

Particles, waves and trends in physics.

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Abstract

Speeds of electrons and protons in atoms are small. For example: An electron moving at a speed $v_e = 0,003c$ creates spectral line $H\alpha$. Accurate electron speeds are given in the table in this article. Confirmation of Doppler's principle in hydrogen for Balmer line $H\alpha$. Comparison the official and of the author's results.

Theory of particles, waves and heat. Accompanying activity of reaction on movement of stable particles in the transmission medium are waves. Neutron, β electron, gamma rays – calculations. Discussion to Cobalt-60 decay.

Stable **electrons** moving with speeds $(0,99c - c)$ creates leptons (μ^-, τ^-), neutrinos (ν_e, ν_μ, ν_τ) and bosons W^+, W^-, Z (= β electrons). Weak interactions are caused with stable **electrons**, which creates leptons (μ^-, τ^-) = (particles = electrons different speeds), neutrinos ν_e, ν_μ, ν_τ (= waves), bosons W^+, W^-, Z (= particles = β electrons moving at nearly the speed of light) and **gamma rays** (=waves of extremely high frequency $>10^{19}$ Hz).

Stable particles (**p** +, **n0**, **D**, **He-3**, **α**) moving with speeds $(0,3c - 0,99c)$ creates baryons and mesons.

The strong interactions are caused with stable particles (**p** +, **n0**, **D**, **He-3**, **α**), which creates baryons and mesons. Therefore creation and annihilation operators in physics are irrelevant.

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 :

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

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

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

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

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

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

Kinetic energy of electron

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

Kinetic energy of electron

$T_{\text{kin ad}} = mc^2 \left[\ln \left| 1 + \frac{v}{c} \right| - \frac{(v/c)}{(1+v/c)} \right]$ 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 accepted 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 = hv).

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 $\left[\ln \left 1 - \frac{v}{c} \right + \frac{\frac{v}{c}}{1 - \frac{v}{c}} \right]$	Behind of electron $\left[\ln \left 1 + \frac{v}{c} \right - \frac{\frac{v}{c}}{1 + \frac{v}{c}} \right]$
Electron 0,002717146 It is in the direction of motion (id)	3,704855771252357587813986763267e-6 1,8931773275045679448456130994356 eV Lambda_{id} (v/c=0,002717146) = hc/E_{k,id} = =654,900051928391151030938994 nm 4,5776826115258921719509259975895e+14 Hz	

	1,8931773275045679448456130994356 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)		3,6890835634754294760932629961125e-6 1,8851177462383644166232590190353 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)	3,7104012971124629780821510682521e-6 1,8960110852742780772396666918109 eV Lambda_{id} (v/c= 0,0027191751)=hc/ E_{k,id} = =653,92124535655764172783570 nm	3,6835939329504166639190831578912e-6 1,8823125509249667924159877724252 eV Lambda_{ad} (v/c= 0,0027191751)=hc/ E_{k,ad} = =658,68 nm

Conclusion:

$\lambda_{ad} (v/c=0,0027212042)=hc/E_{k,ad} = 657,699993841987869470 \text{ nm} = \lambda_{ad} = c/f_{min} = 657,7 \text{ nm}$ against the direction of motion of electron, moving with speed $v = 0,0027212042c$. Electron is in perinucleum. Frequency $4,5776826115258921719509259975895e+14 \text{ Hz}$

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

The wings^[6] of spectral line $H\alpha$ are 1 nm. ($658,68 \text{ nm} - 657,7 \text{ nm} = 0,98 \text{ nm}$, $654,9 \text{ nm} - 653,92 \text{ nm} = 0,98 \text{ nm}$).

Comparison

Official physics:

$$H_{\alpha} : E_3 - E_2 = -1,51\text{eV} - (-3,40\text{eV}) = 1,89\text{eV}$$

LV:

$1,8931774776185590593983814322796 \text{ eV}$, $654,90\text{nm}$ The core of the spectral line $H\alpha$

$1,8931773275045679448456130994356 \text{ eV}$

$1,8851177285881014565911509806897 \text{ eV}$ $\lambda_{ad} = c/f_{min} = 657,7 \text{ nm}$ The core of the spectral line $H\alpha$

$1,8823125509249667924159877724252 \text{ eV}$ $\lambda_{ad} (v/c=0,0027191751)=hc/E_{k,ad} = 658,68 \text{ nm}$ For the wings^[6] of spectral line $H\alpha$

$1,8960110852742780772396666918109 \text{ eV}$ $\lambda_{id} (v/c=0,0027191751)=hc/E_{k,id} = 653,92124535655764172783570 \text{ nm}$ For the wings^[6]

Physics in the past formulated at least part of the truth about the physical phenomena.

Some ideas, even if they were doubtful and rejectable, are still valid today:

1. Electron radiates electromagnetic waves if and only if it moves with acceleration from the higher Bohr's energy levels to a lower. In atom, as a source of electromagnetic waves, then it then, when it moves from afnucleum to perinucleum along the ellipse. If the electron moves with decelerated motion, when it absorbs energy, while moving from a lower to a higher energy level, in the direction from perinucleum to afnucleum along the ellipse with of very small eccentricity. Eccentricity of the ellipse is maximal, when electron radiates head of series. Minimal, almost zero, eccentricity corresponds to edge series.

Faulty arguments leveled against classical physics - the electron is moving with acceleration along of a spiral towards the nucleus - we will find in Beiser^[19] 5.7 The failure of classical physics, p.120, Fig.5.12: "Electron in an atom should be according to classical physics, rapidly converge to the nucleus, because as a result of its acceleration radiates energy."

Because the electron flashes **4,56793859936185,1361937147657453 e+14** times per second, i.e. emits energy **4,567938599361851361937147657453 e+14** times per second and absorbs energy **4,567938599361851361937147657453 e+14** times per second (for spectral line **H α**). Electron creates in the transmission medium, electromagnetic wave **4,567938599361851361937147657453 e+14** times per second and absorbs energy **4,567938599361851361937147657453 e+14** times per second (for spectral line **H α**) - Beiser's argument is unfounded.

Electron is no oscillator. Atom resembles to the solar system with the same "planets" (electrons) and different distances from the nucleus.

Electron in an atom not to skip, but moves continuously with great speed, which increases from the value **0,002717146 c** (in afnucleum) to **0,0027212042 c** (in perinucleum). Then decreases from the value **0,0027212042 c** (in perinucleum) to **0,002717146 c** (in afnucleum) etc.

Changing the speed of the electron is repeated **9,135877198723702723874295314906e+14** times per sec. (spectral lines **H α**).

2. The quantum harmonic oscillator as the quantum-mechanical analog of the classical Planck's harmonic 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. Linear harmonic oscillator is only the projection of the real motion of the electrons along the ellipse in the plane perpendicular to the plane of the ellipse.

Linear harmonic oscillator is only the projection of the real motion of the electrons along the ellipse in the plane perpendicular to the plane of the ellipse.

Or more accurately, is only the projection - of rotating ellipses (Sommerfeld's ellipses around perinucleus) - in a plane perpendicular to the plane of the ellipses.

In quantum mechanics are used so imprecise and imperfect expressions of motion of electrons around the nucleus.

Definition of heat

The main characteristic of **heat** is the energy transfer through a transmission medium.

And no transfer of the substance (= of real particles) from the source to the transmission medium.

Heat exists if and only if there is not a source.

In physics, **heat** refers to a process of transfer of energy between a source and its **transmission medium** other than by work or transfer real particles.

