_e^2} = \frac{1}{\lambda^2}$$

multiply by c^2

$$\frac{c^2}{\lambda_c^2} + \frac{c^2}{\lambda_e^2} = \frac{c^2}{\lambda^2}$$

but

$$\frac{\mathrm{c}}{\lambda_c} = f_c \qquad \frac{\mathrm{c}}{\lambda_{\mathrm{e}}} = f_e \qquad \frac{\mathrm{c}}{\lambda} = f$$

just what you get from the right circle

$$f_c^2 + f_e^2 = f^2$$

So Einstein's constant : the speed of light : c make the link between wavelengths and frequencies, using Pythagoras theorem
such that

$$c = \lambda_c \cdot f_c = \lambda_e \cdot f_e = \lambda^* \cdot f^* = \lambda \cdot f = c$$

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Conclusion

Relativity obeys rules of an Algebraic GROUP that is described by Pythagoras theorem
The figure with the two circles describe the rule of that Algebraic Group

Pythagoras theorem in a N dimensional Space

In a multi dimensional space we can use the following properties

Let c be a consnt (Speed of Light)

λ_n and f_n are wavelength and frequencies

and given

$$\forall_n \left\{ \left(\lambda_n \cdot f_n = c \right) \Big|_{n \in 1..P..N} \right\} \wedge \forall_n \left\{ \left(\lambda_P < \lambda_n \right) \Big|_{n \in 1..P..N} \right\}$$

$$if \qquad \sum_{n=1}^{N} \frac{1}{\lambda_n^2} = \frac{1}{\lambda_P^2} \Leftrightarrow \sum_{n=1}^{N} f_n^2 = f_P^2$$

proof

$$c^2 \cdot \sum_{n=1}^{N} \frac{1}{\lambda_n^2} = c^2 \cdot \frac{1}{\lambda_P^2} \Rightarrow \sum_{n=1}^{N} \frac{c^2}{\lambda_n^2} = \frac{c^2}{\lambda_P^2} \Rightarrow \sum_{n=1}^{N} f_n^2 = f_P^2$$

in this paper

$$\frac{\lambda_P}{\lambda_n} = \cos\left(\theta_n\right) = \sqrt{1 - \beta_n^2}$$

$$\frac{\vec{V}_n}{c} = \beta_n = \sin\left(\theta_n\right)$$

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Longitudinal contraction of a body in motion

One consequence of the well known theory of Relativity is that a body in motion is shorter than a body at rest

8]

$$L^{*}=\frac{L}{\sqrt{1-\beta^{2}}}$$

The best way to measure the length of the body is by finding how many λ are contained in L (Michelson–Morley experiment used this approach)

9]

$$L=X\cdot\lambda$$

but,

10]

$$\lambda=\lambda_{c}\cdot\cos(\theta) \qquad \lambda^{*}=\lambda_{c}$$

Multiplying both side of the equations by X.
And the well known equation is easily found.

11]

$$L=X\cdot\lambda=X\cdot\lambda_{c}\cdot\cos(\theta) \qquad L^{*}=X\cdot\lambda^{*}=X\cdot\lambda_{c}$$
$$L=L^{*}\cdot\cos(\theta)=L^{*}\cdot\sqrt{1-\beta^{2}}$$
$$L^{*}=\frac{L}{\sqrt{1-\beta^{2}}}$$

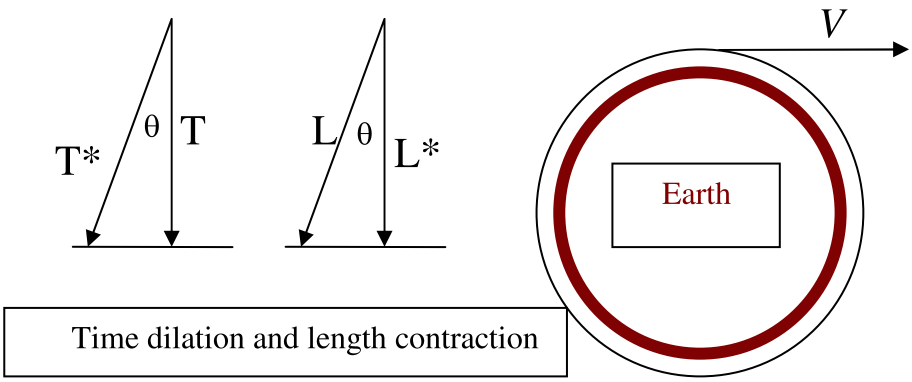
Time Dilation

12]

$$\lambda=\lambda_{c}\cdot\cos(\theta) \qquad \lambda^{*}=\lambda_{c}$$
$$\frac{c}{f}=\frac{c}{f_{c}}\cdot\cos(\theta) \qquad \frac{c}{f^{*}}=\frac{c}{f_{c}}$$
$$T=\frac{1}{f}$$
$$c\cdot T=c\cdot T_{c}\cdot\cos(\theta) \qquad c\cdot T^{*}=c\cdot T_{c}$$
$$c\cdot T=c\cdot T^{*}\cdot\cos(\theta)$$
$$T^{*}=\frac{T}{\cos(\theta)}=\frac{T}{\sqrt{1-\beta^{2}}} \qquad \beta=\frac{V}{c}$$

