

Universal Physics Journal

Article VIII: Universal Gravitation

Author: Ethan Skyler

Publication Date: May 22, 2002

Revision Date: December 12, 2004

Purpose

Galileo Galilei and Isaac Newton are best known for their work on gravitation. Galileo performed an extensive study of the acceleration rates of objects produced by gravitational force. He studied the rate at which an object falls, a pendulum swings, and a round object rolls down or up an inclined plank. Newton extended Galileo's studies of both falling objects and pendulums. Newton hollowed a pendulum bob and filled it with identical quantities of matter using many different materials, from lead to wheat in proving that all matter falls at the same rate of acceleration at any given location on Earth. (See Question 11) Newton showed his true genius when he looked beyond Earth to recognize that Earth's moon was constantly accelerating in Earth's direction and that this acceleration was being caused by a gravitational force acting on the Moon's matter in the direction of Earth's center of matter. He understood that the Moon's precise speed of orbit was the only reason the Moon continued to maintain its distance from Earth.

Newton developed the mathematical formula that predicts the magnitude of gravitational forces affecting any two objects based upon their quantities of matter and the distance between their centers of matter. Newton's formula predicts that the force of gravitation experienced by each object will double when the quantity of matter of one of the two objects is doubled. His formula also predicts, in a purely geometrical manner, very much like being exposed to the light-energy of a distant flashlight, when a first object is moved until the distance from its center to the center of a second object (the flashlight) is now double its original distance, then the "spirits" of gravitational-energy "emitted" [1] by the second object's matter will now be less effective in causing the generation of gravitational forces within the first object's matter at its now double-distance location.

This rule governing the force-distance relationship has become known as "Newton's Inverse-Square Law" in that when the distance between centers of matter is doubled or multiplied times 2, after squaring 2 which equals 4 or $4/1$, the inverse of $4/1$ is $1/4$ which correctly predicts that the new gravitational force being experienced by each object will now be one quarter of its former value. It is not by chance that in exactly the same geometric manner, the light-energy received from a flashlight is reduced to only one quarter ($1/4$) of its former intensity-of-reception when the distance between the flashlight and its target is doubled or multiplied times 2. I see this shared characteristic, predicted by "Newton's Inverse-Square Law", as a strong indicator that light-energy and gravitational-energy also share the same basic composition and rate of expansion as they travel by the same method and at the same speed across the far reaches of empty space.

Despite being in full possession of the excellent and mutually agreeable works of Galileo Galilei and Isaac Newton, despite all of our scientific advancements over the hundreds of years since their time, and despite Earth gravitation being the most prevalent action force that each of us experiences as we go about our daily lives, our understanding of gravitation has not advanced one bit beyond the shared understandings of these two great scientists. In fact we have regressed from their recognitions of gravitation as an event where force is present, to our current position where our top scientists believe gravitation is an event where force is absent.

Galileo and Newton clearly understood the opposite to be true. Reflecting back upon Galileo's Authority Principle, one has to wonder if the authority and belief of a thousand of today's top scientists is superior to the humble reasoning of either Galileo or Newton. On the question of whether gravitation is a forceful or forceless event, I think it can be easily shown that the superior understanding belongs with the Originators, Galileo Galilei and Isaac Newton.

Accordingly, the purpose of the following article is to investigate gravitation from a Universal perspective. Perhaps this effort to restore and extend the combined works of Galileo and Newton will meet with success which, if true, will result in a gain of additional ground in our quest here at Universal Physics to lay the foundation for Universal Physics.

Article VIII

Is the gravitation of one object in the direction of another a forceful event, as set forth in Classical Physics, or is it a forceless event as is currently accepted as true within Modern Physics? There is no middle-ground between these two diametrically opposing positions. Only one position can possibly represent the truth in nature. The remaining position can only be false in every possibility. Knowing this makes my job easier for one clear example of the truth of one position is all that is required to vanquish all thoughts in a logical mind of the truth being possessed by the other position.

(2) Since this comparison involves the question of the presence of force during an event, I shall start by defining force as being "a push or pull experienced by an object or portions thereof." From our study of Article IV "The Nature of Force" we have learned several key features about force.

(a) Force is invisible.

(b) Force may act externally against an object as an external (contact) force impressed against the object's exterior, or force may act as an internal force generated separately and thereby originating within the interior of each component of an object's matter.

(c) Acceleration of an object is always caused by an acceleration/Action force (Newton's LAW I) with this action force being either an internal action force or an external action force or some combination thereof.

(d) If the acceleration/Action force is an internal force, then it is either a Type 1 internal force with internal opposition or it is a Type 2 internal force with external (contact) force opposition.

(e) During acceleration, the magnitude of the action force or action forces responsible for the object's acceleration can be determined using Newton's formula $\text{Force} = \text{mass} \times \text{acceleration}$.

(3) These five key features contain enough information about force for us to effectively decide the "Is gravitation forceful or forceless?" question. Since force is invisible, scales are valuable in detecting the presence or absence of force. But scales do have their limitations in that they require external (contact) forces in order to function. Specifically scales are of no use in detecting the presence or absence of internal Type 1 forces. Type 1 forces, like internal Type 2 forces, are generated within each component of an object's matter. What sets Type 1 forces apart is that they do not find support against external (contact) forces outside the component. Instead they always find support against other internal Type 1 forces present inside the same component of an object's matter. Thus a Type 1 force, if present within a component of matter, is always in balance with an opposing Type 1 force of one kind or another that is also present within the same component. This arrangement makes it impossible to directly measure the magnitude of opposing internal Type 1 forces through the use of any compression scale.