Heat must therefore consist of living force

$$F = QE_{\text{mov}} = QE_{\text{still}} \left(1 - \frac{v}{c} \cos \theta \right)^2 = QE_{\text{still}} \left(1 + \frac{v}{c} \sin \phi \right)^2 =$$

$$= QE_{\text{still}} + QE_{\text{still}} \left(2 + \frac{v}{c} \sin \phi \right) \frac{v}{c} \sin \phi$$

We can conceive, real moving particles - **e**, leptons (**μ⁻**, **τ⁻**), **W⁺**, **W⁻**, **Z** (= **β** electrons) or (**p⁺**, **n⁰**, **D**, **He-3**, **α**) - as moving charges and as the constituent of source in atoms. And creates (emits, radiates) and absorbs (annihilates) by your motion (if moves with acceleration and with deceleration), electromagnetic waves.

Heat as electromagnetic energy or (even outside physics too) thermal electromagnetic energy is the internal energy intake by the body (absorbed when charge (electron, proton) = real particle as a source, annihilates from the transmission medium, electromagnetic energy, i.e. source moving charge (electron, proton) absorbs (annihilates) from the transmission medium the electromagnetic energy, wherein transmission medium between the electrodes of hydrogen lamp is powered, in Interference comparator. Or transmit the electromagnetic energy to the transmission medium when charge (electron, proton) i.e. real particle as a source, creates in the transmission medium, electromagnetic wave. When the real particle as a source (charge-electron, proton) annihilates from the transmission medium, electromagnetic energy, source as a charge (electron, proton) absorbs (annihilates) from the transmission medium, electromagnetic energy by heat exchange to another body.

Definition of particle

The main characteristic of the particle :

Particle as a source exists if and only if repeatedly speeds up and slows down its movement in source along ellipse (when blinks).

Particle as a source, creates in the transmission medium, electromagnetic wave, that spreads in all directions with the velocity c/n , regardless of the source movement, where n is the refractive index of the transmission medium.

In other words, particle, which is the source, can not become the transmission medium and remain in it.

Particle that is the source, remain in the source.

Definition of waves

The main characteristic of the waves is the energy transfer through a transmission medium.

And no transfer of the substance (= of real particles) from the source to the transmission medium.

Wave exists if and only if there is not a source.

In the case of electromagnetic waves, see **2.1.3 The electromagnetic field. Maswell's equations, p. 28**^[3]

electric field intensity E and the magnetic induction B

are both associated with the intensity of a moving charge

$$E_{\text{mov}} = E_{\text{still}} \left(1 - \frac{v}{c} \cos \theta \right)^2 = E_{\text{still}} + B \quad \text{where} \quad B = \frac{E_{\text{still}}}{c} \left(2 + \frac{v}{c} \sin \phi \right)$$

The force acting on the moving electric charge is

$$F = QE_{\text{mov}} = QE_{\text{still}} \left(1 - \frac{v}{c} \cos \theta \right)^2 = QE_{\text{still}} \left(1 + \frac{v}{c} \sin \phi \right)^2 =$$

$$= QE_{\text{still}} + QE_{\text{still}} \left(2 + \frac{v}{c} \sin \phi \right) \frac{v}{c} \sin \phi$$

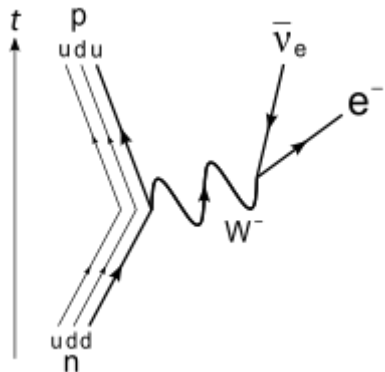
whereby $-\cos \theta = \sin \phi$

$$F = F_{\text{el}} + F_{\text{m}} = QE + Q(v \times B)$$

Neutron, β electron , gamma rays

Gamma rays have frequencies above 10 exahertz (10^{19} Hz), and therefore have energies above 100 keV and wavelength less than 10 picometers, often smaller than an atom. Gamma rays from radioactive decay commonly have energies of a few hundred keV, and almost always less than 10 MeV. The upper limit for such energies is about 20 MeV, and there is effectively no lower limit (they are sometimes classed as x-rays if their frequencies are lower than 10^{19} Hz).

β electron is emitted from the neutron



The Feynman diagram for beta decay of a neutron into a proton , electron , and electron antineutrino via an intermediate heavy W boson.

In the "stable" neutron, electron orbits around the center-of-mass with speed greater than $0,999994c$.

If will start beta decay of a neutron, β electron has kinetical energy in direction of motion $80\ 398\ \text{MeV}$ (it is W- boson), proton is moving at a speed $0,023337082847141190198366394399065c$, and radiates γ ray.

Planck: $80\ 398\ \text{MeV} = h \cdot f$, f is frequency circulation electron around center of mass in neutron in center- of- mass coordinate system

Neutron (= Proton and an electron orbiting a common center of mass) Beta decay is mediated by the weak force.

Electron		Proton	
$mc^2 \ln(1-v^2/c^2) + (2v^2/c^2)/(1-v^2/c^2)$ in the direction of movement = kinetic energy of electron + energy of waves radiated by movement of electron	$mc^2 [\ln 1+v/c - (v/c) / (1+v/c)]$ against the direction of movement = only energy of waves radiated by movement of electron	$mc^2 \ln(1-v^2/c^2) + (2v^2/c^2)/(1-v^2/c^2)$ in the direction of movement = kinetic energy of proton + energy of waves radiated by movement of proton	$mc^2 [\ln 1+v/c - (v/c) / (1+v/c)]$ against the direction of movement = only energy of waves radiated by movement of proton
$v/c = 0,99999364465781184$ W+- BOSON = β electron W+- = $80\ 398 \pm 0.25\ \text{MeV}$ = kinetic energy of elektron in direction of motion of	$0,19314559172439827476506281953288$ Muon neutrino $< 170\ \text{keV} = 0,17\ \text{MeV}$	$5,4446174569388848365045232464552e-4$ $0,510853218258925030861821842245\ \text{MeV}$	$1+v/c = 1,0233368828175491399522$ $[\ln 1+v/c - (v/c) / (1+v/c)] = 2,640490926311681431296567e$

electron

Planck : 80 398 MeV = h*f

$h = 6,6260689633e-34 \text{ Js} = 4,1356673310e-15 \text{ eVs}$

$f = 80 398 \text{ MeV} / h = 8,0 398e+10 \text{ eV} / 4,1356673310e-15 \text{ eVs}$

$= 19440151628578850990759246,829759 \text{ Hz}$

$= 1,94401516285788509907592468297e+25 \text{ Hz}$

angular velocity of the β electron = $= 2 * \pi * f = 122146075082029946177950744,23446 \text{ rad/s}$

Re orbit = $0,99999364465781184c / 122146075082029946177950744,23446 =$

$= 299790552,71634398041510272 / 122146075082029946177950744,23446 =$

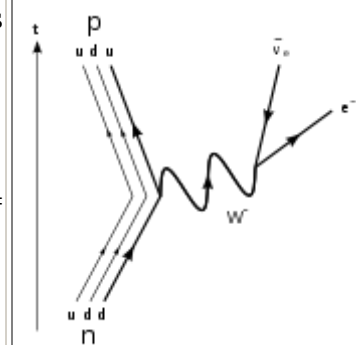
Re orbit = $2,45436091593620905607969474e-18 \text{ m/rad}$

$42,850352057551791567501064480165 * 0,023336882817549139952204241510852c =$

$0,99999364465781183999999999996341c$

$0,99999364465781184c$

$98,697186837160259358230511606622 \text{ keV} = \text{kinetic energy of elektron against direction of motion of electron} < 170 \text{ keV} = 0,17 \text{ MeV}$



Feynman's diagram beta decay of neutron

$v/c = 0,0233368828175491399522042$

$v/c = 0,9766631171824508600477957$

$[\ln |1-v/c| + (v/c) / (1-v/c)] =$

$= 2,810061766229054172607610e-4$

kinetic energy of proton = $0,263660231070038428385127 \text{ MeV}$

$mp / me =$

$= 938,27201323 / 0,51099891013 = 1836,152670054228007830683$

$(mp / me)^{0,5} =$

$42,85035204119364067457096660409$

$(mp / me)^{0,5} =$

$= 42,85035205755179156750106448 = 1,67262163783e-27 / 9,1093825e-31 \text{ Rp orbit} = \text{Re orbit} /$

