# Physics is beautifull

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**Abstract.** *In the paper „ Physics is easy“ we showed, that 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 .*

*Similarly hyperons, mesons and quarks can be replaced by proton and neutron (or alpha particle respectively ) moving at different speeds from 0.1c up to 0.999.. c . While, the neutron is composed of proton and electron orbiting around it.*

*Thus, all particles, which are currently known, can be replaced by the various fast moving electron or proton.*

*Electron and proton are the only stable fundamental elementary particles. We show, that neutron is source β rays - β electrons ( bosons Zo, W+- too) , γ rays, electron neutrinos, muon neutrinos, tauon neutrinos.*

*Keywords: mass, kinetic energy, β rays, bosons Zo, W+- , γ rays, wave–particle duality.*

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## Introduction

**Gamma radiation**[1], also known as **gamma rays** (denoted as γ), is electromagnetic radiation of high frequency (very short wavelength). They are produced by sub-atomic particle interactions such as electron-positron annihilation, neutral pion decay, radioactive decay (including isomeric transition which involves an inhibited gamma decay), fusion, fission or inverse Compton scattering in astrophysical processes. 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). Because gamma rays are a form of ionizing radiation, they pose a health hazard.

Paul Villard, a French chemist and physicist, discovered gamma radiation in 1900, while studying radiation emitted from radium. Alpha and beta "rays" had already been separated and named by the work of Ernest Rutherford in 1899, and in 1903 Rutherford named Villard's distinct new radiation "gamma rays."

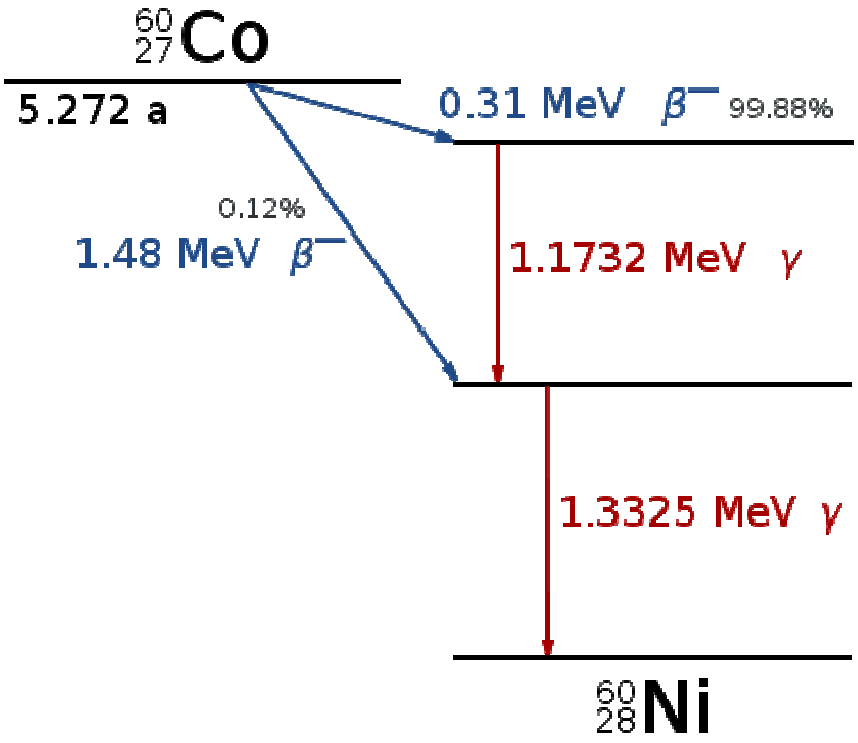
The distinction between X-rays and gamma rays has changed in recent decades. Originally, the electromagnetic radiation emitted by X-ray tubes had a longer wavelength than the radiation emitted by radioactive nuclei (gamma rays).[2] Older literature distinguished between X- and gamma radiation on the basis of wavelength, with radiation shorter than some arbitrary wavelength, such as $10^{-11}$ m, defined as gamma rays.[3]However, as shorter wavelength continuous spectrum "X-ray" sources such as linear accelerators and longer wavelength "gamma ray" emitters were discovered, the wavelength bands largely overlapped. The two types of radiation are now usually distinguished by their origin: X-rays are emitted by electrons outside the nucleus, while gamma rays are emitted by the nucleus.[2][4][5][6]

First $^{60}$Co decays to excited $^{60}$Ni by beta decay:

$$^{60}\mathrm{Co} \rightarrow {}^{60}\mathrm{Ni}^{*} + e^{-} + \overline{\nu}_{e}.$$

