The Black Hole

Robert L. Carroll
2004 Buremda Run
Summerville, SC 29438

The action of the atomic clock is interpreted to show that time is an invariant form. The proper interpretation requires an internal reduction in the energy of matter for any velocity imposed. The law of the conservative field is applied to correct the Einstein equation for free fall. It is found that the action of contact forces is conservative as long as no radiation occurs. These facts are applied to show that the Black Hole as envisioned in the study of Cosmology has no existence in the real universe.

1. Fundamental Facts

The fact that relativity theory exists does not render that theory true. The existence of an experimental fact does not interpret the meaning of that fact. The assumption that the mass increases with velocity depends on an energy increase which certainly does not occur under a condition of free fall in a conservative field.

Another point of difficulty is that of the relativity time transformation. Since time is no more than a comparison of events, it can take no velocity variation. Since we are dealing in relativity, we start with the fact of existence of the atomic clock. The assumed basis of measurement of time is the internal frequency of the atom. It is an experimental fact that the period of the frequency is increased by the act of putting the clock into motion. The period for a condition of motion in relation to that for rest is

$$t = \frac{t_o}{\sqrt{1 - v^2/c_o^2}} \tag{1.1}$$

where t_o represents the period for rest and t Is that for the imposed velocity v. The symbol c_o, represents the standard velocity of light.

Equation (1.1) expresses a fact, but it provides no interpretation of that fact. The equation

$$t = \frac{1}{f} \tag{1.2}$$

describes the fact that in any oscillation, the period is the reciprocal of the frequency. When (1.2) is used in (1.1) and the resulting equation is inverted, we have

$$f = f_o \sqrt{1 - v^2/c_o^2} \tag{1.3}$$

Now we have another fact. If (1.3) is multiplied by Planck's constant, we have

$$hf = hf_o \sqrt{1 - v^2/c_o^2} \tag{1.4}$$

This is an expression of the fact that the internal energy of the mass comprising the clock is reduced when a velocity is imposed upon it. In terms of mass energy we can write

$$e = m_o c_o^2 \sqrt{1 - v^2/c_o^2} \tag{1.5}$$

to represent the reduced mass energy of an object in motion. We conclude that the application of the atomic clock does not prove the validity of the relativity time transformation.

2. The Conservative Field

Since equation (1.5) expresses a reduction in internal energy with velocity associated with a kinetic energy increase, an energy conservation law is implied. The Einstein energy law as applied to a field is

$$m_o c_o^2 + pE_o - \frac{m_o c_o^2}{\sqrt{1 - v^2/c^2}} \tag{2.1}$$

The interpretation is that the rest energy is augmented by the action of the field in such a way that an increase in excess of the rest energy results.

All static fields are conservative. This fact applies to the magnetic field when one considers that no isolated magnetic monopole exists in the real universe. Since it is already accepted to apply to electric and gravitational fields. we consider the fact that (2.1) violates the requirement of the conservative field. Then we write

$$\left[m_o c_o^2 + pE_o\right]\sqrt{1 - v^2/c_o^2} = m_o c_o^2 \tag{2.2}$$

where the right member of the equation expresses the fact that the rest energy is conserved.

The kinetic energy of motion can be found by expanding and transposing terms in (2.2). We find

$$pE_o\sqrt{1-v^2/c_o^2} = m_o c_o^2\left(1-\sqrt{1-v^2/c_o^2}\right) \qquad (2.3)$$

where the potential energy change in the left member shows a velocity contraction. The total energy is then the kinetic energy of motion given by the right member of (2.3) added to the internal energy given by (1.5). We write

$$m_o c_o^2 = m_o c_o^2\sqrt{1-v^2/c_o^2} + m_o c_o^2\left(1-\sqrt{1-v^2/c_o^2}\right) \qquad (2.4)$$

to describe the energy conservation law.

3. Contact Forces

No radiation occurs in the case of free fall. Since no free fall was implied in the acceleration of the atomic clock, we conclude that the action of contact forces without radiation is equivalent to the action of the conservative field. This is reasonable since contact cannot be defined except on the basis of short range fields.