$42,850352057551791567501$

$42,850352057551791567501$

$-40,247749873734600891500904M \text{ eV}$

against the direction of movement = only energy of waves radiated by movement of proton

$5,990565824226854176364e+19 \text{ Hz}$

$0,2636602310700384283851274 \text{ MeV} +$

$+0,24774987373460089150090M \text{ eV}$

$= 0,5114101048046393198860312 \text{ MeV}$

β electron is radiated from a neutron .Logically follows that , gamma rays are actually caused by the movement of a proton

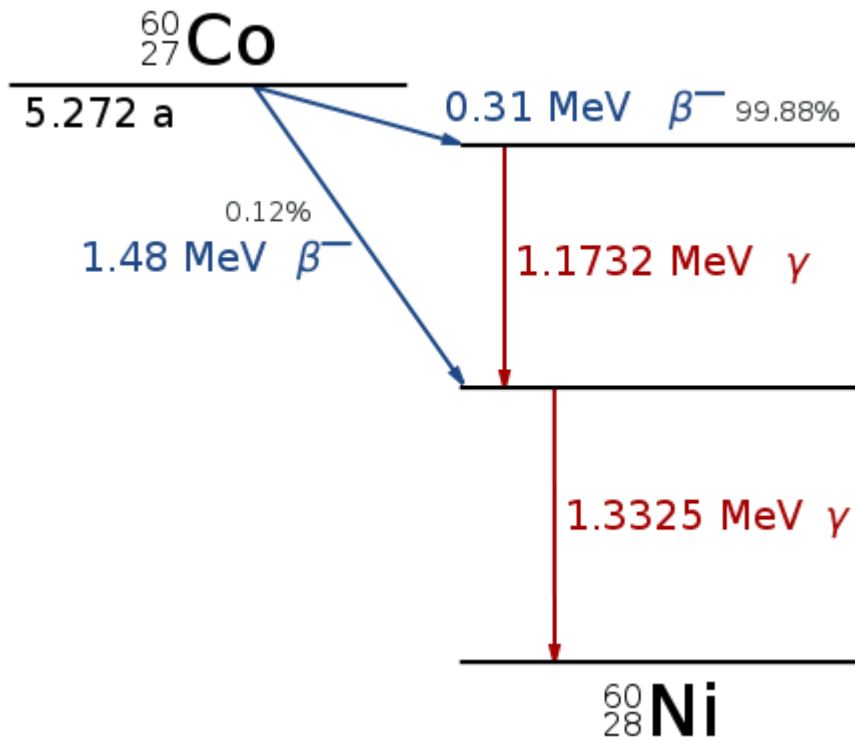
		<p>Rp orbit= =5,72774971052696715576355e-20 m/rad</p> <p>angular velocity of the proton = =2*π*f=122146075082029946177950744,23446 rad/s = angular velocity of the β electron in center-of-mass coordinates system</p> <p>Orbital speed of the proton =12214607508202994617795 rad/s* *5,727749710526967155e-20 m/rad = 6996221,46193102220205731201m/s= =0,0233368828175491399522042415c Orbital speed of the electron= =42,8503520575517915675010644 * *Orbital speed of the proton, see[3] p.63</p>	
<p>v/c = 0,999994396591 BOSON Z 91 187,6 MeV/c² = 91,187,6 GeV = kinetic energy of elektron in direction of motion of electron BOSON Z Planck 91 187,6 MeV = h*f h = 6,6260689633e-34 Js = 4,1356673310e-15 eVs f = 91 187,6 MeV / h = 9,11876e+10 eV/ /4,1356673310e-15 eVs =</p>	<p>0,1931457797076835630826 Muon neutrino= 98,6972828964141347372324 keV = kinetic energy of elektron against direction of motion of electron < 170 keV = 0,17 MeV</p>	<p>5,45056089619770317642249978648e-4 0,51141087453081320114439047437297 MeV How energy of electron !!!!!!! I tis energy β electron in neutron too !!!!!!! v/c = 0,023336900365437361502580178294 1-v/c=0,97666309963456263849741982 [ln 1-v/c + (v/c) / (1-v/c)] = 0,00028100660594011835046899960813 kinetical energy of proton =</p>	<p>1+v/c=1,023336900365437361502580178294878 [ln 1+v/c - (v/c) / (1+v/c)]= =2,64049483679651967173250371e-4 0,247750240644449079625375 MeV 5,99057469606829649581e+19 Hz against the direction of movement of</p>

<p> $=22049065532055484372807257,596126$ Hz $=2,2049065532055484372807257596126e$ $+25$ Hz angular velocity of β elektron $=2*\pi*f=$ $138538364588050870918387289,29769$ rad/s Re orbit = $0,999994396591c /$ $/ 138538364588050870918387289,29769=$ $=299790778,140242710678 /$ $/ 138538364588050870918387289,29769=$ $= 2,1639549379096690127802754e-18$ m/rad Radius of force reach of electron ($v/c=0,99999$ (electron in neutron W,Z): $r_e =2,8182929384359290310322993e-30$ m ...in the direction of movement $r_e =5,8358575551536354084674977e-14$ m ...against direction of movement </p>		<p> $=0,26366063388636412151901497$ MeV Rp orbit = Re orbit / $/42,85035205755179156750106448016 =$ $=5,05002837550386332418e-20$ m/rad angle speed of proton $=2*\pi*f=$ $138538364588050870918387289,2976$ 9 rad/s = angle speed of β electron in the center- of- mass coordinates system speed of proton = $=138538364588050870918387289,297$ 69 rad/s* $*5,050028375503863324181e-20$ m/rad = $6996226,7226555648498930849931m/s$ $=0,023336900365437361502580178294878c$ Radius of force reach of proton ($v/c=0,0233369$ proton in neutron ... W,Z): $r_p= 5,209499982315842954057e-$ 15 m in the direction of movement $r_p= 6,086602736065618022025e-$ 15 m against direction of movement </p>	<p> proton = only energy of waves radiated by movement of proton $0,263660633886364121519015$ MeV+ $+0,247750240644449079625375$ MeV = $= 0,5114108745308132011443905$ MeV β electron is radiated from a neutron . Logically follows that , gamma rays are actually caused by the movement of a proton </p>
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Planck and orbital radius of proton and electron in a Co and Ni neutrons: Cobalt-60 Decay

0,31 MeV β electrons is radiated from a neutron 99,88% from CO-60, 1,48 MeV β electrons is radiated from a neutron 0,12% from