Then the Ni drops down to the ground state by emitting two gamma rays in succession (1.1732 MeV then 1.3325 MeV):

$$^{60}\mathrm{Ni}^{*} \rightarrow {}^{60}\mathrm{Ni} + \gamma.$$




Cobalt-60 Decay

## Subject and Methods

Calculation of the kinetic energy of a body moving at the velocity of v , **[7] p.** 51-52:

$$T_{kin} = \frac{mc^2}{\cos^2 \vartheta}\left[\ln\left|1 - \frac{v}{c}\cos\vartheta\right| + \frac{\frac{v}{c}\cos\vartheta}{1 - \frac{v}{c}\cos\vartheta}\right] \tag{3.11}$$

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

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

$$T_{kin_{\parallel}} = mc^2\left[\ln\left|1 - \frac{v}{c}\right| + \frac{\frac{v}{c}}{1 - \frac{v}{c}}\right] \tag{3.12}$$

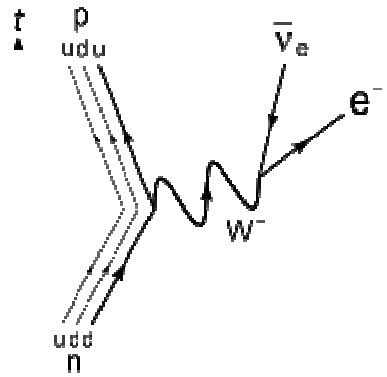
For $\vartheta = 180°$ we have the kinetic energy against the direction of motion

$$T_{kin_{\parallel}} = mc^2\left[\ln\left|1 + \frac{v}{c}\right| - \frac{\frac{v}{c}}{1 + \frac{v}{c}}\right] \tag{3.13}$$

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**

## Stability and beta Decay




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

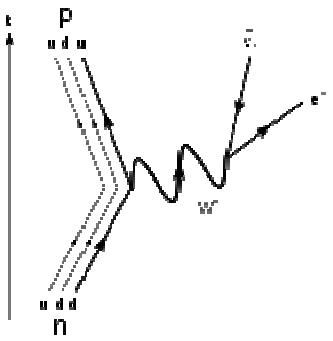
**In the "stable" neutron, electron orbits around the center-of-mass with speed greater than 0,999994c.**

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

**1.Planck : 80 398 MeV = h*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 | |
|---|---|---|---|
| ln (1-v^2/c^2) +(2v^2/c^2)/ (1-v^2/c^2) *mc^2<br><br>**in the direction of movement = kinetic energy of electron + energy of waves radiated by movement of electron** | [ln \|1+v/c\|- (v/c) / (1+v/c) ] *mc^2<br>**against the direction of movement = only energy of waves radiated by movement of electron** | ln (1-v^2/c^2) +(2v^2/c^2)/ (1-v^2/c^2) *mc^2<br><br>**in the direction of movement = kinetic energy of proton + energy of waves radiated by movement of proton** | [ln \|1+v/c\|- (v/c) / (1+v/c) ] *mc^2<br><br>**against the direction of movement = only energy of waves radiated by movement of proton** |
| **v/c = 0,99999364465781184**<br><br>**W+- BOSON = β electron W+-**<br><br>**=** 80 398±0.25 MeV **= kinetic energy of elektron in direction of motion of electron**<br><br>**Planck : 80 398 MeV = h*f**<br><br>**h =6,6260689633e-34 Js= 4,1356673310e-15 eVs**<br><br>**f = 80 398 MeV / h = 8,0 398e+10 eV /4,1356673310e-15 eVs =1944015162857885099075924682976e+25Hz**<br><br>**angular velocity of the β electron=** | **0,193145591724398274765062819532 88**<br><br>**Muon neutrino < 170 keV = 0,17 MeV**<br><br>**98,697186837160259358230511606622 keV = kinetic energy of elektron** against **direction of motion of electron < 170 keV = 0,17 MeV** | 5,444617456938884836504523246455 2e-4<br><br>**0,510853218258925030861821842245 28 MeV**<br><br>v/c=<br>**=0,023336882817549139952204241510 85**<br><br>1-v/c=<br><br>=0,97666311718245086004779575849<br><br>[ln \|1-v/c\|+ (v/c) / (1-v/c) ]=<br>=2,810061766229054172607610029277 5e-4<br><br>**kinetic energy of proton =**<br>**=0,263660231070038428385127418098 89** | 1+v/c=**1,023336882817549139952204241510852**<br><br>[ln \|1+v/c\|- (v/c) / (1+v/c) ]=<br><br>=2,640490926311681431296567756 8935e-4<br><br>**0,247749873734600891500903 85584496 MeV**<br><br>**against the direction of movement = only energy of waves radiated by movement of proton** |

