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Do Gravitons Have Mass?

ABSTRACT: Gravitons are the explanation for many cosmological phenomena. Their mass and energy explain the formation of black holes and singularities, as well as how gravity itself works throughout all dimensions of the multiverse.

KEY WORDS: gravitons, mass, energy, black holes, singularities, spacetime, Planck length, foam, strings, relativity, Einstein, acceleration, gravity, universe, multiverse, Brownian motion.

Gravitons do indeed have mass, and their motions generate kinetic energy. Thus, they have both energy and mass, and they obey the law of conservation of energy and matter.

If gravitons did not have mass there would be no physics that we could understand. Other particles have mass, but they are much larger, much less numerous, and cannot substitute for the gravitational effects which generate space curvature.

The great mystery of so-called force at a distance is explained by the mass of gravitons. What escapes our logical eyes is the incredibly small dimensionality of gravitons, expressed on a logarithmic scale. A light year is approximately 1 x 10 to the 16th power meters; and a hydrogen atom's diameter is only 3.1 x 10 to the minus 11th power. The diameter of the nuclear Weak Force is less than 1 x 10 to the minus 17th power.

At the scale of the graviton there is the Planck length, 1.6 x 10 to the minus 35th power meters. At this range we are talking about spacetime foam and strings. Some theoreticians see gravitons as circular strings, and it is possible to conceive of gravitons within the minus 37th power dimension.

Both the formulas for gravity and Einstein's E=m(c)(c) help explain what is going on.

Implied in Einstein's formula, if there is no mass, then there can be no energy, even if there is instantaneous acceleration. Photons possess measurable energy, so they should have measurable mass. This also explains why giant accelerators cannot accelerate particles beyond "c." Their bursts of energy all come from a stationary point where the equipment is located, and never above "c," requiring increasingly powerful bursts to offset the inertia of the particles accelerated to new inertial frames.

In an accelerating space ship the time of acceleration determines maximum speed relative to the initial inertial frame. To say that light speed ("c") is the absolute top speed attainable in the universe is thus to misunderstand what would be going on relative to different inertial frames of reference. At any given instant such a vehicle could eventually become both at rest within its own inertial frame, and hyperluminal relative to the frame of origin. (See Zeno's paradox of the arrow.)

In the formula for gravity, the force of gravity is equal to acceleration. This explains why we have gravitation-like feelings while accelerating or decelerating in outer space. This principle works on all scales. The formula for gravity is relative to the distance between the centers of two masses. That is why if you could stand on the "surface" of gas giant Saturn your gravity feelings would be similar to standing on the much smaller Earth. Saturn's greater diameter offsets its greater mass. Also, being at the exact center of any planetary scale mass yields no net gravity, as you are being pulled in all directions.

Where things get really interesting is within the smallest dimensions. Even an incredibly small and nearly massless particle can have great adjacent gravitational powers, as long as the centers of two attracted particles are sufficiently close.

By comparison, this explains why black holes are not yet singularities, because their cores still have significant mass to form an event horizon, but not enough mass to collapse the core's volume into a true singularity. It is only when the inward force of enough (how many?) gravitons is able to destroy their integrity as unitary gravitons that a singularity can occur. At the moment of singularity accelerating inward kinetic energy reverses into accelerating outward motion, neither of which is of infinite speed. Yes, even a big bang does not have infinite explosive power, which sets up the multiverse. (Visually, think of the Taoistic yin-yang symbol.)

The reality of dark energy is the reality of gravity flows, seen from different perspectives. Dark energy and dark matter are thus aspects of a phenomenon. That phenomenon is the flow of gravitons on a Planck scale, expressed as spacetime foam.

Gravitons flow on a massive scale among universe bubbles and the matter between, within the multiverse. Given enough flowing gravitons in the spacetime foam, on a scale the human mind can hardly comprehend, there is apparent force at a distance, expressed as the bending of space. Where gravitons gravitate, there is an accelerating flow of gravitons to their collective core, along with a release of energy to help avoid quickly forming singularities.

The presence of apparent gravity reflects a net stream in one direction, greater than other streams of gravitons. Think analogously of the force of water molecules in a river pushing us along. Gravitons in the foam are pushing each other with Brownian motion, and some groups tend to overcome the otherwise random nature of Brownian motion. Paradoxically, just floating in space does not mean we are beyond the effects of gravity, just not within a sphere where one flow dominates others.