CO-60



Cobalt-60 Decay

Electron

Proton

$mc^2 \ln(1-v^2/c^2) + (2v^2/c^2)/(1-v^2/c^2)$ <p>in the direction of movement = kinetic energy of electron + energy of waves radiated by movement of electron</p>	$mc^2 [\ln 1+v/c - (v/c) / (1+v/c)]$ <p>against the direction of movement = only energy of waves radiated by movement of electron</p>	$mc^2 \ln(1-v^2/c^2) + (2v^2/c^2)/(1-v^2/c^2)$ <p>in the direction of movement = kinetic energy of proton + energy of waves radiated by movement of proton</p>	$mc^2 [\ln 1+v/c - (v/c) / (1+v/c)]$ <p>against the direction of movement = only energy of waves radiated by movement of proton</p>
<p>$f = 2,8367852298127699672079838280397e+20$ Hz Re orbit = $42,850352057551791567501064480165$ *Rp orbit = $42,850352057551791567501064480165$ * $*8,6990713657946508626073196142044e-15$ m = Re orbit = $3,7275827059806869125485783868524e-13$ m</p>		<p>0,00268572349418252610237987554703 2,5199391898657489591669909237MeV v/c = 0,05172 , 1-v/c= 0,94828 $[\ln 1-v/c + (v/c) / (1-v/c)] =$ $= 0,00143539122553642070990525571$ kinetic energy of proton = 1,3467874149567344461710700766414 MeV Planck : 1,1732 MeV = h*f f = 1,1732 MeV / h = 1,1732e+6 eV/ /4,1356673310e-15 eVs = f = 283678522981276996720,79838280Hz f = 2,836785229812769967207983828e+20 Hz Vlcek : v/c = 0,05172, v = 0,05172c v = 2*pi*f*r r = v/(2*pi*f) r = 0,05172c/(2*pi*f) $= 8,69907136579465086260731961e-15$ m which is 10 times more than CODATA 2006 for the proton radius, the orbit is so real! Lower speed of proton, a larger radius orbit the proton in a neutron (in a center-of-mass system) 0,05172c = 15505265,92776 m/s $2*pi*f$ $= 1782404727558366288414,7841132354$ r = 0,05172c * h / (2*pi* 1,1732 MeV) 0,05172 / 1,1732 = 0,044084555063075349471530855779</p>	<p>0,0012503836664180792918138993482 1,1732 MeV γ ray <hr/> 1,3467874149567344461710700766414 +1,1732 = =2,519987414956734446171070076641 β electron is radiated from a neutron . Logically follows that , gamma rays are actually caused by the movement of a proton</p>

<p> $f = 3,2219709501581281804505953382738e+20 \text{ Hz}$ Re orbit $42,850352057551791567501064480165^*$ $*8,18066498314118032563081834804e-15 \text{ m} =$ $=3,5054437459248556864205100794378e-13 \text{ m}$ Re orbit $=3,5054437459248556864205100794378e-13 \text{ m}$ f is electron frequency circulation in neutron around center of mass </p>	<p style="text-align: center;">=</p>	<p> $0,0030656951951629005752891913607$ 2,8764560027150324805829147674735 $v/c = \mathbf{0,055242}$, $1-v/c = 0,944758$ $[\ln 1-v/c + (v/c) / (1-v/c)] =$ $0,00164564772927706190965458676942$ kinetical energy of proton $=1,5440652080161668904309575 \text{ MeV}$ Planck : $1,3325 \text{ MeV} = h \cdot f$ $f = 1,3325 \text{ MeV} / h =$ $= 1,3325 e+6 \text{ eV} / 4,1356673310e-15 \text{ eVs}$ $f = 322197095015812818045,0595338 \text{ Hz}$ $f = 3,22197095015812818045059e+20 \text{ Hz}$ $2 \cdot \pi \cdot f =$ $= 2024424053419300272172,43422339 \text{ Hz}$ Vlcek : $v/c = \mathbf{0,055242}$ $v = 0,055242c =$ $= 16561134,964836 \text{ m/s}$ $v = 2 \cdot \pi \cdot f \cdot r$ $r = v / (2 \cdot \pi \cdot f)$ $r = \mathbf{0,055242c} / (2 \cdot \pi \cdot f)$ $= 16561134,964836 /$ $r = 8,18066498314118e-15 \text{ m}$ which is 10 times more than CODATA 2006 for the proton radius, the orbit is so real! $0,055242 / 1,3325 =$ $= 0,041457410881801125703564727955$ Greater speed of proton, smaller radius of the orbit of the proton (in a center-of-mass system) $1,3467874149567344461710700766414$ $+1,1732 =$ $= 2,519987414956734446171070077 \text{ MeV}$ </p>	<p> $0,001420163855695610856070594001$ 1,3325 MeV γ ray β electron is radiated from a neutron . Logically follows that , gamma rays are actually caused by the movement of a proton <hr/> $1,5440652080161668904309575020503$ MeV + 1,3325 MeV = $= 2,87656520801616689043095750205$ </p>
		<p> $0,06206184027937119578766962708235$ 58,23088782368431751016927661 MeV $v/c = \mathbf{0,2385}$ $1-v/c = \mathbf{0,7615}$ $[\ln 1-v/c + (v/c) / (1-v/c)] =$ </p>	<p> $0,02131578019805794905922092308681$ $= [\ln 1+v/c - (v/c) / (1+v/c)]$ $[\ln 1+v/c - (v/c) / (1+v/c)]^*$ $*938,27201323 \text{ MeV} =$ </p>

		0,04073252959733420964215285359831 kinetic energy of proton = =38,21819254924133012209363582 MeV 38,21819254924133012209363582MeV + +20 MeV = = 58,2181925492413301220936358 MeV	=19,999999999999999999999999999999 MeV Gamma rays The upper limit for such energies is about 20 MeV 20e+6 eV/4,1356673310e-15 eVs = =4,8359789120572280382e+21H Z γ rays
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$$h = 6,6260689633e-34 \text{ Js} = 4,1356673310e-15 \text{ eVs}$$

W_{+/-} BOSON = β electron W_{+/-} = 80 398±0.25 MeV = kinetic energy of elektron in direction of motion of electron

$$\text{Planck : } 80\ 398 \text{ MeV} = h \cdot f$$

$$f = 80\ 398 \text{ MeV/h} = 8,0\ 398e+10 \text{ eV} / 4,1356673310e-15 \text{ eVs} = 19440151628578850990759246,829759 \text{ Hz}$$

$$= 1,9440151628578850990759246829759e+25 \text{ Hz}$$

$$\text{angular velocity of } \beta \text{ elektron} = 2 \cdot \pi \cdot f = 122146075082029946177950744,23446 \text{ rad/s}$$

$$\text{Re orbit} = 0,999994c / 122146075082029946177950744,23446 \text{ m/rad} =$$

$$= 299790659,245252 / 122146075082029946177950744,23446 =$$

$$= 2,4543617880797302297482811359261e-18 \text{ m/rad}$$

$$\text{Rp orbit} = \text{Re orbit} / 42,850352057551791567501064480165 = 5,7277517458510177080276963063067e-20 \text{ m/rad}$$

angular velocity of proton = $2 \cdot \pi \cdot f = 122146075082029946177950744,23446 \text{ rad/s}$ = angular velocity of β elektron in center-of-mass coordinates system

$$\text{velocity of proton} = 122146075082029946177950744,23446 \text{ rad/s} \cdot 5,7277988053202572456202593603874e-20 \text{ m/rad} = 6996281,4292940956826137689614932 \text{ m/s} = 0,023337082847141190198366394399065c$$

β electron is radiated from a neutron . Logically follows that , gamma rays(eg 1,1732 MeV γ ray 1,3325 MeV γ ray) are actually caused by the movement of a proton.

γ rays (γ photons) emitted by the excited protons

One neutron from the nucleus Co first converted on excited proton in nucleus Ni *, (and being radiated beta electron) while the excited proton from nucleus Ni * gets into state non excited Ni , which emits a gamma photon. I.e. γ ray (γ photons) are emitted by excited protons.

