Chapter 14. A Conical Theory of Quantum Gravity

Our topics for this section include the dynamic equilibrium of the cosmos, the propagation of gravity waves by the graviton, the collapse of the wave function, and the basic theory of quantum thermodynamics, including a consideration of density and the relationships among density, thermodynamics, and gravity. We also want to add some fresh mathematical insights to the concept of gravity.

Assumptions and Science

Our lives are an interplay between what we believe and what we perceive. Our beliefs help us to make some order out of what often seems to be a chaotic reality. We extract order from our perceptions by paying attention until we notice patterns of regularity in our experiences. These may be inherent in the environment or simply reflections of our own habit patterns. Sorting out which is which until our beliefs match our experiences is a process in which all individuals and mankind as a whole are constantly engaged, either deliberately, by default, or by intuition. The process is part of survival and evolution, and is certainly not limited to humans. When it stops in a species, that species tends to become extinct.

In our history we have a belief that the ancients believed and many still believe that the Earth stands at the center of the universe and the sun, moon, planets, and stars circle around it in various concentric spherical paths that sometimes take curious retrograde directions. This view was codified by a Greek scholar Ptolemy (ca. 150 A.D.) and was the prevailing model of the universe until the 16th century. However, the ancient Egyptians and probably other ancient cultures also held the belief that the sun is the center of the cosmos, and the Earth, moon, and planets follow paths around it. A little attention on the phases of the moon, seasons, angles of the sun in the sky, and eclipses is enough to make it clear that the earth is round, the moon is its satellite, and they both go around the sun. Aristarchus of Samos (312-230 B.C.) studied in Alexandria, a great center of learning in Hellenistic Egypt, and knew a lot about this ancient knowledge, but the decay of learning led to the more complicated simplistic explanations of Ptolemy.

Copernicus in 1543 reasserted the solar hypothesis, and Galileo confirmed that renovated model with his observations. But the belief was still that the paths of celestial bodies were circular like the spherical shells of the Earth-centered model. Tycho Brahe (1546-1601) found discrepancies between his own observations of planets and the circular belief, so he made a series of carefully detailed observations as a reality check. Observation is critical to the discovery of whether experience actually matches belief. Brahe found that what he perceived did not match what people believed. He shared his data with Johannes Kepler (1571-1630). Despite holding many mystical ideas Kepler carefully analyzed Brahe's observational data, and, when he fitted it to a frame with the sun at the center, he discovered three great principles of the solar system's operation.

1. Orbits of planets are ellipses, and the sun is at one of the focal points. 2. The radius vector between planet and sun sweeps over equal areas in equal times (an example of the conservation of angular momentum). 3. The relationship between

the semi-major axis (X) of an orbit and its period (T) is X^3 / T^2 and is the same for all planets in a given solar system. For our solar system the ratio turns out to be 3.36×10^{18} m^3 /s^2.

Isaac Newton (1643-1727) greatly developed our understanding of mechanics when he introduced his three simple laws:

1. Physical bodies have inertia and tend to stay put or in constant linear motion unless acted upon by an external influence. 2. Acceleration of an inertial mass (change of its speed) is caused by application of force to the mass ($a = F / m$). 3. Dynamic equilibrium is omnipresent (every action has a co-occurring equal and opposite reaction.)

Newton applied his understanding of mechanics to Kepler's principles to see if he could extract a more general principle. He did not know a value for the "masses" of the Earth and other celestial bodies, but he could calculate their accelerations from Kepler's laws.

* $a_p = (4 \pi^2 X^3 / T^2)$ r $^{-2}$

He could then apply his second law to determine the gravitational force -- except that he did not know the planet's mass, so he could not come up with a precise number.

* $F_g = (4 \pi^2 X^3 / T^2) M_p r^{-2}$.

He realized that the factor $(4 \pi^2 X^3 / T^2)$ turns out to be a constant (we'll call it C) for any gravitational system, whether it consists of the planets in our solar system, the moons of Jupiter, or any other system of satellites in orbits around a large celestial body. He found that each system has its own constant. Then, in a stroke of genius, Newton applied his third law to get an even broader generalization. He considered the equal and opposite force that keeps the sun and each of its planets in dynamic equilibrium year after year. It would have to be equal to his force formula, but would involve the mass of the sun as the gravity well anchoring the system, so he set a new constant for the gravity well that anchors **any** given gravity system, whether solar, lunar, or any other types of satellites. He then modified his constant so that it includes the system's gravity well.

* $C = G M_{gw}$.

Here M_{gw} is the mass of the gravity well that anchors the system, and G is Newton's generalized gravitational constant that works for any system once you know the masses of the gravity well and the satellite under consideration.

* $(4 \pi^2 X^3 / T^2) = (4 \pi^2 X^3 / T^2 M_{gw}) M_{gw}$.

In other words, Newton introduced a **virtual quantum gravity well bubble (M_{gw} / M_{gw})** into his force formula and ended up with his famous gravity equation:

* $F_g = G\, M_{gw}\, M_{sat} / r^2$.

Now we can see the inner workings of Newton's magical constant *G*.