| | | | |
|---|---|---|---|
| =2*pí*f=1221460750820299461779507 44,23446 rad/s<br><br>Re orbit = 0,99999364465781184c /1221460750820299461779507 44,23446=<br><br>= 299790552,71634398041510272 / 1221460750820299461779507 44,23446=<br><br>Re orbit =<br><br>= 2,45436091593620905607969474 3154e-18 m/rad<br><br>42,85035205755179156750106448 0165*0,0233368828175491399522042 41510852c = 0,99999364465781183999999999996341c<br><br>0,99999364465781184c |  <br><br>Feynman´s diagram **beta decay** of neutron | MeV<br><br>mp / me = 938,27201323 / 0,51099891013<br><br>= 1836,152670054228007830682767 9574<br><br>Odmocnina (mp / me) = 42,85035204119364067457096660 4098<br><br>Odmocnina (mp / me) = 42,85035205755179156750106448 0165 =<br><br>= 1,67262163783e-27 /9,1093821545e-31<br><br>Rp orbit = Re orbit / 42,85035205755179156750106448 0165<br>Rp orbit= =5,72774971052696715576354898795 35e-20 m/rad<br><br>angular velocity of the proton = =2*pí*f=1221460750820299461779507 44,23446 rad/s = angular velocity of the β electron in center-of-mass coordinates system<br><br>Orbital speed of the proton =1221460750820299461779507 44,23446 rad/s* | 5,99056582422685417636421240 10095e+19 Hz<br><br>0,26366023107003842838512741809889 MeV +<br><br>+0,24774987373460089150090385584496 MeV =<br><br>=0,51141010480463931988603127 3942 MeV<br><br>**β electron is radiated from a neutron . Logically follows that , gamma rays are actually caused by the movement of a proton** |

| | | | |
|---|---|---|---|
| | | ***5,72774971052696715576354898795335e-20 m/rad = 6996221,46193102220205731208056382 m/s=**<br><br>**= 0,023336882817549139952204241510852c**<br><br>**Orbital speed of the electron= =42,850352057551791567501064480165**<br><br>*** Orbital speed of the proton, see**[7] p.63 | |
| **v/c = 0,999994396591**<br><br>**BOSÓN Z 91 187,6 MeV/$c^2$ = 91, 187,6 GeV = kinetic energy of elektron in direction of motion of electron**<br><br>**. BOSÓN Z Planck 91 187,6 MeV = h*f**<br><br>**h =6,6260689633e-34 Js=4,1356673310e-15 eVs**<br><br>**f = 91 187,6 MeV / h = 9,11876e+10 eV/ /4,1356673310e-15 eVs = =22049065532055484372807257,596126 Hz = =2,2049065532055484372807257596126e+25** | 0,1931457797076835630826<br>**Muon neutrino=**<br>98,6972828964141347372324 keV = **kinetic energy of elektron** against **direction of motion of electron** < 170 keV = 0,17 MeV | 5,450560896197703176422499786479 9e-4<br><br>**0,511410874530813201144390474372 97 MeV**<br><br>**How energy of electron !!!!!!!!! I tis energy β electron in neutron too !??!!??**<br><br>**_____**<br><br>v/c =**0,023336900365437361502580178294878**<br><br>1-v/c=0,976663099634562638497419821706<br><br>[ln \|1-v/c\|+ (v/c) / (1-v/c) ] = **0,000281006605940118350468999608133** | 1+v/c=**1,023336900365437361502580178294878**<br><br>[ln \|1+v/c\|- (v/c) / (1+v/c) ]=<br><br>=2,64049483679651967173250370 88852e-4<br><br>**0,247750240644449079625375 49769641 MeV**<br><br>**5,990574696068296495808634 896616e+19 Hz** |