From the results above ,Time dilation depend on scattering angle and Relativity Factor

Time dilation = Twins paradox



Walking back in time

from
13]

$$\beta = \frac{V}{c}$$
$$\beta = \sin(\theta)$$
$$\left|\sin(\theta)\right| \le 1$$

Its become obvious that electron can't exceed speed of light

14]

$$\vec{\beta} = \sin(\theta) \qquad \frac{\vec{\beta}}{\sqrt{1-\beta^2}} = \frac{\sin(\theta)}{\cos(\theta)} = \tan(\theta) \qquad \sqrt{1-\beta^2} = \cos(\theta)$$

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The Bohr's Atom and the Fine-Structure Constant

Abbreviations

$c=3{\cdot}10^{8}$	speed of light
$h=6.626{\cdot}10^{-34}$	Plank Constant
$m_0=9.11{\cdot}10^{-31}$	electron rest mass
$\kappa_0= c^2{\cdot}10^{-7}$	Culomb constant
$\varepsilon_0=8.85{\cdot}10^{-12}$	vacuum permittivity
$\mu_0=4{\cdot}\pi{\cdot}10^{-7}$	permeability constant
$e=1.6{\cdot}10^{-19}$	electron charge
$\lambda c=\frac{h}{m_0 \cdot c}=0.0243{\cdot}10^{-10}$	Compton wavelength
$\alpha=\frac{1}{137.035999}$	fine-structure constant
R	Bohr Radius of atom
n=1,2,3,,,,,,	orbital number (integer)
Z	Atomic number (integer)

Introduction

In 1913, Niels Bohr developed a simple theory that succeeded to explain the Rydberg formula. Rydberg formula predicted empirically the wavelengths of the hydrogen atom spectrum. Bohr assumed the atom to be a planetary system and derived equation that could explain what happens in the hydrogen atom. Today we use Quantum Mechanics to explain the structure of the entire elements.

Arnold Sommerfeld introduced the fine-structure constant in 1916, in conjugate to Bohr's atom model. The **fine-structure constant** (usually denoted α, but in this paper it will be also denoted β) is given by;

$$\alpha_1 = \beta_1 = \frac{V_1}{c} = \frac{2 \cdot \pi \cdot \kappa_0 \cdot e^2}{h \cdot c} = \frac{c \cdot \mu_0 \cdot e^2}{2h} = \frac{1}{137.03599}$$

This constant is dimensionless quantity (velocity divided by velocity) and it has a constant numerical value in all system of units what we can also say about β is that this number is less than one because, no one can pass the speed of light. Also β is a Relatevistic Factor and is the same in all system of units.

The fine structure constant appears in Bohr's model of the hydrogen atom
In hydrogen like atom, Bohr assumed that, the centrifugal force is balanced by the electrostatic force between the negative charged electron and the heavy proton in the nucleus of the atom.

1]

$$\frac{m\cdot V^2}{R}=\frac{k_e\cdot e^2}{R^2}$$

Now, Performing some algebraic manipulations on Eq 1

2]

$$\frac{m\cdot V^2}{R}=\frac{k_e\cdot e^2}{R^2}$$

$$\frac{m\cdot V^2}{c^2\cdot R}=\frac{k_e\cdot e^2}{c^2\cdot R^2}$$

$$\frac{m_0\cdot\beta^2}{\sqrt{1-\beta^2}}=\frac{k_e\cdot e^2}{c^2\cdot R}$$

$$\frac{\beta^2}{\sqrt{1-\beta^2}}=\frac{k_e\cdot e^2}{m_0\cdot c^2\cdot R}\cdot\frac{2\cdot\pi}{2\cdot\pi}\cdot\frac{h\cdot c}{h\cdot c}=\frac{h\cdot c}{m_0\cdot c\cdot c}\cdot\frac{2\cdot\pi\cdot k_e\cdot e^2}{h\cdot c}\cdot\frac{1}{2\cdot\pi\cdot R}$$

$$\beta=\alpha\approx\frac{2\cdot\pi\cdot k_e\cdot e^2}{h\cdot c}=\frac{1}{137.035999}$$

$$\lambda c=\frac{h}{m_0\cdot c}=0.0243\cdot 10^{-10}$$

$$\frac{\beta^2}{\sqrt{1-\beta^2}}=\lambda c\cdot\beta\cdot\frac{1}{2\cdot\pi\cdot R}$$

$$2\cdot\pi\cdot R=\lambda c\cdot\frac{\sqrt{1-\beta^2}}{\beta}=\lambda c\cdot\frac{\cos(\theta)}{\sin(\theta)}=\lambda e$$