(4) "Yet the thing is not altogether desperate" [2], to quote an ever-hopeful Isaac Newton, for if a Type 1 force is causing the action of acceleration for an object, then we know this Type 1 force is an acceleration/Action force and further we know it is causing the generation of its own supporting Type 1 acceleration/Reaction force. If we have previously measured the quantity of the object's matter (mass attribute) and are now able to measure the object's rate of acceleration, relative to a non-accelerating reference frame, then by applying Newton's formula, $\text{Force} = \text{mass} \times \text{acceleration}$, the magnitude of the Type 1 acceleration/Action force responsible for the object's acceleration can be accurately calculated. Here, Newton's formula, $F=ma$, is an effective replacement for a scale in a Type 1 force event where a scale is of no use.

(5) Our first test will involve the measurement of the force one object may, upon sustained contact during a non-accelerative event, freely impress against another object. I will use an ordinary compression spring scale in this test. This scale is specifically designed to indicate the presence of equal and opposite forces when inserted between contacting objects. If the scale is picked up and squeezed or compressed between two hands, a force reading will be displayed by the scale's force indicator. After placing the scale on level ground, I will set a paving brick on top of the scale. Immediately I note that the scale indicates the brick object is pushing down with a 2.5 lb.force while the object on the underside of the scale, Planet Earth, is pushing up with an equal 2.5 lb.force when the additional force Earth is pushing in support of the scale is discounted. Here the scale reveals what we already know from common everyday experiences as fact that each object has a natural and forceful attraction in the direction of the other. If the scale is removed and I insert my open hand between the paving brick and Earth, I can directly experience and verify the presence of the mutual forces between these two objects when they are in contact with each other. Conversely I understand that if no forces, no pushes or pulls, are currently present between the brick and Earth then I will trust the inserted scale to display absolutely no force reading whatsoever. Since this is obviously not the case in this event, I trust the scale's display as to the presence of mutual, invisible 2.5 lb forces as the paving brick and Earth mutually gravitate toward each other. I recognize that this simple physical experiment involving the direct

measurement of the 2.5 lb.f the paving brick is freely impressing as the force of its gravitational weight against Earth as well as the direct measurement of the 2.5 lb.f Earth is freely impressing as the force of its gravitational weight against the paving brick represents all the proof a logical mind needs in recognizing, understanding and accepting that each and every gravitational event in the Universe is a forceful event.

(6) Armed with this new recognition of a very old understanding regarding the forces of gravitation, let us apply this understanding to a different gravitational event, one where acceleration is noticeably present. Using a tape measure, pick up the paving brick from the scale, raise it to where its lowest horizontal surface is exactly 4 feet above the surface of the ground and then release the brick. Did the brick stay at rest at the 4 foot elevation upon release? If you find this question amusing since the answer seems absurdly obvious to you, let me point out that since we have been living our entire lives in the presence of the gravitational forces generated equally and oppositely within every object and within Earth, our objectivity during such an experiment is unfortunately absent. We fully expect, ahead of the test, that the released brick will immediately and without hesitation begin rapid acceleration toward Earth. Why? One reason is because this has always been our experience of such an Earthly event. Now suppose you are an astronaut on a mission to the Moon. At some point during your journey, when the spacecraft's rockets are inactive, you brace your body in a vertical position, measure a height of 4 feet above the "floor", position the brick at this height and again release the brick. Did the brick stay at rest at the 4 foot elevation upon release? Perhaps now this question does not seem absurd.

(7) There is another piece of evidence present during the Earth-bound event and absent during the space-bound event that serves to help you to anticipate the brick's behavior upon its release. When you are holding the brick while standing against Earth, you are fully aware that your arm is providing the ongoing upward-directed 2.5 lb action force needed to keep the brick from falling. Without there being one present, it is as if you are pulling the brick upward against an invisible rubber band stretching from the brick to Earth. Thus here on Earth it is easy for you to predict that upon release, the brick will accelerate away from your hand in the direction of the unrelenting gravitational force that you sense is being generated within the brick's matter in Earth's direction.

(8) On the other hand, as you hold the same brick at the same elevation above the "floor" in the spacecraft, you are equally aware that your arm is providing no ongoing force in any direction to the brick. It is as if the invisible rubber band stretching from the "floor" up to the brick is now missing. In fact you do not even need to exert any effort in order to hold your arm parallel to the floor. So here in the space between Earth and the Moon, it is easy for you to predict that upon the brick's release, it will remain at its current relative position before you since you can sense no gravitational force being generated within the brick's matter in any direction.

(9) Focusing on the Earth event, you already know that scientists have established that upon the brick's release, its velocity relative to Earth's surface and in Earth's direction will increase or accelerate by approximately 32 feet per second or 10 meters per second at the end of each second of fall. In this accelerative manner, the speed of the brick at the end of 1 second of fall is 32 ft/s (10 m/s), at the end of the 2nd second, 64 ft/s (20 m/s), at the end of the 3rd second, 96 ft/s (30

m/s), at the end of the 4th second, 128 ft/sec (40 m/s), and finally at the end of the 5th second, 160 ft/sec (50 m/s). These predicted acceleration rates for the falling brick do ignore the increasing effect of the forces of friction as the still air is forced aside by the speeding brick.

(10) Are you wondering if there are factors present in this accelerating brick event that indicate the correctness of our recognition that gravitation is a forceful event? Since upon release in the Earth event the brick immediately begins an accelerating motion in the downward direction away from your hand, which is an acceleration that does not occur upon the brick's release during the Space event, it is logical to accept that an acceleration/Action force is present and acting within the brick's matter during the Earth event while such a force is entirely absent during the Space event. This understanding finds support in Newton's LAW I.

