COSMIC RAY PROTON VELOCITY

Abstract

Nokola Tesla, the discoverer of the cosmic rays, stated that their velocity was greater than the speed of light. But he was not able to calculate just what it was.

We will do so here,

We commence with the following observation: To construct an equation showing the tremendous energy involved, we must have either (1) a great mass for the proton, or (2) a velocity greatly in excess of c. It cannot be done using c and the bare proton mass.

Since no bremsstrahlung is observed when the proton comes to rest, we must conclude that it has its bare mass and the velocity is way in excess of c.

Einstein's energy equation, $(m/R - m)\, c^2$, has been tested and is correct.

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(R = Lorentz transform) = $\sqrt{1 - v^2/c^2}$)

Waikepedia encyclopedia declares the energy of a cosmic ray proton is approx 10^{20} eV or 10^{14} MeV.

We now process these parameters.

10^{14} MeV = 1.6021×10^{8} ergs

m (proton) = 1.672649×10^{-24} gr

Next we determine R with Einstein's equation:

$$\left(\frac{mc^2}{R} - mc^2 \right) = 1.6021 \times 10^{8} \qquad \text{[Eq 1]}$$

Therefore,

$$R = \frac{mc^2}{1.6021 \times 10^8 + mc^2} = 9.383323 \times 10^{-12} \qquad \text{[Eq.2]}$$

Lest it is felt that [Eq.2] is built in by [Eq.1] , below is the equation from the author's work[1] that produces R from **super c velocities.**

Note, since the Lorentz transforms do not exist in the super c range, all velocities there are Newtonian. Thus Eq 3 is valid for the Newtonian velocities in the relativistic range as well as the Newtonian velocities of the super c range.

(V = Newtonian velocity)

[Eq 3]

$$R = \frac{1}{\sqrt{1 + \frac{V^2}{c^2}}}$$

This equation is inoperative at v = c.

When v = c, V = infinity and R = 0. Thus , the equation yields R = - infinity. which means the equation is incorrect and therefore inoperative.

More accurately, as v $\rightarrow$c, V $\rightarrow$ infinity – which means the range of V is 0 to infinity. And R can be found by Eq 3 for any Newtonian (proper) velocity.

In the relativistic realm R can be found by any relative velocity of 0 $\rightarrow$ c.
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by use of the Lorentz transform.

NEXT, WE TEST:

The energy, 1.6021×10^{8} ergs, is given by experiment.
If R is correct, Einstein's equation will yield that many ergs:

$$\left(\frac{mc^2}{9.383323 \times 10^{-12}} - mc^2 \right) = 1.6021 \times 10^{8} \text{ ergs, the exact amount.}$$

Next, we ask – given R, what is the associated velocity?

The author's work[1] (which is too long to go into here) gives

[Eq 4]

$$V = \sqrt{\frac{1}{R^2} - 1} \times c = 3.194950 \times 10^{21} \text{ cm/sec}$$

which is 106,572,043,100 c ---- Believe it or not!

If this seems too high, recall that the energy creating it is on the order of our sun's total energy output for 150,000 years!! Both are mind staggering.

To test this figure, we feed V of [Eq 4] into equation 3 and find we get the correct answer for R. And this R fed into Einstein's equation gives the correct energy obtained by experiment. We feel this is sufficient substantiation.

Note, Although it is difficult for the Lorentz transform to process this velocity, due to the author's theories[1] he was able to bypass it and acquire comparable results for velocities greater than c, (Eq 3). Assuredly, the R for super c velocities is correct. Since the Lorentz transform for super c velocities doesn't exist, R is called the "the transform operator".

In short, the Lorentz transformation due to its structure is inoperative at c or above. However, the author developed a relativistic equation for energy[1] with a different structure than Einstein's but which gives exactly the same result

[Eq 5]

$$E = \frac{mv^2}{(R + R^2)}$$

The equation utilizes relativistic velocities.

The author also altered this equation to serve all Newtonian velocities, 0 to infinity.