We must pay attention to β because the electron velocity V hides in β. We can see that because of "Length contraction" due to Relativity **<u>the circumference of the circle become as long as the electron wavelength λe due to relativity</u>**
And the electron is moving in a curved space with radius R

3]

$$2\cdot\pi\cdot R=\lambda c\cdot\frac{\sqrt{1-\beta^2}}{\beta}=\lambda c\cdot\frac{\cos(\theta)}{\sin(\theta)}=\lambda e$$

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(may be ,the last equation is just what "string theory" is searching for)
4]

$$\lambda_c = \frac{2\cdot\pi\cdot R\cdot\beta}{\sqrt{1-\beta^2}} \approx \frac{2\cdot\pi\cdot R}{137.035999}$$

$$R = \frac{\lambda_c}{2\cdot\pi}\cdot\frac{\sqrt{1-\beta^2}}{\beta} = 5.29967799799740\text{E-}11$$

The last result is the radius of the first orbit in Bohr's Atom
If the orbital number is higher, the electron speed V_n changes due to change in β_n .

$$\beta_n = n\cdot\beta_1$$

The total Energy of the electron is given by

4]

$$-1\cdot E = -1\cdot\frac{\kappa_0\cdot e^2}{2\cdot R}$$

$$-1\cdot E = \frac{2\cdot\pi^2\cdot\kappa_0^2\cdot e^4\cdot m}{h^2} = \frac{1}{2}\cdot\frac{4\cdot\pi^2\cdot\kappa_0^2\cdot e^4}{h^2\cdot c^2}\cdot m\cdot c^2 = \frac{1}{2}\cdot\frac{m_0\cdot c^2\cdot\beta^2}{\sqrt{1-\beta^2}}$$

$$-1\cdot E = \frac{1}{2}\cdot\frac{m_0\cdot c^2\cdot\beta^2}{\sqrt{1-\beta^2}} = \frac{1}{2}\cdot h\cdot f_c\cdot\frac{\beta^2}{\sqrt{1-\beta^2}} = \frac{1}{2}\cdot h\cdot f_c\cdot\frac{\sin^2(\theta)}{\cos(\theta)} = \frac{1}{2}\cdot h\cdot f_e\cdot\sin(\theta)$$

Bohr condition was that the electron is described by a wave according to De Broglie hypotesis. So if there is standing wave condition: than , a whole number of wavelengths must fit along the circumference of the electron's orbit: Bohr model don't take Relativity into account.
What we can see is how Relativity changes Energy, the energy of the electron is Compton's energy computed from Compton's wavelength. In the frame of the observer the value of the energy is different
One must pay attention when computing energy and orbital radius taking account Relativity

5]

$$\alpha_1 = \beta_1 = \frac{V_1}{c} = \frac{1}{137.03599}$$

$$\alpha_n = \beta_n = \frac{V_n}{c} = \frac{Z\cdot V_1}{n\cdot c}$$

$$R_n = \frac{n^2}{Z}\cdot R_1$$

$$E_n = \frac{Z^2}{n^2}\cdot E_1$$

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So what is the meaning of the fine-structure constant? As we see this constant is the β factor in Relativity So may be that β is due the electric and magnetic field of the electron that curve space
In each orbit β is different.
From Zeeman Effect and Bohr's atom model, we can learn that inside the atom their are some preferred β, So we can say that β is quantizes by the electromagnetic field .
The main question is what happens to the fine structure constant when using Schrödinger equations . According to Schrödinger there is a cloud that indicate the probability to find an electron. So the orbit is complicate and may be that β is changing periodically in each cycle, but not exactly constant

Conclusion

When an electron passes through an electromagnetic space, the space is curved and the electrons trajectory is a circle, ellipse, hyperbola etc. just like the planets. We always have to take Relativity into account.
The reason for the fine-structure constant is still not known and it must belong to trigonometry.