Newton's LAW I

Every body continues in its state of rest, or of uniform motion in a right line, unless it is compelled to change that state by forces impressed upon it. [3]

(11) Newton's LAW I predicts the presence of a motion-changing action force as being the cause of the brick's acceleration in the Earth event. This prediction is further supported by Newton's formula $\text{Force} = \text{mass} * \text{acceleration}$. We know in U.S. units the brick's mass is 2.5 lb.m and its rate of acceleration is 32 ft/s for each second of fall. In U.S. units, Newton's formula is $\text{Poundal} = \text{mass} * \text{acceleration}$ or $\text{Poundal} = 2.5 \text{ lb.m} * 32 \text{ ft/s/s}$ or $\text{Poundal} = 80$. Poundal converts to lb.force at the ratio of 32/1. Dividing 80 P by 32 yields a force of 2.5 lb which tells us that a 2.5 lb.force is responsible for the brick's acceleration away from your hand. Since you have previously measured the force of the brick's gravitational weight to be the same 2.5 lb.f as is predicted to be present and acting as the cause of the brick's acceleration by Newton's formula, then all facts are in agreement with our conclusion that all gravitational events are forceful events, even weightless events involving acceleration.

(12) There is another factor to consider during the Earth event. That factor is the retarding forces of friction between the parting air and the falling brick. The pressure between the falling brick and the parting air is mutual as in equal in magnitude and opposite in direction all along the brick's lower surfaces. If the brick's acceleration is allowed to continue as when released from a great height, it will eventually reach a steady speed of fall known as "terminal velocity" at which time the brick's acceleration in Earth's direction will cease, leaving the brick in the non-accelerative state of rest-motion until impacting with Earth's surface. How does the retarding effect of air friction help as an indicator that gravitation is a forceful event? Well, if gravitation is a forceless event as some contend, then what force from the falling paver is the upward-directed force of air friction pushing against? We know from Article III "The Equality of Opposing Forces" that it simply is not possible to push with any force at all against an object that does not push back with an equal force. This truth, as clearly stated in Newton's LAW III and the Universal Law of Mutual Forces, indicates to us that the generally upward-directed forces of air friction are not pushing up against nothing at all. By all known laws of Physics, the retarding effects of the upward-directed forces of air friction are only possible if the falling brick is pushing in the downward-direction with an equal force all its own. Here the very presence of the

retarding forces of air friction is confirmation that gravitation of objects is a forceful event. No application of any forceless theory for gravitation can remove this truth.

Conclusion

(13) Gravitation is a forceful event in every possibility. The presence of a gravitational force during a non-accelerative event can be accurately measured with a spring scale as the contact forces two objects are freely impressing against each other. The presence of a gravitational force during an accelerative event can be accurately calculated using Newton's formula $\text{Force} = \text{mass} * \text{acceleration}$ if the falling object's quantity of matter (mass) and rate of acceleration are known. This forceful understanding is in full agreement with the works of Galileo Galilei and Isaac Newton, along with the tenants of Universal Physics, and finally with the logic and sensible experience we use in the formation of our own personal common sense.

(14) Now that gravitation is once again recognized by logical minds as the forceful event it has always been, it is time for us to consider its cause. Initially I think it is important to recognize that gravitation is a component to component event. Rather than thinking of the gravitation of the Moon in Earth's direction being mutual to the gravitation of Earth in the Moon's direction, it is better to think of the gravitation of one Earth atom in the direction of one Moon atom and visa-versa. Each atom is composed of electrically charged particles in high-speed motion about each other. There is a great deal of energy stored within the structure of each atom's nucleus. This stored energy is real energy in nature, like the excess energy that is stored in the atoms of a charged battery, or the energy that travels along the series of atoms that form the structure of conducting wires, or the energy that travels free of atoms in the form of expanding energy emission wave-fronts that travel across the empty space between atoms.

(15) An atom is an open-frame energy dynamo. Thus an atom has no barrier to prevent it from sending energy out into spaces beyond nor one to prevent it from receiving energy in from spaces beyond. As a natural function of its operation, every atomic dynamo leaks or emits a small portion of its nuclear energy stores into the spaces beyond the atom. These emissions depart the atom in a smooth energy wave manner at the orbiting electron's frequency of orbit as first proposed by the Physicist, Hantaro Nagaoka [4].

(16) The orbiting electron forms a high-speed transmission and reception antenna for the energy-storing nucleus. Leave a metal wrench in the sunlight and it can warm to the point where it is too hot to handle. The electron antenna orbiting the nuclei at high rotational speeds is successful in capturing the incoming energy emission from the Sun. As the wrench warms, it sends out more and more energy emissions of its own until it reaches a balance where its outgoing energy transmissions equal its incoming energy receptions. But the wrench has not yet reached its energy absorption limit. Continue heating it with an acetylene/oxygen torch and the atoms within the wrench will continue both receiving and transmitting more and more energy. Atoms are, by nature, so energy-hungry that they will continue absorbing energy right up to the point of their own destruction.

(17) The key to understanding the orbiting electron's role as an energy receiving antenna is simple. It all has to do with cross-sectional area. Place a given object in the sunlight and it will

absorb a given amount of energy over a given period of time. Place an object with twice the cross-sectional area in the sunlight for the same period of time and it will absorb twice the given amount of the Sun's energy. Place an object in the sunlight that has a cross-sectional area 900,000,000 times smaller than the given object and in the same period of time it will absorb 900,000,000 times less energy than the given object. What does this have to do with the energy-collecting ability of an atom? Place a given atom in the sunlight with its given cross-sectional area and in a given period of time it will absorb a given amount of energy. Now imagine the removal of all electrons from the atom leaving just the massive but diminutive nucleus in the center. The remaining portion of the atom's matter (the nucleus) will equal more than 99 percent of the atom's former value of matter. But its cross-sectional area will be reduced to 1/900,000,000th of its former value. Now imagine this bare nucleus in the sunlight. Due to its extremely small cross-sectional area, almost all of the sun's energy will pass right by the nucleus. If every atom in the wrench somehow loses its energy-gathering (and energy transmitting) electron antenna while continuing to maintain the form of a wrench, the wrench will weigh nearly its normal weight against Earth yet it will not noticeably warm in the sunlight. This electron-less wrench, if possible, will also be hard to locate since light energy will pass right through in all directions making the wrench virtually invisible.