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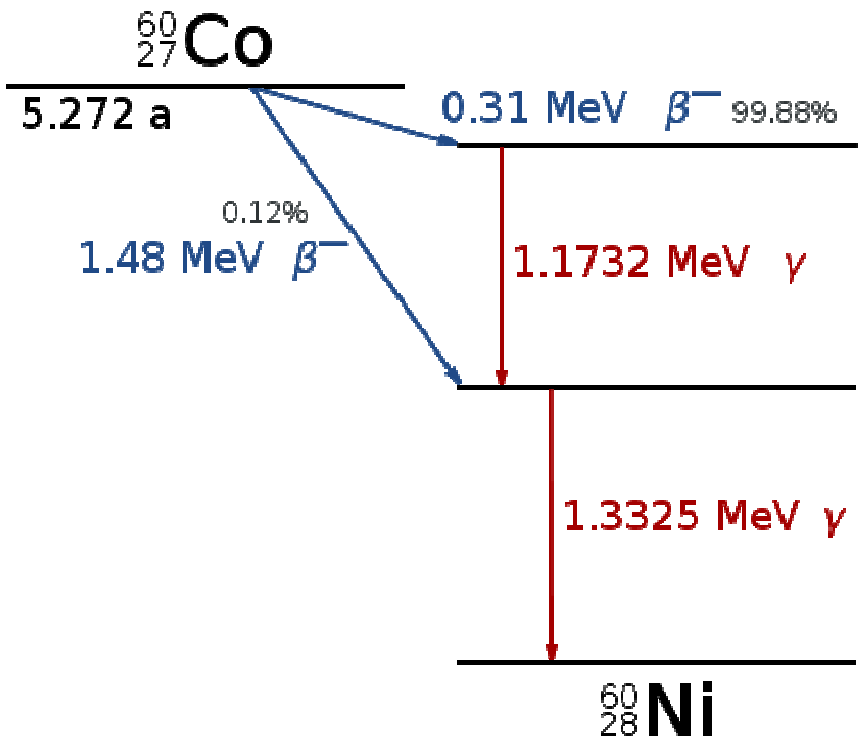
| **Hz**<br><br>**uhlová rýchlosť β elektrónu =2*pí*f= 1385383645880508709183872 89,29769 rad/s**<br><br>**Re orbit = 0,999994396591c / 1385383645880508709183872 89,29769=**<br><br>**= 299790778,140242710678 / 1385383645880508709183872 89,29769=**<br><br>**= 2,16395493790966901278027540467 78e-18 m/rad**<br><br>**Radius of force reach of electron**<br><br>**( v/c=0.99999 (electron in neutron …W,Z ):**<br><br>**$r_e$ =2,8182929384359290310322993e-30 m**<br><br>**…in the direction of movement**<br><br>**$r_e$ =5,8358575551536354084674977e-14 m**<br><br>**…against direction of movement** | | **3**<br><br>**kinetical energy of proton =**<br><br>**=0,26366063388636412151901497702731 MeV Rp orbit = Re orbit / /42,850352057551791567501064480165 = =5,050028375503863324181402290192 8e-20 m/rad**<br><br>**angle speed of proton =2*pí*f= 1385383645880508709183872 89,29769 rad/s = angle speed of β electron in the center- of- mass coordinates system speed of proton = =1385383645880508709183872 89,29769 rad/s* *5,050028375503863324181402290192 8e-20 m/rad = 6996226,722655564849893084993099 7 m/s= =0,023336900365437361502580178294878c**<br><br>**Radius of force reach of proton ( v/c= =0,0233369** proton in neutron …W,Z)**:**<br><br>**$r_p$=** 5,209499982315842954057e-15 m **in the direction of movement**<br><br>**$r_p$=** 6,086602736065618022025e-15 m **against direction of movement** | **against the direction of movement of proton = only energy of waves radiated by movement of proton**<br><br>**0,26366063388636412151901497702731 MeV+**<br><br>**+0,247750240644449079625375497 69641 MeV =**<br><br>**= 0,511410874530813201144390474 723 MeV**<br><br>**β electron is radiated from a neutron . Logically follows that , gamma rays are actually caused by the movement of a proton** |




Cobalt-60 Decay

**Planck , Vlcek and orbital radius of proton and electron in a Co and Ni neutrons:**

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| Electron | | Proton | |
|---|---|---|---|
| ln (1-v^2/c^2) +(2v^2/c^2)/ (1-v^2/c^2) *mc^2 | [ln \|1+v/c\|- (v/c) / (1+v/c) ] | ln (1-v^2/c^2) +(2v^2/c^2)/ (1-v^2/c^2) | [ln \|1+v/c\|- (v/c) / (1+v/c) ] *mc^2 |

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|---|---|---|---|
| **in the direction of movement = kinetic energy of electron + energy of waves radiated by movement of electron** | *mc^2<br>**against the direction of movement = only energy of waves radiated by movement of electron** | *mc^2<br>**in the direction of movement = kinetic energy of proton + energy of waves radiated by movement of proton** | **against the direction of movement = only energy of waves radiated by movement of proton** |
| **f =2,836785229812769967207983828039 7e+20 Hz**<br>**Re orbit = 42,850352057551791567501064480165* *Rp orbit= 42,850352057551791567501064480165***<br>***8,699071365794650862607319614204 4e-15 m =**<br>**Re orbit = 3,727582705980686912548578386852 4e-13 m** | | 0,002685723494182526102379875547030 3<br>**2,519939189865748959166990923748 9MeV**<br>v/c = **0,05172 ,** 1-v/c= 0,94828<br>[ln \|1-v/c\|+ (v/c) / (1-v/c) ] =0,001435391225536420709905255709391 3<br>**kinetic energy of proton = 1,346787414956734446171070076641 4 MeV**<br>**Planck : 1,1732 MeV = h*f**<br>**f=1,1732 MeV / h =1,1732e+6 eV/4,1356673310e-15 eVs =**<br>**f = 283678522981276996720,79838280397Hz**<br>**f =2,836785229812769967207983828 04e+20 Hz** | 0,001250383666418079291813899 3482723<br>**1,1732 MeV γ ray**<br>**————————————-**<br>**1,346787414956734446171070076 6414 + +1,1732 =**<br>**= 2,519987414956734446171070076 641**<br>**β electron is radiated from a neutron . Logically follows that , gamma rays are actually caused by the movement of a proton** |