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Summary

Here is a first list of some physical conclusions

1. The presented theory is a wave theory
2. Time is moving from past to the future
3. Time is kept by a pulse generator a TicTac machine.
4. Photon electron interaction is bidirectional.
5. After each pulse the photon moves a distance given by λ^* and λ, the electrons moves a distance λe or λc
6. The motion of the electron after scattering is in a right angle to the direction of the photon.
7. The motion will be in straight lines till the next photon-electron interaction
8. The photon and the electron can not predict when and where will be the next interaction (future is unknown)
9. The present position of each electron depends on the whole history of all the electron and photon beginning at the Big bang
10. The probability that electron will interact not with its neighbors is low
11. Electron behave like wave but human prefers to explain physics using particles, not waves. So Relativity is a the dictionary from wave to particle mechanics.
12. The chance to come back to where the photon or the electron was previously is rare
13. The electron is able to return to where he was previously dependent on a series of interactions with other photons.
14. Inside the atom, or around a massive gravitational field, the electrons moves in planetary motion. May be, because of a sequence of photons- electrons interaction. Or may be because the field bend space (both are equivalent)

The second list of conclusions is about the Casino rules

1. the behavior of many electron photon interactions operates according to rules of a **CASINO**
2. The rules are well defined, in such a way, that any interaction is unpredictable , so it is a almost a fair play
3. There are two kinds of players, photon and electrons. And their number is almost infinite.
4. The playground is almost infinitely big
5. There is an asymmetry: electrons have one wavelength photon can have many wavelengths.
6. The rules of complexity of the UNIVERSE
   Suppose one wants to predict the next photon-electron collision. So, He must to find the history of all the photons and electron involved and keep all this information in a computer memory. This kind of computer will be bigger than the Universe itself. So future can't be predicted.

Suppose, there is such a powerful computer that will help us to predict future . But don't forget that the computer itself is made from electrons that influent all other electrons and will change all other electron position……so the ability to predict future does no exist.

The Casino's rules

1. Compton's Equation was found to be misleading therefore replaced by a new equation the "Mourici Compton Equation"

$$\lambda^* - \lambda = \lambda c \cdot (1-\cos(\theta)) = \lambda c \cdot \left(1-\sqrt{1-\left(V/c\right)^2}\right) = \lambda c \cdot \left(1-\sqrt{1-\beta^2}\right)$$

2. New law of physics were found
3. Relativity and Quantum Mechanics found to be the same theories
4. I have found a clue that may be our Universe can be described without any physical constants
5. Phenomenon's are local
6. The present depend on the history of all the players in our Universe
7. No way to go back in time
8. Asymmetry between the players. Photons have many wavelength the electron have only one wavelength Compton wavelength.

Thank you for reading the article
If you find any mistake please send a mail

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Appendix

Calculating the trigonometric identity

$$ctg(\varphi)=\left(1-\frac{1}{\cos(\theta)}\right)\cdot ctg\left(\frac{\theta}{2}\right)=\frac{\cos(\theta)-1}{\cos(\theta)}\cdot ctg\left(\frac{\theta}{2}\right)$$

$$ctg(\varphi)=\frac{-2\cdot\sin^2\left(\theta/2\right)}{\cos(\theta)}\cdot\frac{\cos\left(\theta/2\right)}{\sin\left(\theta/2\right)}=-1\cdot\frac{\sin(\theta)+\sin\left(0^\circ\right)}{\cos(\theta)}=-1\cdot\frac{\sin(\theta)}{\cos(\theta)}$$

$$ctg(\varphi)=\frac{\cos(\varphi)}{\sin(\varphi)}=-1\cdot\frac{\sin(\theta)}{\cos(\theta)}$$

$$\cos(\varphi)\cdot\cos(\theta)+\sin(\varphi)\sin(\theta)=0$$

$$\frac{\cos(\varphi)\cdot\cos(\theta)+\sin(\varphi)\cdot\sin(\theta)}{\sin(\varphi)\cdot\cos(\theta)}=0$$

$$\frac{\cos(\varphi+\theta)}{\sin(\varphi)\cdot\cos(\theta)}=0$$

$$\varphi+\theta=\pi/2$$

Explanation

Why

$$\lambda^*-\lambda=\lambda c\cdot\left(1-\cos(\theta)\right)=\lambda c\cdot\left(1-\sqrt{1-\left(V/c\right)^2}\right)=\lambda c\cdot\left(1-\sqrt{1-\beta^2}\right)$$

Can be understood us

$$\lambda=\lambda_c\cdot\cos(\theta)\qquad \lambda^*=\lambda_c$$

given,

$$\theta,\beta,V/c\to 0$$

$$\cos(\theta)\approx 1-\frac{\theta^2}{4}$$

$$\lambda^*-\lambda=\lambda c\cdot\left[1-\cos(\theta)\right]\approx\lambda c\cdot\frac{\theta^2}{4}$$

$$\sqrt{1-\beta^2}\approx 1+\frac{1}{2}\beta^2$$

$$\lambda^*-\lambda\approx\lambda_c\cdot\left[-\frac{1}{2}\beta^2\right]$$

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