(18) The atom's energy is stored within the nucleus and not in the motion of the orbiting electrons as is the current position held within Modern Physics. The Modern Physics understanding has an insurmountable problem. The energy storehouse within the Modern Physics model of the atom is thought to be the electron's "kinetic" energy of motion about the nucleus. The problem is that in Universal Physics, "kinetic" energy is recognized as being nothing more real than an imaginary observer-oriented rating system for an object's motion, relative to the observer's frame of reference. Like "inertia", an object simply does not possess any such thing as "kinetic" energy regardless of the "speed" the observer may think the object is traveling. In truth, "kinetic" energy is not an explanation of the source of the energy emitted by an electron.

(19) Thus a mistake was made in the early 1900s during the formation of the Modern Physics model of the atom which led to the development of the quantum theory where an electron was viewed as jumping from an inner to an outer orbit around the central nucleus and then back to the inner orbit once again as it was thought to first gain "kinetic energy of motion" and then lose this "kinetic energy of motion" by somehow converting its "motion" into an outgoing energy emission of one unit or "quanta" or "photon" that was thought to be instantly accelerated up to light-speed in one random direction.

(20) In a Nagaoka-style atom, the electrons, traveling at high-speed along many different planes of orbit about the nucleus, continually capture incoming energy from spaces beyond that they transmit inward for storage in the massive, energy-hungry nucleus. Meanwhile, in its unexcited state, the nucleus continually emits low-levels of energy that, upon reception by the orbiting electrons, causes the generation of an inward-directed acceleration/Action forces internal to the electrons' matter that causes the inward-directed (centripetal) acceleration required in order for the electrons to remain in close orbit of the central nucleus. Some of the atom's nuclear gravitational energy emissions, uncaptured by orbiting electrons, naturally pass outside the atom's perimeter to affect matter beyond. These uncaptured nuclear "gravitational" energy emissions are

responsible, upon reception, for causing Earth's matter to forcefully retain itself in orbit of the Sun and for the Moon's matter to forcefully retain itself in orbit of both the Sun and the baricenter the Moon shares with Earth. Here the unexcited atom's incoming energy emissions from spaces beyond are in perfect balance with its outgoing energy emissions. Since every atom exists in the Universal Sea of Energy, there is no reason for the unexcited atom to ever run out of operational energy.

(21) In its excited state, the Nagaoka-style atom is receiving higher levels of incoming energy than its nucleus can retain. The atom's speed of operation increases. The electrons are forced to a higher orbital speed resulting in an automatic increase in the electron's orbital radius from the excited nucleus. Thus the excited atom's diameter increases. So do the atom's emissions increase for every bit as much "excess" incoming energy the nucleus receives, it automatically emits back out into spaces beyond in a balanced act of self-preservation. These nuclear emissions are captured by the orbiting electrons and re-emitted into spaces beyond, not just one "quanta" or "photon" at a time but in a continuous manner leading to the formation of expanding energy fronts or waves departing the atom in all directions.

(22) From the perspective of a nearby observer, a portion of the electron's emissions will be sent in the observer's direction. When the electron is on the atom's far-side, this portion has to pass back through the atom's interior if there is any hope for this far-side energy to be received by the observer. But these cross-atom emissions will be mostly captured by the nucleus and electrons on the atom's near-side effectively preventing the far-side emissions from traveling directly to the observer. Thus only the energy emissions from the electrons sweeping around the atom's near-side have a chance of reaching the observer. These sweeping near-side emissions, sent in the observer's direction, impart to the transmitted energy the qualities of frequency and polarization that are observed.

(23) In an interesting manner, which will be discussed more thoroughly in a later article, these sweeping near-side emissions are responsible for the autorotation of bodies in space as well as the autorotation of the Solar System and even the autorotation of each and every galaxy in this Universe. Through autorotation, which Johannes Kepler referred to as being caused by a "sweeping force", all Universal structures including solar systems and galaxies autorotate and/or orbit about an axis. This autorotation feature is caused by the slightly off-center, inward-directed, acceleration/Action force of gravitation. In turn this a/A force of gravitation causes the generation of its own supporting, outward-directed, acceleration/Reaction force within the matter of each rotating or orbiting object in accord with the degree of absolute acceleration that matter is experiencing. These two mutual pairs of forces causing and resulting from the acceleration of autorotation are the sole reason Universal structures maintain or even expand their size without collapse. No outward-directed action force or "cosmological constant" need be invented in order to explain and understand the operation of such Universal structures. Recognition of this off-center attraction and the autorotation that results is the complete understanding.

(24) Universal gravitation involving two bodies in space is not an event where each body is "pulled" by some outside agent toward the other. There is no mechanism in place whereby Earth "pulls" on the distant Moon forcing the Moon to orbit Earth. Instead, Universal gravitation is

initiated by an exchange of gravitational energy between two bodies. This exchange is not instantaneous. It takes some time for Earth's gravitational energy to reach the Moon's matter for it travels or expands away from Earth in all directions at the normal speed of light in a vacuum of 186,000 miles per second. The transit time between Earth and the Moon is a small portion more than 1 second. Think of Earth as shining a gravitational "flashlight" toward the Moon. If the Moon did not shine a gravitational "flashlight" of its own back toward Earth, Earth would be completely unaffected by the Moon's presence in space. There would be no tides on Earth beyond those caused by the Sun, and no Earthly wobble resulting from Earth's former 3000 mile orbital radius of the former Earth/Moon baricenter.

(25) The force of gravitation in Earth's direction is generated separately within each component of the Moon's matter upon each component's reception of the energy from Earth's gravitational "flashlight". Generally, this action force of Earth gravitation is the result of an imbalance in the operation of the Moon's atoms causing each atom to actively and forcefully displace itself in Earth's direction with its own internal acceleration/Action force of gravitation toward Earth which causes both the atom's inward-directed (centripetal) acceleration toward Earth and the reactive generation of the atom's internal force of acceleration/Reaction which is the outward-directed (centrifugal) force that provides the Newton LAW III required support and termination for the event-causing acceleration/Action force of gravitation in Earth's direction.