Comparing the kinetic energies of the 1,1732 MeV γ ray and proton we calculate the speed of proton :

$$1,1732 \text{ MeV} = \frac{mc^2}{\cos^2 \vartheta} \left[\ln \left| 1 - \frac{v}{c} \cos \vartheta \right| + \frac{\frac{v}{c} \cos \vartheta}{1 - \frac{v}{c} \cos \vartheta} \right] = eU_{\text{mov}} = eU_{\text{still}} \left(1 - \frac{v}{c} \cos \vartheta \right)^2 =$$

$$= 938,27201323 * [\ln |1+v/c| - (v/c) / (1+v/c)],$$

$$[\ln |1+v/c| - (v/c) / (1+v/c)] = 0,0012503836664180792918138993482723$$

$$v/c = \mathbf{0,05172} \quad 1+v/c = 1,05172 \quad [\ln |1+v/c| - (v/c) / (1+v/c)] = 0,001250332268646105392474619837639$$

$$v/c = \mathbf{0,05172} \quad 1-v/c = 0,94828 \quad [\ln |1-v/c| + (v/c) / (1-v/c)] = 0,0014353912255364207099052557093913$$

the kinetic energy of proton = **1,3467874149567344461710700766414 MeV**

$$1 - v^2/c^2 = 0,9973250416 \quad v^2/c^2 = 0,0026749584$$

Comparing the kinetic energies of the 1,3325 MeV γ ray and proton we calculate the speed of proton :

$$1,3325 \text{ MeV} = \frac{mc^2}{\cos^2 \vartheta} \left[\ln \left| 1 - \frac{v}{c} \cos \vartheta \right| + \frac{\frac{v}{c} \cos \vartheta}{1 - \frac{v}{c} \cos \vartheta} \right] = eU_{\text{mov}} = eU_{\text{still}} \left(1 - \frac{v}{c} \cos \vartheta \right)^2 =$$

$$= 938,27201323 * [\ln |1+v/c| - (v/c) / (1+v/c)], \quad [\ln |1+v/c| - (v/c) / (1+v/c)] = 0,0014201638556956108560705940006587$$

$$v/c = \mathbf{0,055242} \quad 1+v/c = 1,055242 \quad [\ln |1+v/c| - (v/c) / (1+v/c)] = 0,0014200474658858386656346045912884$$

$$1 - v^2/c^2 = 0,996948321436 \quad v^2/c^2 = 0,003051678564$$

$$v/c = \mathbf{0,0233371} \quad 1+v/c = 1,0233371$$

$$[\ln |1+v/c| - (v/c) / (1+v/c)] = 2,6405393248504354747513935636936e-4$$

$$1 - v^2/c^2 = 0,99945537976359 \quad v^2/c^2 = 0,00054462023641$$

$$\ln(1 - v^2/c^2) = -5,4476859587977874891229245264689e-4$$

$$v/c = \mathbf{0,0233371} \quad , 1 - v/c = 0,9766629$$

$$[\ln|1 - v/c| + (v/c) / (1 - v/c)] = 2,8101149011597037322533689209691e-4$$

Proton 938,27201323 MeV/c² :

v/c	$mc^2 \ln(1 - v^2/c^2) + (2v^2/c^2) / (1 - v^2/c^2)$ in the direction of movement = kinetic energy of proton + energy of waves radiated by movement of proton	$mc^2 [\ln 1 + v/c - (v/c) / (1 + v/c)]$ against the direction of movement = only energy of waves radiated by movement of proton
0,0233371	<p>5,4506542260101392070047624846627e-4 0,51141963140591407441489142146824 MeV because : for emission of electron β from neutron is valid equation: <i>kinetic energy of proton + energy of waves radiated by movement of proton = kinetic energy of elektron in direction of motion of electron</i> = 0,26366521657187376826117133419276 MeV + + 0,24775441483404030615372008727548 MeV γ ray (for emission of electron β from neutron) = = 0,51141963140591407441489142146776 MeV =free electron</p> <p>(for electron speed $v = 0,6821555671006273161671553c$) = = 0,51099890997249598396127388955714 MeV for a free electron, which left neutron, from β electron (W + -, or Z) becomes a free electron ($v = 0,6821555671 c$)</p> <hr/> <p>v/c = 0,0233371 , 1 - v/c = 0,9766629 [ln 1 - v/c + (v/c) / (1 - v/c)] =</p>	<p>2,6405393248504354747513935636936e-4 0,24775441483404030615372008727548 MeV γ rays for emission of electron β from neutron energy of waves radiated by movement of proton:</p> <hr/> <p>$mc^2 [\ln 1 + v/c - (v/c) / (1 + v/c)] = \mathbf{938,27201323 MeV} *$ *2,6405393248504354747513935636936e-4 = = 0,24775441483404030615372008727548 MeV γ rays (for emission of electron β from neutron)</p> <hr/> <p>Comment: 0,26366521657187376826117133419276 + + 0,24775441483404030615372008727548 = = 0,51141963140591407441489142146776 for emission of electron β from neutron is valid equation: <i>kinetic energy of proton + energy of waves radiated by movement of proton = kinetic energy of elektron in direction of motion of electron</i> (for v/c = 0,6821555671006273161671553) = 0,51099890997249598396127388955714 MeV =free electron (for electron speed</p>

	<p>= 2,8101149011597037322533689209691e-4 kinetic energy of proton = =0,26366521657187376826117133419276 MeV</p>	<p>v =0,6821555671006273161671553c) = =0,51099890997249598396127388955714 MeV for a free electron, which left neutron, from β electron (W + -, or Z) becomes a free electron (v = 0,6821555671 c)</p>
<p>W+- BOSON = β electron W+- = 80 398±0.25 MeV = kinetic energy of elektron in direction of motion of electron Planck : 80 398 MeV = h*f f = 80 398 MeV/h = 8,0 398e+10 eV /4,1356673310e-15 eVs =19440151628578850990759246,829759 Hz =1,9440151628578850990759246829759e+25 Hz angular velocity of β elektron =2*π*f=122146075082029946177950744,23446 rad/s</p> <p>Re orbit = 0,999994c /122146075082029946177950744,23446 m/rad= = 299790659,245252 / 122146075082029946177950744,23446= =2,4543617880797302297482811359261e-18 m/rad</p> <p>Rp orbit = Re orbit / 42,850352057551791567501064480165 = 5,7277517458510177080276963063067e-20 m/rad see you [3] p.68.</p> <p>angular velocity of proton =2*π*f=122146075082029946177950744,23446 rad/s = angular velocity of β elektron in center-of-mass coordinates system</p> <p>velocityofproton=122146075082029946177950744,23446rad/s*5,7277988053202572456202593603874e-20m/rad =6996281,4292940956826137689614932m/s= =0,023337082847141190198366394399065c =0,0233371c</p> <p>for emission of electron β from neutron is valid equation: kinetic energy of proton + energy of waves radiated by movement of proton = kinetic energy of elektron in direction of motion of electron (for electron speed v =0,6821555671006273161671553c) =0,51099890997249598396127388955714 MeV</p>		
<p>0,05172</p>	<p>0,0026857234941825261023798755470303 2,5199391898657489591669909237489</p>	<p>0,0012503836664180792918138993482723 1,1732 MeV γ rays</p>

