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THE MECHANISM OF GRAVITATIONAL FORCE

E. E. WATSON

Although it has been known since the time of Newton, nearly three centuries ago, that bodies attract each other according to the law of inverse-squares, no explanation as to how gravitation operates has been accepted. However with our present knowledge of matter it would seem that some explanation should be possible. Keeping in mind Newton's first law of motion, namely, "Every body continues in its state of rest or of uniform motion in a straight line unless compelled to alter that state by impressed force", let us consider for the purpose of illustration an atom within the motion is that produced by the electron as it rotates on its own axis, or as it travels in an orbit around the nucleus, or by the vibration or the rotation of the nucleus in part or whole.

I. PRODUCTION OF SPACE WAVE FRONTS

Since the normal motion of a body is a straight line, it follows that for each vibration within the atom, as produced by the rotation of the nucleus or by the rotation or revolution of the electron, a potential energy surface in or surrounding the atom is generated in opposition to Newton's first law of motion. This energy surface once formed, has a radial velocity of 186,000 miles per second, a velocity which is dependent not on its origin but on the velocity of space propagation.

II. I (THE INTENSITY OF THE ENERGY AT ANY GIVEN POINT IN THE WAVE FRONT) $=k/d^2$

At a distance of r units from the source of generation there exists, for each expanding wave front, a spherical surface of $4\pi r^2$ square units. Hence the intensity of the energy expressed by any given area in this expanding spherical space wave front varies inversely as the square of the distance from the source of generation. That is, Newton's principle, namely, "The attraction between two bodies varies inversely as the square of the distance between them", (that is as k/d^2), is true for the intensity of the energy expressed by any given portion of a spherical space wave front.

III. I INTENSITY VARIES DIRECTLY AS THE PRODUCT OF THE MASSES

Since each wave front originating at A may effect each atom at B which vibrates in unison with it, and each wave front originating at B may in similar manner effect each atom at A, the pull of A on B is just equal to the pull on B on A. Hence the combined pull of mass A on mass B (or B on A) varies directly as the product of the synchronization taking place. That is, the pull between two masses varies as the product of the masses, $M_1 M_2$.

IV. SPACE WAVE FRONTS ARE UNOBSTRUCTED IN THEIR MOTION THROUGH MATTER.

Since spherical space waves fronts are merely space disturbances, unless they are absorbed into the motion of an atom, their passage from one point to another is unobstructed by the presence of matter. Hence the gravitational effect on an atom on the far side of an object or on the near side is inversely proportional to the square of the distance of the given object from the source of generation. From this hypothesis it follows that only a given per cent of the spherical "space wave fronts" are absorbed by any body. During an eclipse of the moon, the gravitational pull of the sun on the moon, during the period of occultation, is so slightly diminished, that the decrease has not even been detected. Hence we conclude that only a small per cent of these space waves are absorbed by the earth in passing through it and that there is no such thing as a gravitational screen.

V. SIMPLE HARMONIC MOTION IN ATOM A IS TRANSFERRED BY SPHERICAL SPACE WAVE FRONTS TO ATOM B.

Two factors enter into the transfer of energy from A to B, namely:

- (1). The creation of an expanding spherical space wave front,
- (2). The average velocity of the simple harmonic motion within the atom, the selective factor in the synchronizations at atom B.

If a potential energy surface is created within the atom by some orbital motion as that of an electron then the orbital distance traversed at a velocity "u" is to the corresponding linear distance traversed as a simple harmonic motion along any diameter of the orbit at an average velocity "v" as $2\pi r$ is to $4r$ or at 1.57 is to 1.

Furthermore, since these spherical wave fronts travel as space waves, and represent energy, they have an equivalent of mass. If this equivalent of mass is absorbed into an atom, the work done on the atom is driving it away is equal to the kinetic energy of the mass-equivalent of that portion of the space wave front absorbed, namely, $1/2mv^2$. But if the mass equivalent from atom A is to be absorbed into the rotary motion of any part of the atom at B, the motion must be completely synchronized both as to its period of vibration and as to the phase required for absorption. This is possible if the two atoms, one at A and the other at B, have the same period of vibration, and the space wave front from A is so timed in reaching B that the forward component of the orbital motion, "u" is just equal to the average velocity "v" in the simple harmonic motion along any diameter of the atom into which the space wave is to be absorbed, but this velocity "v" is less than "u" the orbital velocity of the electron in the ratio of 1 to 1.57. Hence the mass equivalent of the spherical space wave front from A enters the atom at B as a drag upon the orbital motion of the vibrating unit. To overcome this drag, work must be done by the nucleus. But if work is done by the nucleus on the absorbed mass, the mass of the spherical space wave front must

do an equal amount of work, in the nature of a pull, on the nucleus. The amount of work to be done by the nucleus is expressed by the formula $1/2m (u^2 - v^2)$. But $1/2m (u^2 - v^2 = 1/2m [(1.57v)^2 - v^2] > 1/2mv^2$ (the kinetic energy of the impact), for $(2.46v^2 - v^2) > v^2$, since $1.46 > 1$.

Hence, the energy expended by the nucleus in overcoming this drag is greater than the push on the atom due to the kinetic energy of the impact. That is, the absorption of a spherical space wave front produces in each atom where the absorption takes place a light acceleration in the direction of the oncoming space wave front. The sum total of these accelerations given to the atom by the successive "absorbed wave fronts" is the so-called gravitational pull on the atom. Hence gravitation as expressed by Newton's universal law, namely $F = \frac{K m_1 m_2}{d^2}$

is purely a mechanical effect, and is common to all matter where spherical space wave fronts involving potential energy can be originated and absorbed.

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