(26) Switch on the Moon's gravitational "flashlight" and 1 second later, the same effect to a lesser degree will once again occur within each component of Earth's matter. The result will be an eventual restoration of Earth's normal tides and with Earth's 3000 mile orbital radius of the Earth/Moon baricenter.

(27) If the Sun's gravitational "searchlight" was somehow switched off, Earth and the Moon would continue on with their orbit of the Sun's matter for about 8 minutes until the last of the Sun's gravitational energy emissions sweep through the matrix of Earth's matter. From that point on, being released from the immense inward-directed force of Sun gravitation, Earth and the Moon would continue on with their mutual orbit of the Earth/Moon baricenter as they jointly follow a near straight-line path out of Solar System space. They would, of course, continue on with their orbit of the galactic core.

(28) One by one, the remaining planets, along with their satellites, would also leave Solar System space by following Earth's example once their own gravitational force toward the Sun comes to an end. At 12.5 minutes Mars would abandon its orbit of the Sun but continue on with its gentle orbit of the galactic core. At 44 minutes giant Jupiter would follow suit as the last of the Sun's gravitational energy sweeps through its matter matrix. In 1 hour, 18.5 minutes, the planet Saturn will begin its departure of Solar System space. Next to abandon its solar orbit would be Uranus at 2 hours and 38.5 minutes after the Sun's gravitational "searchlight" was switched off. Neptune would have to wait 4 hours and 8 minutes before joining the planetary exodus. Finally diminutive Pluto, whose orbit of the Sun is at such a relaxed pace that it takes 251 Earth years to complete a single circuit of the Sun, will make a barely perceptible course change as it begins following a much straighter path in galactic space at 5 hours and 28 minutes as the last of the Sun's gravitational energy sweeps on through.

(29) While the speed of light energy streams and gravitational energy streams seems immediate in local events, in solar events the speed is relatively slow since the transmission distances are so great. Light energy travels at 186,000 miles per second which is 669,600,000 miles per hour. At 8000 miles in diameter, it would take 83,700 Earths all lined up in a row to equal the distance light energy travels in one hour. Yet it takes 5.5 hours or 460,350 Earths in a row to equal the transit time and distance from the Sun to the planet Pluto. On a galactic scale, the rate of travel of light and gravitational energies is positively lethargic, taking 876,600,000 hours just to cross the diameter of the "Milky Way" galaxy.

(30) Much has been made of the belief by some scientists and science authors that Newton predicted that the Universal Gravitation between any two objects in the Universe is "instantaneous" regardless of how great may be the distance of separation between the two objects. When pressed for the location of a quote from Newton regarding this "instantaneous" prediction, the scientist or author will be forced to admit that no quote to this effect exists within Newton's work. The truth is that Newton never did predict that the effects of Universal Gravitation are instantaneous. Pressed further, the scientist or author will say that the "instantaneous" prediction is an automatic consequence of Newton's formula for Universal Gravitation. If his formula for Universal Gravitation is correct in predicting that equal and opposite gravitational forces are being generated within any two objects in space, with each force being due to the presence of the other object's matter, then these scientists and authors will reveal that they believe it is Newton's formula that makes the prediction that the generation of these gravitational forces will be "instantaneous" even if the two objects are separated by a distance that light energy takes billions of years to cross.

(31) One of the items left on the Moon's surface from NASA's missions there is a laser reflector. By sending laser energy from Earth to the Moon's reflector and back to Earth and then measuring the laser energy's transit time which is more than 2 seconds, scientists are able to establish not only the magnitude of the distance between Earth and the Moon but also the rate at which the Moon is moving away from Earth per year due to the effect of autorotation. These tests also verify that this laser event is not "instantaneous". It takes time for the laser energy wave fronts to complete their round-trip journey.

(32) Now imagine the following event. The Earth laser is switched on continuously. A spacesuit-equipped scientist is standing on the Moon's surface next to the laser reflector. The scientist is holding a laser detector that will illuminate when placed in the continuous laser energy stream. The scientist observes during this event that the "instant" he thrusts the detector into the laser energy stream, the detector illuminates. For certain there is no 1 second wait for the laser energy wave fronts to travel from the emitter on Earth the vast distance to the Moon's reflector prior to the detector's illumination. The detector's illumination is observed as being immediate, even "instantaneous".

(33) From this event, what do you think the scientist should conclude? Do you think his conclusion should be that the laser energy wave fronts take no time at all to transit the distance from Earth to the Moon since the detector's illumination is "instantaneous"? Or is it obvious to

you that the laser wave fronts have to first have completed their time-consuming journey from Earth to the Moon before any observed "instantaneous" illumination of the scientist's detector will occur?

(34) If the scientist decides to apply a formula that predicts the intensity of the laser wave fronts at the Moon's reflector, do you think it is logical to assume that this formula also carries with it the prediction that the laser wave fronts' transit time from Earth to the Moon is "instantaneous"? No? I agree. The laser wave fronts have to complete their journey to the Moon before the detector's illumination will appear "instantaneous" to the scientist/observer. Accordingly I find it logical to accept that the scientist's intensity-of-illumination formula makes no prediction whatsoever as to the transit time of the laser energy from Earth.

(35) In the same manner, I hope you recognize that it is equally logical to accept that Newton's magnitude-of-gravitational-force formula makes no prediction whatsoever as to the transit time of the gravitational energy wave fronts between any two bodies. Like the laser energy wave fronts present at the Moon's reflector, these gravitational energy wave fronts need to be present at the affected body before any force predicted by Newton's formula will occur. At this late date in the development of the Universe, the gravitational energy wave fronts sent from the components of the matter of bodies in space billions of years distant have long ago begun to arrive at Earth's location. So while the force of gravitation, like the laser detector's illumination, may appear to be "instantaneous" to the observer, the gravitational energy wave fronts, like the laser energy wave fronts, still require the passage of time to cross the distance separating any two bodies in the Universe.