	<p>v/c = 0,05172 , 1-v/c= 0,94828 $[\ln 1-v/c + (v/c) / (1-v/c)] =$ =0,0014353912255364207099052557093913 kinetic energy of proton = 1,3467874149567344461710700766414 MeV</p> <hr/> <p>1,3467874149567344461710700766414 +1,1732 = = 2,519987414956734446171070076641 MeV= = $mc^2 \ln (1-v^2/c^2) + (2v^2/c^2) / (1-v^2/c^2) =$ = in the direction of movement = kinetic energy of proton + + energy of waves radiated by movement of proton</p>	<p>Comparing the kinetic energies of the 1,1732 MeV γ rays and proton we calculate the speed of proton :</p> <p>1,1732 MeV =</p> $\frac{mc^2}{\cos^2 \vartheta} \left[\ln \left 1 - \frac{v}{c} \cos \vartheta \right + \frac{\frac{v}{c} \cos \vartheta}{1 - \frac{v}{c} \cos \vartheta} \right] = eU_{\text{mov}} =$ <p>= 938,27201323 MeV * [ln 1+v/c - (v/c) / (1+v/c)] , v = 0,05172c see you above</p> <hr/> <p>$mc^2 [\ln 1+v/c - (v/c) / (1+v/c)] = 1,1732 \text{ MeV}$ against the direction of movement = only energy of waves radiated by movement of proton = energy of γ rays 1,1732 MeV</p>
0,055242	<p>0,0030656951951629005752891913607114 2,8764560027150324805829147674735 v/c = 0,055242, 1-v/c= 0,944758 $[\ln 1-v/c + (v/c) / (1-v/c)] =$ = 0,0016456477292770619096545867694231 kinetic energy of proton = =1,5440652080161668904309575020503 MeV</p> <hr/> <p>1,544065208016166890430957502050 MeV+1,3325 MeV= = 2,87656520801616689043095750205 MeV= = $mc^2 \ln (1-v^2/c^2) + (2v^2/c^2) / (1-v^2/c^2) =$ = in the direction of movement = kinetic energy of proton + + energy of waves radiated by movement of proton</p>	<p>0,0014201638556956108560705940006587 1,3325 MeV γ rays Comparing the kinetic energies of the 1,3325 MeV γ ray and proton we calculate the speed of proton :</p> <p>1,3325MeV=</p> $\frac{mc^2}{\cos^2 \vartheta} \left[\ln \left 1 - \frac{v}{c} \cos \vartheta \right + \frac{\frac{v}{c} \cos \vartheta}{1 - \frac{v}{c} \cos \vartheta} \right] = eU_{\text{mov}} =$ <p>= 938,27201323 * [ln 1+v/c - (v/c) / (1+v/c)] , $[\ln 1+v/c - (v/c) / (1+v/c)] =$ = 0,0014201638556956108560705940006587 v = 0,055242c</p> <hr/> <p>$mc^2 [\ln 1+v/c - (v/c) / (1+v/c)] = 1,3325 \text{ MeV}$ against the direction of movement=onlyenergy of waves radiated by movement of proton = energy of γ rays 1,3325 MeV</p>

0,1	0,01015168434851876083665316264402 9,5250413113601786986314420892325	0,0044010888952339509530430323716742 4,1294185381353557125587631775622
0,2	0,042511338813078203778756268178333 39,887199453249524912925837248854	0,015654890127287959545051358487848 14,688545276624924762274133011344
0,2385 upper limit for speed of proton in neutron= 0,2385c	0,062061840279371195787669627082353 58,230887823684317510169276612683 MeV v/c = 0,2385 1-v/c= 0,7615 [ln 1-v/c + (v/c) / (1-v/c)] = 0,040732529597334209642152853598307 kinetic energy of proton = =38,218192549241330122093635817073 MeV Comment: $mc^2 \ln(1-v^2/c^2) + (2v^2/c^2) / (1-v^2/c^2) =$ = in the direction of movement = kinetic energy of proton + + energy of waves radiated by movement of proton = 38,218192549241330122093635817073 MeV + 20 MeV = = 58,218192549241330122093635817073 MeV	0,02131578019805794905922092308681 Gamma rays The upper limit for such energies is about 20 MeV 20 MeV = $\frac{mc^2}{\cos^2 \vartheta} \left[\ln \left 1 - \frac{v}{c} \cos \vartheta \right + \frac{\frac{v}{c} \cos \vartheta}{1 - \frac{v}{c} \cos \vartheta} \right] = eU_{\text{mov}} =$ = = 938,27201323 [ln 1+v/c - (v/c) / (1+v/c)] , [ln 1+v/c - (v/c) / (1+v/c)]= =0,02131578019805794905922092308681 v/c = 0,2385 1+v/c= 1,2385 [ln 1+v/c - (v/c) / (1+v/c)] = 0,021329310682036986145516773484046 v/c = 0,2385 1-v/c= 0,7615 [ln 1-v/c + (v/c) / (1-v/c)] = 0,040732529597334209642152853598307 kinetic energy of proton = 38,218192549241330122093635817073 MeV 1 - v ² /c ² = 0,94311775 , v ² /c ² =0,05688225 ln (1-v ² /c ²) = -0,058564136699643354622393167303608

0,3	0,1034915183309564753206594734422 97,103195256615981530619973957697	0,031595033698260282804726756111724 29,644735876136367895740124416315
0,4	0,20659899380760319968003169486638 193,84605385115215744477303017213	0,050757950906927216218879124502706 47,624764784872103514767224480511
0,5	0,37898459421488573922744766067367 355,59063819715545377935410145411	0,072131774774831048644679782131016 67,679225535833657944955762108731
0,6	0,678712897371580488467409819381 636,81731662199920030130340847408	0,095003629245735553650937031148342 89,139246476552804316253364891193
0,7	1,248224074187214795765659690525 1171,173715049790902349488797128	0,11886354517981745505507257495347 111,52633783552238591841798542491
0,8	2,5339043080235741891445273629486 377,49149642144899674890050027	0,14334222045767456374528669617442 134,49399376968080492945211734271 / meson pí +- /
0,9	6,8655845826520333024993603119937 6441,7858683657726192890803907208	0,16816967564607898651735176667717 157,78890013268263163523366844813
0,99	94,585477015562380011096949442981 88746,905941711606333662244494576	0,19064720155047137913293235234906 178,8789336154263583545510500319
0,999	992,28514190159865722507680221572 931033,3777902292026700374964563	0,19289718058079427713077657976902 180,99002596993270707595628949319
0,9999	9989,9827818085837834082411933913 9373321,2568205757269535807354964	0,19312218055996614431315921000012 181,20113715336700296534860754822
0,99994	166653,83606125849039287728844767 156366630,27369937738835558708407	0,19314568055994531391725237153108 181,22318654565836338784472026638

$$\begin{aligned}
20 \text{ MeV} &= \frac{mc^2}{\cos^2 \vartheta} \left[\ln \left| 1 - \frac{v}{c} \cos \vartheta \right| + \frac{\frac{v}{c} \cos \vartheta}{1 - \frac{v}{c} \cos \vartheta} \right] = eU_{\text{mov}} = eU_{\text{still}} \left(1 - \frac{v}{c} \cos \vartheta \right)^2 = \\
&= 938,27201323 * [\ln |1+v/c|- (v/c) / (1+v/c)], \\
&[\ln |1+v/c|- (v/c) / (1+v/c)] = 0,02131578019805794905922092308681
\end{aligned}$$

$v/c = \mathbf{0,2385}$ $1+v/c = 1,2385$ $[\ln|1+v/c| - (v/c) / (1+v/c)] = 0,021329310682036986145516773484046$
 $v/c = \mathbf{0,2385}$ $1-v/c = \mathbf{0,7615}$ $[\ln|1-v/c| + (v/c) / (1-v/c)] = 0,040732529597334209642152853598307$
kinetic energy of proton = 38,218192549241330122093635817073 MeV

$1 - v^2/c^2 = 0,94311775$, $v^2/c^2 = 0,05688225$ $\ln(1-v^2/c^2) = \mathbf{-0,058564136699643354622393167303608}$

Electron **0,51099891013 MeV/c²**

v/c	$mc^2 \ln(1-v^2/c^2) + (2v^2/c^2) / (1-v^2/c^2)$ in the direction of movement = kinetic energy of of realy electron + energy of waves radiated by movement of electron	$mc^2 [\ln 1+v/c - (v/c) / (1+v/c)]$ against the direction of movement = only energy of waves radiated by movement of electron
0,1	0,01015168434851876083665316264402 0,0051874996380768658673878930679016 MeV	0,0044010888952339509530430323716742
0,2	0,042511338813078203778756268178333	0,015654890127287959545051358487848
0,3	0,1034915183309564753206594734422	0,031595033698260282804726756111724
0,4	0,20659899380760319968003169486638	0,050757950906927216218879124502706
0,5	0,37898459421488573922744766067367 0,19366071459986691576770514278552 MeV	0,072131774774831048644679782131016
	0,31 MeV ...99,88% 0,31 MeV β electrons is radiated from a neutron 99,88% from CO-60, see you scheme-fig. Cobalt-60 Decay above.	
0,6	0,678712897371580488467409819381 0,34682155084805217124241945172775 MeV	0,095003629245735553650937031148342
0,7	1,248224074187214795765659690525	0,11886354517981745505507257495347
0,8	2,5339043080235741891445273629486 1,2948223397737582250000519595204 MeV	0,14334222045767456374528669617442 0,073247718429485891868064712669302

