Explaining Gravity

General relativity theory (GR) explains gravity as space-time curvature due to the presence of mass. What is mass and how does its presence curve space-time in a manner consistent with such laws of nature as momentum and conservation of energy?

Mass relates to both relative motion and gravity. Gravitational mass and inertial mass of relative motion are equivalent according to both GR and Newtonian Mechanics (NM).

Mass is primarily defined by NM, which is first modified by special relativity (SR) wherefore relative motion complies with the relativity of space-time instead of with absolute space-time. Conservation of momentum applies for both theories. Momentum is the product of a quantity of mass and its speed differing from the product of another quantity of mass and its speed. Conservation of momentum is the change in momentum in one direction compensated for by an equal change in momentum in the opposite direction. It applies for both relative motion and gravity. If a greater mass collides with a lesser one, the change in speed of the greater mass is less than the change in speed of the lesser mass. A greater amount of mass also gravitates towards a lesser amount of mass at a greater rate of acceleration than does the lesser mass gravitate in the opposite direction towards the greater amount of mass.

NM is further modified by GR, which includes SR as a special case. In SR, light speed in a vacuum of gravitational free space is constant, as always determined the same by a non-accelerating observer no matter what is the velocity of the observer relative to any other system. In GR, light speed is slower in a gravitational field than in gravitational free space.

To explain how the presence of mass curves space-time, as to gravitate other mass, consider space itself contains inertia apart from visible mass, as some form of energy slowing light speed and relative motion of matter. This space inertia is directed toward the presence of visible mass, as caused by mass emitting a form of energy in creating a vacuum effect. Other mass is not gravitated directly by the emitted energy, as it is only the vacuum effect resulting in the gravitational effect. There is thus no violation of momentum with regard to a gravitational particle directly causing changes in the momentums of masses in one direction without the gravitational energy changing its momentum in the opposite direction.

How about the equivalence of inertial mass and gravitational mass? How does matter move seemingly free through the inertia of space?

If the inertia of space is highly elastic, such as with a background of energy similar to a cosmic microwave background radiation moving every which way, then matter can move freely through it similar to how waves move freely through a medium. Suppose matter also interacts with the background radiation in accordance with a different application of the Doppler principle. The Doppler principle usually applies inasmuch as light reflected from matter acquires the opposite change in momentum that matter acquires from the light. Matter moving towards the oncoming light thus increases the energy of light upon reflecting it whereas light catching up with mass is reflected with less energy to even have less energy than before. For the background radiation, consider to the contrary a different condition whereby matter only interacts with light of a particular range in energy whereby inertial space also constitutes a shielding mechanism. This range in energy is still according to the Doppler principle such that matter reflects the same degree of energy of different light from and to all directions no matter depending on what the velocity of matter. There is thus no resistance to relative motion by the relativity of interaction with light. Moreover, since the equivalence of inertial mass and gravitational mass is simply according to the quantity of all other radiation reflected by a particular quantity of matter, a particular quantity of it determining gravitational acceleration of other mass can be measured in a manner proportional to how the speed of a particular quantity of mass changes momentum of other mass, as according to the principle of equivalence.

How does matter continually convert the inertia of space into gravitational energy without a loss of inertial space energy to nullify the vacuum-gravitational effect? A recycling mechanism, as here now explained, seems feasible.

A particular condition of the recycling process is that it is extremely gradual. Gravitational force is considerably less in magnitude in comparison to such other forces of nature as electrostatic. The ratio of gravitational potential to electrostatic potential of the hydrogen atom, for instance, is

$$\frac{Gm_a}{r_a} \div \frac{e^2}{m_a r_a} = \frac{Gm_a^2}{e^2} \cong 8.08 \times 10^{-37}$$

The mass of the hydrogen atom is m_a, its Bohr radius is r_a, G is the gravitational constant, and e is the electrostatic unit of charge.

This extremely minute gravitational potential in comparison to electrostatic potential suggests a long range effect consistent with the nature of quantum physics. The Plank constant h includes the parameters m_a, v and r_a as the product $m_a v r_a$. Since the gravitational energy of m_a is relatively weak, the product $m_a v r_a$ holds if the range of the weaker part of m_a is correspondingly longer. This longer range, as here proposed, is with regard to the slight interaction of energy with spatial inertia.

The long range effect could also relate to the Hubble Constant H_o. Astronomers have found that more distant starlight is redshifted, on the average, as weaker than blue light, and that the average decrease in energy is constant. The Wilkinson Microwave Anisotropy Probe (WMAP) was launched in the year 2001 to journey into deep space to map the cosmos. According to nine years of data released in 2012 and standard theory H_o is most recently calculated as 69.32 plus or minus 0.80 kilometers per second at a distance of one million parsecs. The speed is half at half the distance. At a distance equal to the diameter of the hydrogen atom the highest average speed within the limit of error in ratio to light speed c renders a dimensionless number of the value 8.02×10^{-37}. Moreover, interpreting c as an upper limit, the product $H_o c$ equates as the radius R_u of the observable universe:

$$\frac{H_o(2r_a)}{c} = \frac{2r_a}{R_u} \cong 8.08 \times 10^{-37}$$

The Hubble Constant thus appears consistent with a long range effect of gravitational radiation recycling back into inertial space.

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