(36) Now that we accept that Isaac Newton did not predict any such thing as Universal Gravitation being an "instantaneous" event, are you wondering what Newton actually did have to say about the cause of gravitation? Not much, due most likely to the ever-present critical climate of the scientific community in regard to the expression of new understandings. But what little he did write in PRINCIPIA was nothing short of profound when one considers that in Newton's time, scientific understanding were just starting to break free from the restrictions imposed by religious logic and beliefs.

"And when such cases occur, we are to compute the attractions of the bodies by assigning to each of their particles its proper force, and then finding the sum of them all. I here use the word attraction in general for any endeavor whatever, made by bodies to approach to each other, whether that endeavor arise from the action of the bodies themselves, as tending to each other or agitating each other by spirits emitted..." [1]

(37) First note Newton's reference to "assigning to each of their particles its proper force,...". Here I see that Newton views gravitation as a "proper force" and further that it is an internal force present within each of a body's "particles" or components of matter. Here one could say that Newton sees the force of an object's weight as being the sum of the force of weight of each of the object's components or "particles". It is a small step from this recognition of his to recognition of the Universal Physics stacking of forces effect (See Article IV) as the particles' internal forces of gravitational weight stack up in the direction of Earth's supporting surface below.

(38) Now focus on Newton's words translated into English in PRINCIPIA regarding his understanding as to the cause of Universal gravitation.

"I here use the word attraction in general for any endeavor whatever, made by bodies to approach to each other, whether that endeavor arise from the action of the bodies themselves, as tending to each other or agitating each other by spirits emitted..."

(39) Here I see Newton telling us that a good possibility as to the cause of the mutual gravitation of two bodies in the direction of each other is if each body is "emitting" "spirits" that travel across the intervening space between the two bodies and upon reception by the receiving body cause an "agitation" within the "particles" of the receiving body's matter resulting in the receiving body experiencing a "tending" or "attraction" in the direction of the "emitting" body.

(40) This explanation of Newton's regarding the cause of the mutual forces of gravitation affecting any two bodies present in the Universe is comfortably compatible with the Universal Physics understanding whereby each body continually "emits" gravitational energy "spirits" that, after traveling at light-speed across the intervening space between the two bodies, arrive to cause an imbalance or "agitation" in the atomic operation of the receiving body's components of matter or "particles" resulting in the receiving components displacing, "tending" or attracting" themselves in the direction of the "emitting" body. For such thoughts as these, it is obvious that in the continuing development of Universal Physics, Isaac Newton will always remain the Master of Gravitation.

(41) Are you wondering as to the reason why the mutual forces of Universal gravitation experienced by two bodies of dissimilar size, such as Earth and the Moon are always equal in magnitude? This equality is predicted by the seldom-read second-half of Newton's LAW III regarding the equality of action-at-a-distance forces, by part 3 of the Universal Law of Mutual Forces (See Article III), and by Rule 8 of the Universal Physics Rules for Force & Motion set forth in Article X.

Newton's LAW III:

To every action there is always opposed an equal reaction: or, the mutual actions of two bodies upon each other are always equal, and directed to contrary parts.

(42) In LAW III, Newton recognizes that the "mutual action" Earth's emissions have upon the components of the Moon's matter is equal and opposite to the "mutual action" the Moon's emissions have upon the components of Earth's matter. I have found that I have a natural tendency to think that due to Earth's greater quantity of matter, surely the gravitational force experienced by the Moon is greater than the gravitational force experienced by Earth. But upon some reflection, I have found that such is not the case. The forces experienced by each body upon reception of gravitational energy emission from the other body are always equal in magnitude regardless of any difference in the quantity of matter of the two bodies.

(43) In working out this problem, I first consider that astronomers report that Earth contains a quantity of matter 81 times greater than that of the Moon. Then I imagine Earth being composed

of just 81 identical atoms and the Moon being composed of just 1 such atom. Next I recognize that gravitational emissions and the forces evoked upon their receptions are a component to component event. Thus I begin by considering that there is no reason to think that the gravitational force caused within the 1 Moon atom by its reception of the gravitational energy emissions sent by just 1 of the Earth atoms is anything but equal in magnitude to the gravitational force caused in the 1 Earth atom. The equal emissions from each of these two equal atoms will logically cause the generation ("agitation") of equal gravitational forces in the other atom upon the emission's reception.

(44) Next I consider that in addition to this first pair of mutual gravitational forces, a second pair of mutual gravitational forces exists, one in the 2nd Earth atom and an equal one in the 1 Moon atom. The force score on each side is equal at $2 = 2$. Notice that the two Earth atoms are experiencing 1 force each since each is receiving the gravitational energy emissions from only 1 Moon atom. But on the other side of the equation, the 1 Moon atom is experiencing 2 forces for it is receiving the gravitational energy emissions from 2 Earth atoms.

(45) Now I expand the event up to the 81 Earth atoms / 1 Moon atom model. Here 81 Earth atoms are experiencing 1 force each for each is receiving the gravitational energy emissions from just the 1 Moon atom. Total Earth force = 81. Meanwhile the 1 Moon atom is receiving the gravitational energy emissions from all 81 Earth atoms. Total Moon force = 81. Thus I conclude that the total of the 81 weak forces being generated separately within each of the 81 Earth atoms is equal in magnitude to the total of the 81 weak forces being generated jointly within the 1 Moon atom. The force on each side is again in balance at $81 = 81$. Finally I understand from this model that the overall gravitational force being generated in Earth's direction within the 1 Moon atom is 81 times more forceful than the gravitational force being generated in the Moon's direction within any one of the Earth atoms. This difference in the forces generated within identical components of matter is the reason why two dissimilar bodies will experience equal gravitational forces of attraction.