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|---|---|---|---|
| | | **Vlcek : v/c = 0,05172, v = 0,05172c**<br>**_____**<br>**v= 2*pí*f*r r = v/(2*pí*f)**<br>**r =0,05172c/(2*pí*f) =8,69907136579465086260731961420 44e-15 m**<br>**which is 10 times more than CODATA 2006 for the proton radius, the orbit is so real!**<br>**Lower speed of proton, a larger radius orbit the proton in a neutron (in a center-of-mass system)**<br>**0,05172c =15505265,92776 m/s**<br>**2*pí*f =1782404727558366288414,7841132354**<br>**r = 0,05172c*h/ (2*pí* 1,1732 MeV )**<br>**0,05172 / 1,1732 = 0,044084555063075349471530855779066** | |

| | | | |
|---|---|---|---|
| **f= 3,22197095015812818045059533827 38e+20 Hz**<br><br>**Re orbit = 42,85035205755179156750106448 0165***<br><br>***8,18066498314118032563081834804e-15 m =**<br><br>**=3,50544374592485568642051007943 78e-13 m**<br><br>**Re orbit =3,50544374592485568642051007943 78e-13 m** | | 0,00306569519516290057528919136071 14<br><br>**2,87645600271503248058291476747 35**<br><br>v/c = **0,055242,** 1-v/c= 0,944758<br><br>[ln \|1-v/c\|+ (v/c) / (1-v/c) ] = 0,00164564772927706190965458676942 31<br><br>**kinetical energy of proton =1,54406520801616689043095750205 03 MeV**<br><br>**Planck : 1,3325 MeV = h*f**<br><br>**f= 1,3325 MeV / h = 1,3325 e+6 eV/4,1356673310e-15 eVs =**<br><br>**f= 322197095015812818045,05953382738 Hz**<br><br>**f= 3,22197095015812818045059533827 38e+20 Hz**<br><br>**2*pí*f = 2024424053419300272172,4342233942 Hz**<br><br>**Vlcek : v/c = 0,055242**<br><br>**v = 0,055242c = 16561134,964836 m/s** | 0,00142016385569561085607059400006587<br><br>**1,3325 MeV γ ray**<br><br>**β electron is radiated from a neutron . Logically follows that , gamma rays are actually caused by the movement of a proton**<br><br>**———————————-**<br><br>**1,54406520801616689043095750205 03 MeV +1,3325 MeV =**<br><br>**=2,87656520801616689043095750205** |

| | | | |
|---|---|---|---|
| | | **v= 2*pí*f*r r = v/(2*pí*f)**<br><br>**r = 0,055242c /(2*pí*f) =16561134,964836 /**<br><br>**r = 8,18066498314118032563081834804e-15 m**<br><br>**which is 10 times more than CODATA 2006 for the proton radius, the orbit is so real!**<br><br>**_____**<br><br>**0,055242 / 1,3325 =0,041457410881801125703564727954972**<br><br>Greater speed of proton, smaller radius of the orbit of the proton **(in a center-of-mass system)**<br><br>**_____-**<br>**1,346787414956734446171070076641 4 + +1,1732 =**<br><br>**= 2,519987414956734446171070076641MeV** | |

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| | | 0,062061840279371195787669627082353<br><br>**58,230887823684317510169276612683 MeV**<br><br>v/c = **0,2385** 1-v/c= **0,7615**<br>[ln \|1-v/c\|+ (v/c) / (1-v/c) ] = 0,040732529597334209642152853598307<br><br>**kinetic energy of proton = 38,218192549241330122093635817073 MeV**<br><br>---<br><br>**38,218192549241330122093635817073 MeV +**<br><br>**+ 20 MeV = 58,218192549241330122093635817073 MeV** | 0,021315780198057949059220923 08681=[ln \|1+v/c\|- (v/c) / (1+v/c) ]<br><br>[ln \|1+v/c\|- (v/c) / (1+v/c) ] *938,27201323MeV = =19,999999999999999999999999999 MeV<br><br>**Gamma rays The upper limit for such energies is about 20 MeV**<br><br>---<br><br>**20e+6 eV/4,1356673310e-15 eVs =4,835978912057228038199767 8623247e+21 Hz γ rays** |