	1,48 MeV ...0,12 % 1,48 MeV β electrons is radiated from a neutron 0,12% from CO-60 see you scheme-fig. Cobalt-60 Decay above.	
0,9	6,8655845826520333024993603119937 3,5083062391405199226056377244506	0,16816967564607898651735176667717 0,085934520972061965718261717105777
0,99	94,585477015562380011096949442981	0,19064720155047137913293235234906
0,999	992,28514190159865722507680221572	0,19289718058079427713077657976902
0,9999	9989,9827818085837834082411933913 5104,870313721651903600403226683 MeV	0,19312218055996614431315921000012
0,999994 W+-	166653,83606125849039287728844767 85159,928596286780506969369911588 MeV	

Discussion to Cobalt-60 Decay

Neutron is source β rays - β electrons (bosons Zo W+- too) , γ rays, electron neutrinos, muon neutrinos, tauon neutrinos:

1a.) β electron is radiated from a neutron ,for $v/c = 0,999994396591$

BOSON Z = β electron

for $v/c = 0,99999364465781184$ W+- BOSON = β electron w+-

1b.) electron neutrinos, muon neutrinos, tauon neutrinos are waves against the direction of movement (= only energy of waves radiated by movement of electron) and in direction of movement (= only energy of waves radiated by movement of electron)

2. Logically follows that , gamma rays are actually caused by the movement of a proton in neutron.

Quarks

Why are discovered by quarks in pairs?

u,d

c,s

t,b

We show that each particle is accompanied by his twin.

A pair of quarks of one generation = one speed of proton.

u,d quarks are in the proton at speed of proton :

from $v = 0,05875c$ to $v = 0,105065c$ down – up,

PROTON	Front of proton	Behind proton
$\frac{v}{c}$	$\left[\ln \left 1 - \frac{v}{c} \right + \frac{\frac{v}{c}}{1 - \frac{v}{c}} \right]$ kinetic energy of proton in direction of motion of proton	$\left[\ln \left 1 + \frac{v}{c} \right - \frac{\frac{v}{c}}{1 + \frac{v}{c}} \right]$ kinetic energy of proton against direction of motion of proton
0,05875	0,0018704988039450329861777626124876 <i>Down quark: 1,7550 MeV</i>	0,0015986835148543461794415692315107 <i>Up quark: 1,5 MeV</i>
0,075	0,0031195396113692225967210545118109 <i>Down quark: 2,92697671 MeV</i>	0,0025532197191610043413170483032692 <i>Up quark: 2,4MeV</i>
0,081622	0,0037302615346601410853636615401917 <i>Down quark: 3,5 MeV</i>	0,0029991740444424494322328316937018 <i>Up quark: 2,81404106871 MeV</i>
0,08878	0,0044589013511482922312132108807756 <i>Down quark: 4,18366235 MeV</i>	0,0035171037326795615947714523093236 <i>Up quark: 3,3 MeV</i>
0,094686	0,0051156918494022662432562213837619 <i>Down quark: 4,8MeV</i>	0,0039715278483606256196473452168454 <i>Up quark: 3,72637 MeV</i>
0,105065	0,0063947340594173847177662769260429 <i>Down quark: 6 MeV</i>	0,0048283015026596502291040657295924 <i>Up quark: 4,530260 MeV</i>

c,s quarks are in the proton at speed of proton

from $v = 0,5111c$ to $v = 0,7805c$:

PROTON	Front of proton	Behind proton

$\frac{v}{c}$	$\left[\ln \left 1 - \frac{v}{c} \right + \frac{\frac{v}{c}}{1 - \frac{v}{c}} \right]$ kinetic energy of proton in direction of motion of proton	$\left[\ln \left 1 + \frac{v}{c} \right - \frac{\frac{v}{c}}{1 + \frac{v}{c}} \right]$ kinetic energy of proton against direction of motion of proton
0,5111	0,32981074951021491557976368704646 c quark: 309,452195927844585291MeV 1.16–1.34 GeV	0,074607434272664489316082658299818 s quark: 70,002067556937811146930701620MeV
0,6668	0,90218811150262740395503144610525 c quark: 846,49785569 MeV 1.16–1.34 GeV	0,11085762440585416420687015655648 s quark: 104,0146 MeV
0,6821555671006273161671553	1,00000000000000000000000002540294 proton 938,27201323 MeV	0,11455138503597051915497991380189 107,48035865598495497447128210228 MeV muon ??
0,68235958021424280152472	1,0013786565641523712273883571732 neutron = 939,5655681 MeV	0,1146005687662303001068450497695 107,52650637359396091907658895042 MeV muon ??
0,713	1,236047494268773255524413529431 c quark: 1160 MeV 1.16–1.34 GeV	0,12201738104659464824870350196726 s quark=114,485493763640 MeV
0,72585	1,3535582771630143437838209404184 c quark: 1270 MeV 1.16–1.34 GeV	0,12514431408438967945446850497659 s quark: 117,41941 MeV
0,73333	1,4281572732698825869678018468163 c quark: 1340 MeV 1.16–1.34 GeV	0,12696860023316592749751861919307 s quark= 119,1311MeV

0,7805	2,0394056095695354577702972159855 c quark:1913,517207083363387638 MeV/c ² 1.16–1.34 GeV	0,13853421250289559168530489708379 s quark: 129,982774 MeV
0,9928305	Higgs Boson /p: 133,54335827671029218747501724036 Higgs Boson 125300 MeV/c²	0,191354813279005033975005068774 179,5428721672400220720275MeV/c²

t quark is in the proton (neutron) at speed of proton (neutron):

v=0,994637c for Top quark: 169 100MeV

v=0,994766c for Top quark: 173 400MeV/c²

PROTON	Front of proton	Behind proton
$\frac{v}{c}$	$\left[\ln \left 1 - \frac{v}{c} \right + \frac{\frac{v}{c}}{1 - \frac{v}{c}} \right]$ kinetic energy of proton in direction of motion of proton	$\left[\ln \left 1 + \frac{v}{c} \right - \frac{\frac{v}{c}}{1 + \frac{v}{c}} \right]$ kinetic energy of proton against direction of motion of proton
0,9928305	Higgs Boson /p: 133,54335827671029218747501724036 Higgs Boson 125300 MeV/c²	0,191354813279005033975005068774 179,5428721672400220720275MeV/c²
0,994637	180,2249215745799592957129046 9898 Top quark: 169 100MeV	0,19180643378644112290601029593 852 179,966608779270804265884148 MeV
0,994766	184,8078143171624183434454031 6264 Top quark: 173 400MeV	0,19183868355887822897300444041 866 179,99686783818157713891779163 MeV

b quark is in the proton (neutron) at speed of proton (neutron):

v=0,8665c pre 4,2 GeV Bottom quark

PROTON	Front of proton	Behind proton
$\frac{v}{c}$	$\left[\ln \left 1 - \frac{v}{c} \right + \frac{\frac{v}{c}}{1 - \frac{v}{c}} \right]$	$\left[\ln \left 1 + \frac{v}{c} \right - \frac{\frac{v}{c}}{1 + \frac{v}{c}} \right]$
	kinetic energy of proton in direction of motion of proton	kinetic energy of proton against direction of motion of proton
0,8665	4,476313841592169302436394	0,159827140990503087217669575
	4,2 GeV <i>Bottom quark</i>	149,96133334595438795425311140944 MeV

Leptons (electron, muon, tau), W + - Z bosons and neutrinos

Leptons (electron, muon, tau), W + - Z bosons and neutrinos (electron neutrino , muon neutrino, tau neutrino) can be replaced with electron moving at different speeds from 0.1c up to 0.999.. c :

ELECTRON	Front of elektron	Behind elektron
$\frac{v}{c}$	$\left[\ln \left 1 - \frac{v}{c} \right + \frac{\frac{v}{c}}{1 - \frac{v}{c}} \right]$	$\left[\ln \left 1 + \frac{v}{c} \right - \frac{\frac{v}{c}}{1 + \frac{v}{c}} \right]$
	kinetic energy of elektron in direction of motion of electron	kinetic energy of elektron against direction of motion of electron

where v is velocity of electron , proton , neutron, alpha particle.