(46) When I expand this event up to include the bodies of Earth and the Moon, I now understand that while Earth contains many more components of matter than does the Moon, the gravitational forces being generated within the Moon's fewer components are many times stronger than the same type of forces being generated within identical components in Earth. All things considered, the total of the few-but-strong forces on one side of the equation is always the equal of the total of the many-but-weak forces on the other side. This is the reason dissimilar bodies share equal magnitudes of mutual forces of gravitation. While Isaac Newton made no effort to explain the reasoning behind this understanding, he nevertheless fully understood and accurately predicted its consequences in the writing of LAW III.

(47) Leaving no room for misunderstanding, Part III of the Universal Law Of Mutual Forces from Article III reads as follows:

Part III. Energy Emission Based Mutual Forces Affecting Two Contacting or Two Non-contacting Objects.

The resultant force composed of the sum of the vectors of the myriad of individual forces being generated internally and separately within the individual components of the matter of one object,

due to the operational imbalance of these components caused by their reception of energy emissions, of one type or another, sent from a second object, is always equal in magnitude and generally opposite in direction to the mutual resultant force composed of the sum of the vectors of the myriad of individual forces being generated internally and separately within the individual components of the matter of the second object due to the operational imbalance of these components caused by their reception of energy emissions sent from the one object.

Part III applies equally well to any combination of gravitational, magnetic and electrostatic events.

(48) Empowered with the Universal Physics understanding that gravitation is an internal force being generated within each component of the matter of an object in response to its reception of incoming gravitational energy waves from each component of the matter of a second object, one may wonder if scientists have detected the presence of incoming gravitational energy waves from the components of the matter of large bodies in space. To my knowledge, the answer is no, gravitational energy waves have yet to be detected. But I wonder if gravitational scientists understand what it is they are looking for when searching for evidence of incoming gravitational energy.

(49) Today there exist a number of gravitational detectors in place around Earth. A study of the operational theory of these precision devices reveals a surprisingly imaginary basis. In brief, gravitational scientists think their best chance to observe gravitational energy waves is to test for "ripples" in the "fabric" of space thought to be caused by the fairly rare explosion of a giant star, known as a supernova. The hoped for existence of these theoretical space "fabric ripples" are based upon the 1918 predictions of Albert Einstein. Einstein's predictions indicate to gravitational scientists that if a giant star suddenly moves, as during a supernova explosion, "space" itself will vibrate rather like the vibrations of a tsunami tidal wave expanding away from the site of an underwater Earthquake.

(50) Clearly this "vibrating" space "fabric" theory is firmly based upon Einstein's forceless version of gravitation known as the "General Theory of Relativity". Here in Article 8, we have now reestablished that gravitation is a forceful event as originally recognized by both Galileo Galilei and Isaac Newton. The reestablishment of their true-to-experiment understandings renders Einstein's forceless version of gravitation imaginary and therefore obsolete. We also know from Article 6 that Einstein confused the action force of gravitation with the reaction force of acceleration/Reaction putting his "General Theory of Relativity" on a false footing right from the start. In Question 7 we learned that "curved" or "rippled" or "vibrating" space is science fiction. Space is room and nothing more. Here in Article 8 we recognize generally that gravitation is an internal force resulting from an atom-to-atom energy exchange. This means that gravitation between two bodies occurs two atoms at a time. In the introduction to Article 8, we learned that gravitational energy waves obey Newton's Inverse-Square Law governing the steep reduction in their energy content as they spread out over distance through the Universal Sea of Energy.

(51) Consider the gravitation of a single atom located at the center of Earth. This single atom is receiving incoming gravitational energy from every other atom in the Universe. While all

incoming gravitational energy arrives at the same instant, realize that there is a wide variation in the transit time of each incoming energy wave front. Some wave fronts arrive barely diminished from nearby atoms after spending near zero time in transit. Other wave fronts arrive barely existing after being diminished by their expansion over the great distances and billions of years of time spent in transit.

(52) Direction is also an issue, for expanding gravitational energy wave fronts are arriving at our single Earth atom from every possible direction in space. The effect each miniscule incoming gravitational energy wave has in acting as the cause of an imbalance in the operation of our single atom depends upon how close in distance the emitting atom is to the receiving atom. The greater the distance, the less the effect according to the predictions of Newton's "Inverse Square Law". In order to be successful in causing the action of acceleration of the single Earth atom in a particular direction, a preponderance of emitting atoms need to be located nearby in the same general direction in space. While there are a countless number of atoms located nearby in Earth's body, their overall effect on the single atom, located at Earth's center of matter, is one of equilibrium for the atom's displacement due to incoming gravitational energy wave fronts from Earth's remaining atoms is approximately equal in all directions. Despite the unreal pressures present at Earth's center, the single Earth atom is weightless for it is not freely bearing against nearby atoms with any more force in one direction than it is bearing in any other direction.

(53) Yet this single atom is accelerating, along with all other Earth atoms, in the Sun's direction (away from a tangential straight-line path) as it forcefully displaces itself to follow a curved orbital path along the circumference drawn by a 92 million mile average radius from the center of the Sun. So while the strongest combination of incoming gravitational energy waves is from nearby Earth atoms, the greatest imbalance and therefore the greatest acceleration of the single Earth atom occurs in the direction of the Sun, caused by the single atom's individual reception of the incoming gravitational energy waves sent individually and separately from the high number of atomic components that make up the Sun. A lesser imbalance is generated within the single Earth atom by its reception of incoming gravitational energy waves sent individually from the fewer but much closer atoms of the Moon. Thus the single Earth atom follows a wobbly orbit of the Sun as it is also continually being accelerated around the baricenter of the Earth/Moon binary system which is only 3,000 miles nearby in the Moon's direction.

(54) With this recognition of the nature of gravitational energy waves, let us consider the problems inherent in the detection of incoming gravitational energy waves from the Sun or Moon. Do the portions of the gravitational energy waves emitted from each of the Sun's components of matter that travel in Earth's direction end up traveling in great organized tsunami-like wave fronts that would make detection less difficult? In order to do so, there would have to be some cooperative mechanism that naturally adjusted the speed of gravitational energy after emission. Consider that each emitting component of the Sun's matter is located, at any give instant, at either a different distance or in a different direction or both from the single Earth atom than is any other of the Sun's immense number of components.