**f is electron frequency circulation in neutron around center of mass**

**h =6,6260689633e-34 Js= 4,1356673310e-15 eVs**

f = 80 398 MeV / h = 8,0 398e+10 eV /4,1356673310e-15 eVs **=19440151628578850990759246,829759 Hz =1,944015162857885099075924682975 9e+25 Hz**

**angular velocity of β elektron =2*pí*f=122146075082029946177950744,23446 rad/s**

**Re orbit = 0,999994c /122146075082029946177950744,23446 m/rad=**

**= 299790659,245252 / 122146075082029946177950744,23446=**

**=2,45436178807973022974828113592 61e-18 m/rad**

**Rp orbit = Re orbit / 42,850352057551791567501064480165 = 5,72775174585101770802769630630 67e-20 m/rad**

**angular velocity of proton =2*pí*f=122146075082029946177950744,23446 rad/s = angular velocity of β elektron in center-of-mass coordinates system**

**velocity of proton =122146075082029946177950744,23446 rad/s*5,72779880532025724562025936038 74e-20 m/rad**
**=6996281,429294095682613768961493 2m/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** MeV = $$\frac{mc^2}{\cos^2\vartheta}\left[ln|1-\frac{v}{c}\cos\vartheta| + \frac{\frac{v}{c}cos\vartheta}{1-\frac{v}{c}\cos\vartheta}\right] = eU_{\text{mov}} = eU_{\text{still}}\left(1-\frac{v}{c}\cos\vartheta\right)^2$$ =

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

[ln |1+v/c|- (v/c) / (1+v/c) ] = 0,00125038366641807929181389934827 23

**v/c= 0,05172** 1+v/c= 1,05172 [ln |1+v/c|- (v/c) / (1+v/c) ] =0,00125033226864610539247461983763 9

v/c = **0,05172** 1-v/c= 0,94828 [ln |1-v/c|+ (v/c) / (1-v/c) ] =0,00143539122553642070990525570939 13

**the kinetic energy of proton = 1,346787414956734446171070076641 4 MeV**

1-v^2/c^2=0,9973250416 v^2/c^2 =0,0026749584 ln (1-v^2/c^2) =

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

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

**= 938,27201323 * [ln |1+v/c|- (v/c) / (1+v/c) ] , [ln |1+v/c|- (v/c) / (1+v/c) ] = =0,00142016385569561085607059400065 87**

**v/c =0,055242** 1+v/c= 1,055242 [ln |1+v/c|- (v/c) / (1+v/c) ] =**0,00142**0474658858386656346045912884

1-v^2/c^2= 0,996948321436 v^2/c^2 = 0,003051678564 ln (1-v^2/c^2) =

**v/c =0,0233371** 1+v/c= **1,0233371**

**[ln |1+v/c|- (v/c) / (1+v/c) ] = 2,64053932485043547475139356369 36e-4**

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

ln (1-v^2/c^2) = **-5,44768595879778748912292452646 89e-4**

v/c = **0,0233371** , 1-v/c= 0,9766629

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

## Proton 938,27201323 MeV/$c^2$

| | | |
|---|---|---|
| **v/c** | ln (1-v^2/c^2) +(2v^2/c^2)/ (1-v^2/c^2)<br>*mc^2<br>**in the direction of movement = *kinetic energy* of proton + energy of waves radiated by movement of proton** | [ln |1+v/c|- (v/c) / (1+v/c) ]<br>*mc^2<br>**against the direction of movement = only energy of waves radiated by movement of proton** |
| **0,0233371** | 5,450654226010139207004762484662 7e-4<br>**0,5114196314059140744148914214 6824 MeV**<br>**_____-**<br>v/c = **0,0233371** , 1-v/c= 0,9766629<br>[ln |1-v/c|+ (v/c) / (1-v/c) ] = 2,810114901159703732253368920 9691e-4<br>**kinetic energy of proton =0,263665216571873768261171334192 76 MeV** | 2,640539324850435474751393563693 6e-4<br>**0,247754414834040306153720087275 48 MeV γ ray for emission of electron β from neutron**<br>**_____**<br>**0,263665216571873768261171334192 76+**<br>**+0,247754414834040306153720087275 48=**<br>**=0,511419631405914074414891421467 76**<br>**for emission of electron β from neutron is valid equation:**<br>***kinetic energy* of proton + energy of waves radiated by movement of proton = kinetic energy of elektron in direction of motion of electron (for v/c =0,6821555671006273161671553) =** |