$\frac{v}{c}$	Front of electron, proton, neutron, deuteron, He-3, α -particle	Behind of electron, proton, neutron, deuteron, He-3, α -particle	Decay modes
	$\left[\ln \left 1 - \frac{v}{c} \right + \frac{\frac{v}{c}}{1 - \frac{v}{c}} \right]$	$\left[\ln \left 1 + \frac{v}{c} \right - \frac{\frac{v}{c}}{1 + \frac{v}{c}} \right]$	
Neutron 0,5836009497521116689581	K⁺/<u>n0</u> : 0,5254312381545198230873 Kaon K⁺ 493.677 MeV/c ²	/<u>n0</u> : 0,09117355136082414012969482667 85,6635122670815933982547583 MeV/c² f =2,07133460116943425312851e+22 Hz ...gamma rays $\gamma + \gamma$	$\mu^+ + \nu_\mu$ or π^+ + π^0 or $\pi^0 + e^+ + \nu_e$
Neutron 0,58484084562020497175	K⁰/<u>n0</u> : 0,52962147343915804715590191755369 K⁰ 497,614 MeV/c ²	?/<u>n0</u> : 0,091462174250863105453354510569334 85,934692341921117094216144 MeV/c² f = 2,0778917064911439211823414e+22 Hz ...gamma rays $\gamma + \gamma$	$\pi^\pm + e^\mp + \nu_e$ or $\pi^\pm + \mu^\mp + \nu_\mu$ or $\pi^0 + \pi^0 + \pi^0$ or $\pi^+ + \pi^0 + \pi^-$
Neutron 0,599835288	η/<u>n0</u> : : 0,58309194091818769891623293001713 Eta meson η 547,853 MeV/c ²	γ ? /<u>n0</u> : 0,094965026195762925653475196132505 89,22585075434455074110 MeV/c² f=2,15747156630740041065976e+22Hz...gamma rays $\gamma + \gamma$	γ + γ or $\pi^0 + \pi^0 + \pi^0$ or $\pi^+ + \pi^0 + \pi^-$
Neutron 0,68499502942048864	η'(958)/<u>n0</u> : : 1,0193862207063241677384071561382 Eta prime meson η'(958) 957,78 MeV/c ²	γ ? /<u>n0</u> : 0,115236174677131574767638556 108,27192004399275268448921 MeV/c² f = 2,618003492816778961296378e+22Hz ...gamma rays $\gamma + \gamma$	$\pi^+ + \pi^- + \eta$ or $(\rho^0 + \gamma) / (\pi^+ + \pi^- + \gamma)$ or $\pi^0 + \pi^0 + \eta$
Alpha particle 0,740795108978806110189	$\Lambda 0b$5620,2/α: 1,5078154480367796791747546093745 bottom Lambda $\Lambda 0b$ 5620,2MeV/c ²	/α: 0,12879211144543390135241844828114 480,057042583086248078468247 MeV/c²	See $\Lambda 0b$ decay modes
Alpha particle 0,753304289775682	Ω^-b /α: 1,6539771248615256969702790233076 bottom Omega Ω^-b 6165 MeV/c ²	K⁺ /α: 0,13185382624286629129216216386684 491,4692147603471497734838317031 MeV/c² 2,20778523965285 MeV/c² less than K⁺ mezón 493,677 MeV/c²	$(\Omega^- + J/\psi)$ seen)
		K⁺ 493,677/ α : 0,13244614197078588654692405272934	$\mu^+ + \nu_\mu$ or $\pi^+ + \pi^0$ or

			$\pi^0 + e^+ + \nu_e$
0,76	1,739550311026520918277625358595	0,13349562723187859551307097261093	
		K0 , K0S , K0L 497,614/a: 0,13350238007979032474302239232303	$\pi^\pm + e^\mp + \nu_e$ or $\pi^\pm + \mu^\mp + \nu_\mu$ or $\pi^0 + \pi^0 + \pi^0$ or $\pi^+ + \pi^0 + \pi^-$
Neutron 0,8103668245118	$\Sigma^+c//n^0$: 2,6106751662913639364421254497813 2452,9 MeV/c ²	(π^0/n^0 : 0,1436585501770159947294269) (π^+ /n^0 : 0,1485475979299) 0,14590373087681143063739535698886 137,08609408352138674567554995853 MeV/c² pion pi π^0	$\Delta^+c + \pi^0$
	Σc (2455) / n^0 : 2,6129102428463471969270455599951		
Proton 0,8105263656822	Σ^+c/ p^+ : 2,6142737704998220827257144593942 2452,9 MeV/c ²	0,145943178944838051921943801563 136,93440513896538769387243389314 MeV/c² pion zero π^0	$\Delta^+c + \pi^0$
Neutron 0,821091179644426	$\Omega^0c //n^0$: 2,8685603604665840766027218852177 Charmed Omega Ω^0c 2695,2 MeV/c ²	π^\pm /n^0 : 0,14855719485567454693134509431545 139,57919697038852205221964844453 MeV/c² pion pi π^+ , π^+ , π^- $\pi^- = 139,57018 \pm 0,00035$ MeV/c ²	See Ω^0c decay modes
	$\Omega^0c = 2695,2$ Ω^0c /p^+ : 2,8725144391651203471961904745908		
Proton 0,8212451756	Ω^0c / p^+ : 2,8725144391651203471961904745908 2,872514499307888530047789439106 2,695.2 \pm 1.7 MeV/c² 6,9 \pm 1.2 \times 10 ⁻¹⁴ s	Proton v/c= 0,82188 π^+ / p^+ : 0,14875235875885830238195117240016 139,57017509117216095767602139546.... MeV/c ² 139,57 = $\pi^- +$	See Ω^0c decay modes
Electron 0,996425584251459554502	π^-/e^- : 273,13204749023558573115849192 139,5701835 MeV/c ² pi minus π^- 139,57 MeV/c ²	$\nu\mu/e^-$: 0,19225357757678994895712344707072 98,241372067052395131711693801718 keV/c ² = kinetic energy of elektron against direction of motion of electron <	$\mu^+ + \nu\mu$

Conclusion

All movements in physics are based on principle of **action - reaction** and on velocity of stable particles (**e-, p+,n0, D, He-3, α**).

Action, as a motion of stable charged particles (**e-, p+,n0, D, He-3, α**), is characterized speeds up in source along ellipse.

Action creates unstable particles (leptons μ^{-} , τ^{-} , baryons, mesons), bosons **W +, W-, Z** (= particles = β electrons moving at nearly the speed of light)in direction of motion of stable particles (e-, p+,n0, D, He-3, alfa).

Reaction creates in the transmission medium, electromagnetic waves, as unstable “particles” - neutrinos **$\nu_e, \nu_{\mu}, \nu_{\tau}$** , mesons π^0, π^+, π^- , **η, K** and **gamma rays** (=waves of extremely high frequency $>10^{19}$ Hz) - against direction of motion of stable particles (e-, p+,n0, D, He-3, alfa).

Accompanying activity of **reaction** on movement of stable particles in the transmission medium are waves, or unstable “ particles“ , i.e. neutrinos and mesons. See you please Shortened great table of elementary particles.^[20]

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