[Eq 6]

The equation is

$$E = m \frac{(VR)^2}{(R + R^2)}.$$

Newtonian velocity

Just as there are two lengths to a fast moving rod – the length at rest in the moving coordinate system (proper length), and the length observed in the considered at rest system (relative length) – there are two velocities. The length of a rod is a distance, and distance with respect to time is velocity. The observed velocity is relative velocity and the velocity of the observed system is Newtonian (proper) velocity. (see "The Dual Velocity Theory of Relativity" in the book, A Diagnosis of Special Relativity By V. Vergon. available from V. Vergon)

It will be found that determining R by use of the Lorentz transform, and R by use of Eq 3 yields the same result. However, with the transforms, relative velocities are used whereas in equation 3 Newtonian velocities must be used.

As it turns out, energy can be determined by Eq 6 for all velocities. There is one restriction, however: IT IS A NEWTONIAN VELOCITY EQUATION -- AND NEWTONIAN VELOCITIES MUST BE USED THROUGHOUT.

Below c, the relativistic velocity can be converted to Newtonian by

$$v/R = V$$

(see "The Dual Velocity Theory of Relativity" in A Diagnosis of Special Relativity By V. Vergon.)

Note: R is obtainable from super c velocities by Eq. 3.

It is also obtainable from the mass and energy of a particle by Eq. 2.

If one doubts the result here, recall that the R for this velocity, when inserted into Einstein's equation, GIVES THE CORRECT ENERGY FOR THE PROTON <u>as ascertained in the laboratory</u>. It also works in Eq. 6

A counter argument may be proposed to the effect that an R of 9.383323×10^{-12} can be obtained from the Lorentz transform. True but Einstein's equation calls for a mass increase (m/R – m) which violates the modern agreement that mass is velocity invariant, i.e. relative mass does not exist. So the equation is invalid.

The correct equation is Eq. 6. Note: the R in that equation is not a Lorentz transform but is obtained from Eq. 3 where V is Newtonian.

For sub c relative velocities, the equation for energy is $E = m \frac{v^2}{(R + R^2)}$.

For sub c velocities, the Lorentz transform R is valid but There is no mass increase so the equation is valid and the correct equation to use.

What is the relationship between energy and momentum?

Since the velocity of the cosmic ray proton is greater than c, we use the equation for c.(Also note that in Eq 6, at high velocities (VR) closely approximates c.)

Thus E = P c

So P = E/c = 5.344028 x 10^{-3} = mV. Note: As stated prior, in my work there are two velocities, the observed one, and the actual one The velocities given here are the actual ones. In using the actual (Newtonian) velocities, the Lorentz R is inapplicable but R is supplied by Eq 3.

Nikola Tesla, the discoverer of cosmic rays, stated that they traveled faster than light, but he was not able to figure out just HOW fast. The author was fortunately able to do so.

Physicists will look at over 100,000,000,000 c and choke with disbelief. But then they see that the R of the velocity, placed in Einstein's equation, gives the correct energy, and by that, they must accept it.

The R of the velocity placed in Equation 6 also produces the correct energy. However, in the case of Einstein's equation it is the mass that increases whereas in the case of Equation 6 it is the velocity that increases. Since it may be assumed the proton travels bare, this indicates equation 6 is the proper equation – which in turn means the proton travels at the super c velocity.

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A book, "A Diagnosis of Special Relativity" , Vertner Vergon, ExeterPublishing@yahoo,com

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ADDENDUM

It is commonly asserted that cosmic ray protons travel at "very near velocity c".

If so, the only way they could posses the energy they have is if they had a mass of 1.783 x 10^{-13} gr – a 1.066 x 10^{11} increase. This would require acceptance of relative mass – which we know does not exist.

Therefore, the ONLY way the proton could deliver that energy is if it traveled at a higher (super c) velocity.

There is a counter argument to the effect that the impelling force for protons is electromagnetic – and as happens in an accelerator, the proton absorbs such and thereby gains in mass. And that is what the Einstein equation shows. So that increased mass and virtual c account for the energy.

However, there is a consideration that negates that counter argument. And that is, the mass built up will maintain only as long as the particle is under bombardment. Once that ceases, the mass is given off as radiation – "cyclotron radiation". So then we might expect that once the protons are in free space, they will shed the mass build up and travel at their bare mass.

Hypothetically, the radiation given off may well be the after glow that is observed after the cosmic ray burst.

It may be remarked that the development of the proton velocity collaterally verified the Dual Velocity Theory of Relativity[I] and the existence of super c velocities.

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