| | | |
|---|---|---|
| | | **=0,5109989099724959839612738895571**4 MeV |
| **0,05172** | 0,0026857234941825261023798755470303<br>**2,5199391898657489591669909237489**<br>v/c = **0,05172 ,** 1-v/c= 0,94828<br>[ln \|1-v/c\|+ (v/c) / (1-v/c) ] =0,0014353912255364207099052557093913<br>**kinetic energy of proton = 1,346787414956734446171070076641 4 MeV** | 0,0012503836664180792918138993482723<br>**1,1732 MeV γ ray**<br>**————————————-1,346787414956734446171070076641 4 + +1,1732 =**<br>**= 2,5199874149567344461710700766414** |
| **0,055242** | 0,0030656951951629005752891913607114<br>**2,8764560027150324805829147674735**<br>v/c = **0,055242,** 1-v/c= 0,944758<br>[ln \|1-v/c\|+ (v/c) / (1-v/c) ] = 0,0016456477292770619096545867694231<br>**kinetic energy of proton =1,5440652080161668904309575020503 MeV** | 0,0014201638556956108560705940006587<br>**1,3325 MeV γ ray**<br>**————————————-**<br>**1,5440652080161668904309575020503 MeV +1,3325 MeV =**<br>**=2,8765652080161668904309575020 5** |
| **0,1** | 0,0101516843485187608366531626440 2<br>**9,5250413113601786986314420892325** | 0,0044010888952339509530430323716742<br>**4,1294185381353557125587631775622** |

| | | |
|---|---|---|
| **0,2** | 0,042511338813078203778756268178333<br>**39,887199453249524912925837248854** | 0,015654890127287959545051358487848<br>**14,688545276624924762274133011344** |
| **0,2385** | 0,062061840279371195787669627082353<br>**58,230887823684317510169276612683 MeV**<br>v/c = **0,2385** 1-v/c= **0,7615** [ln \|1-v/c\|+ (v/c) / (1-v/c) ] = 0,040732529597334209642152853598307<br>**kinetic energy of proton = 38,218192549241330122093635817073 MeV** | 0,021315780198057949059220923086 81<br>**Gamma rays The upper limit for such energies is about 20 MeV**<br>**38,218192549241330122093635817073 MeV +**<br>**+ 20 MeV = 58,218192549241330122093635817073 MeV** |
| **0,3** | 0,103491518330956475320659473442 2<br>**97,103195256615981530619973957697** | 0,031595033698260282804726756111724<br>**29,644735876136367895740124416315** |
| **0,4** | 0,206598993807603199680031694866 38<br>**193,846053851152157444773030172 13** | 0,050757950906927216218879124502706<br>**47,624764784872103514767224480511** |
| **0,5** | 0,378984594214885739227447660673 67<br>**355,590638197155453779354101454 11** | 0,072131774774831048644679782131016<br>**67,679225535833657944955762108731** |
| **0,6** | 0,678712897371580488467409819381<br>**636,817316621999200301303408474 08** | 0,095003629245735553650937031148342<br>**89,139246476552804316253364891193** |
| **0,7** | 1,248224074187214795765659690525<br>**1171,173715049790902349488797128** | 0,118863545179817455055072574953 47<br>**111,526337835522385918417985424 91** |

| | | |
|---|---|---|
| **0,8** | 2,5339043080235741891445273629486<br>**2377,491496421448996748900500 27** | 0,14334222045767456374528669617442<br>**134,49399376968080492945211734271 / pí +- /** |
| **0,9** | 6,865584582652033302499360311 9937<br>**6441,78586836577261928908039072 08** | 0,16816967564607898651735176667717<br>**157,78890013268263163523366844813** |
| **0,99** | 94,585477015562380011096949442981<br>**88746,90594171160633366224449457 6** | 0,19064720155047137913293235234906<br>**178,87893361542635835455105003 19** |
| **0,999** | 992,285141901598657225076802215 72<br>**931033,37779022920267003749645 63** | 0,19289718058079427713077657976902<br>**180,99002596993270707595628949319** |
| **0,9999** | 9989,982781808583783408241193391 3<br>**9373321,25682057572695358073549 64** | 0,19312218055996614431315921000012<br>**181,20113715336700296534860754822** |
| **0,999994** | 166653,836061258490392877288447 67<br>**156366630,27369937738835558708 407** | 0,19314568055994531391725237153108<br>**181,22318654565836338784472026638** |