A basic flaw in physical theory becomes apparent. It is assumed that the act of accelerating an object by means of a contact force increases the total energy of the object. Then, by relativity theory, a mass increase with velocity must occur. The error lies in the assumption that the force of reaction does no work. We discard the assumption and write the force combination

$$F_{12} + F_{21} = 0 \qquad (3.1)$$

in accord with the requirement that forces of action and reaction are equal in magnitude and opposite in direction (1).

In (3.1) we assume an object making contact with a second object at rest. Then F_{12} represents the applied force and F_{21} is the inertial force of reaction. The work integral may be written

$$\int_o^s \left(F_{12} + F_{21}\right) ds = 0 \qquad (3.2)$$

where s is a finite distance through which contact is maintained. The zero value of the integral is justified by the fact that the integrand is identically zero over the distance of contact.

Equation (3.2) can be expanded and transposed to yield

$$\int_o^s F_{12}\, ds = -\int_o^s F_{21}\, ds = +\int_s^o F_{21}\, ds \qquad (3.3)$$

where the positive sign before the final integral results from the reversal of the limits of integration. In terms of work we have

$$W_{12} = W_{21} \qquad (3.4)$$

The interpretation of equation (3.4) requires that the accelerated object lose just as much energy to the source as it received from the source. The analysis justifies equation (2.4). It follows that there is no mass increase with velocity in the case of free fall or by acceleration by a contact force.

4. Radiation

If we write (2.3) In the form

$$\Delta m c_o^2 = \left(m_o - m_o\sqrt{1-v^2/c_o^2}\right)c_o^2 \qquad (4.1)$$

a radiation element is described. In accord with the experimental fact of existence of the retardation spectrum, we find that an object retarded below the velocity of free fall in a field radiates energy into the field. It follows that an object driven to a velocity in excess of that of free fall must absorb radiation energy. We conclude that any mass decrease or increase in matter occurs only by radiation loss or gain.

The analysis serves to emphasize the fact that mass changes in matter require the existence of time-varying fields. Since particle accelerators depend on the action of such fields, mass changes can occur. It is entirely in error to assume that en Increase in the velocity of an object automatically requires a -mass increase. This certainly does not occur in the case of free fall in a static field.

5. Cosmology

In the past sixty-five years or so, there has developed a study titled “Cosmology” which is not subject to any of the known laws of physics. One concept dear to the heart of any cosmologist is that of the “Black Hole.” We proceed to develop the concept.

In a massive star, fusion of the hydrogenous elements into heavier ones can occur. The resulting reduction in volume causes the surface of the star to collapse toward the center. In extreme cases, it is possible to speculate that the collapsing surface can attain the velocity of light. When this occurs, the star acts as a radiation trap in the sense that no light can escape to be seen in the external universe.

We continue the analysis. If equation (1.1) is applied, it requires that the period of oscillation extends to infinity. The interpretation is that time does not pass at the velocity of light. The collapsing surface of the star continues falling forever with no change to observed by anyone external to the system.

Now if we apply a bit of simple logic, we are forced to the conclusion that the faster an object goes, the slower it is. When the velocity of light is reached, there is no motion at all. The fact that the conclusion was reached by the use of the relativity time transformation cannot change the fact the conclusion is nonsense. It follows that the relativity time transformation is also nonsense.

There is another point to be made. In equation (2.3), as applied to a gravitational field, we find

$$pE_o = \frac{Gmm_o}{r} \tag{5.1}$$

where m represents the mass of the star and m_o is the mass of the collapsing surface. When (5.1) is used in (2.3) and the resulting equation is solved for the radius r, we find

$$r = \frac{Gm\sqrt{1 - v^2/c_o^2}}{c_o^2\left(1 - \sqrt{1 - v^2/c_o^2}\right)} \tag{5.2}$$

When the condition $v = c_o$ is used, we find $r = 0$. In this case, the assumed black hole must have a zero radius unless the mass is infinite.

6. Concluding Remarks

There can be no doubt that extremely large mass objects exist in the universe. There is, however, no reason to suppose that any of these act as light traps. As a final comment, we may pose the question: If gravity exists as a force, and forces are propagated with the velocity of light, how does gravitation escape a black hole when light does not?

Reference

Carroll, Robert L., 1990, The role of the inertial force in energy exchanges, *Galilean Electrodynamics* 1(1):7.