(55) This means that at any given instant, every energy emission from every component of the Sun's matter begins its expansion in Earth's direction from a different and therefore unique

point-of-beginning. To think that from this myriad of individual and unique beginnings, comes an organization of gravitational energy fronts with Earth as its focal point is to think against reality. What is more likely to happen? The gravitational energy emissions from each of the Sun's many components end up expanding out into the Universal Sea of Energy space from the component's unique center of emission at any given instant of emission. The only organization present will be accidental and temporary just as with the accidental and temporary organization of water waves during the chaos of a "rip tide".

(56) Chaos. This is the best way to describe the manner in which gravitational energy travels through space. Complete chaos. This is what a gravitational energy detector is being asked to detect. Of course the steep reduction in energy content predicted by Newton's "Inverse-Square" formula for gravitation will apply. So along with there being no general organization of incoming gravitational energy waves to concentrate their energy content upon arrival, we can also count on a steep reduction in the energy content of each individual arriving wave after traveling all the way from the 92 million mile distant Sun.

(57) Weak chaos. This is what the detector has to work with in the Sun's direction. By now you may realize, as do I, that the detector's best chance of detecting the presence of incoming gravitational energy waves is to detect the energy waves from the single, heaviest or most massive atom. The closer the detector is to this subject atom, the greater will be the intensity of the incoming gravitational energy waves emitted by this single atom. Without a doubt, the closest, most massive atom will reside not within the Sun or the Moon or even within Earth. The closest such atom will reside within the detector's own structure. Even if a detector could be made to detect the gravitational energy being emitted by atoms located within its own structure, surely these ever-present emissions will be tuned out as examples of "background radiation" and thereby be ignored.

(58) In regards to today's operational theory regarding the detection of imagined shock waves in the "fabric of space" thought by gravitational scientists to arrive at Earth from a distant exploding Sun, the truth is that no such "gravitational" shock waves can ever exist. During a "supernova" event there is no increase or reduction in the amount of matter within the exploding Sun. The explosion simply spreads this matter out in all directions but the weak chaos of its gravitational energy emissions in Earth's direction will continue unabated.

Ethan Skyler

References

[1] Sir Isaac Newton, 1686, 1729, Mathematical Principles of Natural Philosophy and His System of the World, 1934, 1962, PRINCIPIA, University of California Press, Berkeley, Los Angeles, London, page 192

[2] Sir Isaac Newton, PRINCIPIA, page 12

[3] Sir Isaac Newton, PRINCIPIA, page 13.

[4] In 1904, the Physicist, Hantaro Nagaoka proposed a model of the atom where electrons circled the nucleus at great distance and velocity in order to maintain a stable orbit, much the same as planets orbit the Sun. A Nagaoka electron orbiting an energized nucleus at the not impossible rate of 500 trillion times per second would intercept preliminary outgoing energy emissions from the nucleus and impart frequency and polarization characteristics to the final outgoing emissions placing them in the spectrum of visible light.

Unfortunately, the Nagaoka Atom, along with its recognition of the massive nucleus as the central energy storehouse, was set aside in favor of the Modern Physics Atom where the atom's energy emissions were envisioned to take the form of "photon energy packets" departing in random directions after being created and accelerated up to light-speed by the force of a reduction in the "kinetic" energy of the motion of the atom's diminutive electrons as they "jumped" in "quantum leaps" from a more distant orbit of the nucleus to a less-distant orbit. While very imaginative, the Modern Physics Atom lacks the connection with reality enjoyed by the Nagaoka Atom.

Author's Commentary

Now that Galileo's and Newton's understanding of gravitation, as being a forceful event, is once again accepted as a Universal Truth, it is time to leave behind a wide array of imaginary terms as we advance the development of Universal Physics. Included in this discard pile is every term granting material characteristics to the nothingness of space. Space is not a thing. Space is nothing more than room. Space has no physical beginning and no physical end. Space has no temporal beginning and no temporal end. Thus there is no end to the room of space.

The linkage between space and time is nothing more than a relational one. There exist but 3 Euclidean physical dimensions and 1 Universal Time dimension. This is all that is needed to compare the position of an object in a 3 dimensional Euclidean frame of reference at a given moment of Universal Time with the position of the same object in the same 3 dimensional Euclidean frame at an earlier or later moment of Universal Time. The shortest distance between any two points positioned on the curved surface of a 3 dimensional Earth is and always will be a straight line. Some boring of Earth may be necessary to allow for the direct measure of Euclid's truth.

Now that we have reestablished the truth of Galileo's and Newton's forceful understanding of Universal Gravitation, the Lost-Logic Principle dictates that before logic is restored, every term and concept associated with Einstein's forceless theory of gravitation must be sought out and discarded as being a term or concept without truth and therefore without merit.

Ethan Skyler

Copyright Notice

Article VIII: "Universal Gravitation" (C) Copyright 2002-2007 by Ethan Skyler. All Rights Reserved. No portion of Article VIII, minus the exceptions noted below, may be copied by any means without the author's written permission and even then only if the author's copyright notice is permanently affixed to each approved copy. Requests for written permission may be directed to Ryan Skyler, Editor, Universal Physics Journal, 9734 Manitou Place NE, Bainbridge Island, WA, USA.

The author grants each visitor to The Universal Physics Journal the right to make one (1) copy of Article VIII for his or her own personal archive as long as the author's copyright notice is permanently affixed to the archive copy.

The Author's Commentary to Article VIII is hereby granted by the author, Ethan Skyler, into the realm of the Public Domain. As such it may be freely copied, in full, or in part, by any means so long as a reference to the author and this site address <http://www.UniversalPhysics.org> are included with each copy.