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

**[ln |1+v/c|- (v/c) / (1+v/c) ] =0,021315780198057949059220923086 81**

**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

**kinetická energia protónu = 38,218192549241330122093635817073 MeV**

1-v^2/c^2= 0,94311775 , v^2/c^2 =0,05688225 ln (1-v^2/c^2) = **-0,058564136699643354622393167303608**

# **Electron 0,51099891013** MeV/$c^2$

| **v/c** | ln (1-v^2/c^2) +(2v^2/c^2)/ (1-v^2/c^2)<br>*mc^2<br>**in the direction of movement = kinetic energy of of realy particle ( electron) + energy of waves radiated by movement of electron** | [ln \|1+v/c\|- (v/c) / (1+v/c) ]<br>*mc^2<br>**against the direction of movement = only energy of waves radiated by movement of electron** |
|---|---|---|
| **0,1** | 0,010151684348518760836653162644 02<br>**0,005187499638076865867387893067901 6 MeV** | 0,004401088895233950953043032371 6742 |
| **0,2** | 0,042511338813078203778756268178333 | 0,015654890127287959545051358487848 |
| **0,3** | 0,103491518330956475320659473442 2 | 0,031595033698260282804726756111724 |
| **0,4** | 0,206598993807603199680031694866 38 | 0,050757950906927216218879124502706 |

| | | |
|---|---|---|
| **0,5** | 0,37898459421488573922744766067367<br><br>**0,193660714599866915767705142785 52 MeV** | 0,072131774774831048644679782131016 |
| | **0,31 MeV ...99,88%** | |
| **0,6** | 0,67871289737158048846740981 9381<br><br>**0,346821550848052171242419451727 75 MeV** | 0,095003629245735553650937031148342 |
| **0,7** | 1,24822407418721479576565969 0525 | 0,11886354517981745505507257495347 |
| **0,8** | 2,53390430802357418914452736294 86<br><br>**1,29482233977375822500005195952 04 MeV** | 0,14334222045767456374528669617442<br><br>**0,07324771842948589186806471266 9302** |
| | **1,48 MeV ....0,12 %** | |
| **0,9** | 6,86558458265203330249936031199 37<br><br>**3,50830623914051992260563772445 06** | 0,16816967564607898651735176667717<br><br>**0,08593452097206196571826171710 5777** |
| **0,99** | 94,58547701556238001109694944298 1 | 0,19064720155047137913293235234906 |
| **0,999** | 992,28514190159865722507680221572 | 0,19289718058079427713077657976902 |
| **0,9999** | 9989,98278180858378340824119339 13<br><br>**5104,87031372165190360040322668 3 MeV** | 0,19312218055996614431315921000012 |

| | | |
|---|---|---|
| **0,999994**<br>**W+-** | 166653,836061258490392877288447 67<br>**85159,928596286780506969369911588 MeV** | |

## Discussion

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.**

## References


[1] Wikipedia, the free encyclopedia last modified on 23 December 2010 at 03:16.

[2] Dendy, P. P.; B. Heaton (1999). *Physics for Diagnostic Radiology*. USA: CRC Press. p. 12. ISBN 0750305916. http://books.google.com/?id=1BTQvsQIs4wC&pg=PA12.

[3] Charles Hodgman, Ed. (1961). *CRC Handbook of Chemistry and Physics, 44th Ed.*. USA: Chemical Rubber Co.. p. 2850.

[4] Feynman, Richard; Robert Leighton, Matthew Sands (1963). *The Feynman Lectures on Physics, Vol.1*. USA: Addison-Wesley. pp. 2–5. ISBN 0201021161.

[5] L'Annunziata, Michael; Mohammad Baradei (2003). *Handbook of Radioactivity Analysis*. Academic Press. p. 58. ISBN 0124366031. http://books.google.com/?id=b519e10OPT0C&pg=PA58&dq=gamma+x-ray.

[6] Grupen, Claus; G. Cowan, S. D. Eidelman, T. Stroh (2005). *Astroparticle Physics*. Springer. p. 109. ISBN 3540253122.

[7] Vlcek L.: New Trends in Physics, Slovak Academic Press, Bratislava 1996

ISBN 80-85665-64-6. Presentation on European Phys. Soc. 10th Gen. Conf. – Trends in Physics ( EPS 10) Sevilla , E 9 -13 September 1996

[8] Vlcek L.: New Trends in Physics /book, elementes pictures, spheres in nuclei, forecasted nuclei, ZOO-3D editorfor interactive inspecting of nuclei spheres/, Academic Electronic Press, Bratislava, 2000, CD- ROM,

ISBN 80-88880-38-6. Only book: Presentation on European Phys. Soc. 10th Gen. Conf. – Trends in Physics ( EPS 10) Sevilla , E 9 -13 September 1996