* $G = (4\,\pi^2\, X^3 / T^2\, M_{gw})$.
* $F_{gw\text{-}sat} = (4\,\pi^2\, X_{sat}{}^3 / T_{sat}{}^2\, M_{gw})\, M_{gw}\, M_{sat} / r^2$
* $(6.67\times10^{-11}) = (4\,\pi^2\, (3.38\times10^{18}) / 2\times10^{30})$ [$(X_{sat}{}^3 / T_{sat}{}^2)$ for planets, M_{gw} for sun]
* $F_{sat\text{-}gw} = (4\,\pi^2\, X_{gw}{}^3 / T_{gw}{}^2\, M_{sat})\, M_{sat}\, M_{gw} / r^2$

In other words, the formula can be flipped inside out and works for the sun's "orbit" as well as the earth's orbit. The numbers inside *G* automatically adjust so that it comes out to have the same constant value and the system finds dynamic equilibrium. The sun's orbit is just a tiny wobble. We can find the acceleration and force on the sun by earth:

* $a_{sun} = F_{sun\text{-}earth} / M_{sun} = G\, M_{earth} / r^2_{sunearth} = \dfrac{(6.674\times10^{-11})(6\times10^{24})\ \mathrm{m}}{(1.5\times10^{11})^2\ \ \mathrm{s}^2} = 1.778\times10^{-8}\ \dfrac{\mathrm{m}}{\mathrm{s}^2}$
* $F_{sunearth} = GM_{sun}\, M_{earth} / r^2_{sunearth} \approx 3.54\times10^{22}$ N.

Inside *G* we then find the adjusted values:

* $6.67384\times10^{-11} = (4\,\pi^2\, X_{sun}{}^3 / (3.156\times10^7)^2\, (5.983\times10^{24})$ kg
* $X_{sun} \approx 2.16\times10^9$ m. (A small wobble; the sun's mean radius is about 6.96×10^8 m.)
* $(6\times10^{24}$ kg) $(1.5\times10^{11}$ m) / $(2\times10^{30}$ kg) = $(4.5\times10^5$ m) = (earth-sun barycenter)

The latter equation is just the formula for a lever. Of course, the real world is not quite that simple, because the planets influence each other. For example, the moon's elliptical signature is slightly larger than that for manmade satellites, because the moon's mass is great enough to cause acceleration of the earth that affects the value of the constant *C* for our local earth system, while manmade satellites have negligible mass. Also, in a binary star system the two players may have nearly the same mass and orbit elliptically or nearly circularly around a barycenter somewhere between them. From such systems we often can calculate the masses of distant stars. Newton knew nothing about binary star systems (or galaxies), but his basic formula is truly elegant and universal. We see the principle of dynamic equilibrium working throughout it. The gravity well barycenter differs from one system to another, but the values of *X* and *T* modify to maintain the constant value of *G* within the formula. The result is that the force becomes inversely proportional to the square of the distance between any two interacting centers of mass:

* $F_g\, r^2 = (4\,\pi^2\, X^3 / T^2\, M_{gw})\, M_{gw}\, M_{sat}$.
* $F_g\, r^2 = G\, M_1 M_2$.

Newton's elegant edifice is a belief system built on certain assumptions. One of those assumptions is his first law -- the law of inertia. He put this belief in place without explaining why it is so. This then influences his force law, because without knowing where inertial mass comes from we now have all sorts of forces coming into play. At least he resolves the mechanical drama with a conclusion that equilibrium reigns supreme

in the end.

When we inspect Newton's beliefs, we find that his motions occur in an absolute frame, and apparently God set the rest frame and endowed objects with inertial mass. That is an assumption without any evidence to support it. If you inspect your own actions in life, you will find that you control the amount of force you exert, and the amount is limited only by your own skill in action -- your understanding and application of the mechanics of action.

The only other forces you experience derive from events that occur in your environment that happen to influence you. You are unable to detect any forces or masses involved in any events that do not directly influence you. As a detached observer you feel no forces; you might as well be watching television. From this analysis we draw the conclusion that each individual is personally responsible for any forces that he or she experiences. By repeatable experiment it is clear that any force you exert on your environment provokes an equal and opposite reaction from the environment. It is not difficult to expand our horizon of perception to understand how everything that appears to happen to us that is "unprovoked" derives from a prior provocation of force we have exerted on the environment. This is the **law of karma**. Every action has an equal and opposite reaction.

The unit of force, named aptly a "newton" (N) after the man who defined it, is a compound unit consisting of mass times acceleration: kg m/s^2. We can now inspect Newton's gravitational formula and see its complete underlying dynamics of four particle mixing. $F_g = M_f\ a_f$, where M_f is the mass involved in the force, and a_f is the acceleration involved with the force.

* $\boldsymbol{M_f}\ a_f\ r^2 = (4\ \pi^2\ X^3\ /\ T^2\ \boldsymbol{M_{fgw}})\ \boldsymbol{M_{gw}}\ \boldsymbol{M_{sat}}$ (The 4 masses – 2 masses and 2 anti-masses -- are highlighted in boldface.)

Note that M_{fgw} must be equal to the gravity well mass if we are calculating the satellite, because that is how Newton defined it as a balancing mass to get G to be a universal constant, but r (the distance between the two bodies) is definitely **not** X (the semi-major axis of the orbit), since it only goes between the two centers of mass.

* $M_f\ M_{fgw}\ a_f\ r^2 = (4\ \pi^2\ X^3\ /\ T^2)\ M_{gw}\ M_{sat}$.

Since $M_{fgw} = M_{gw}$, we could cancel the two masses from the equation as unnecessary, but then we seem to lose our universal constant -- or do we?

It could be that the "anti-masses" for the gravity well and the satellite that are associated with the "force" correspond to the second focal point in each body's ellipse. The sun has an anti-mass focal point equal but opposite in mass to its own mass and so does the earth. The gravity well focal point is the unity focus for the system, and the second focal point is the potential focus. When the system is in equilibrium the two focal points balance each other. If the kinetic energy is too great, the potential focal point moves so far away

that it become entangled in other systems. This breaks the elliptic path open into a "parabolic" path.

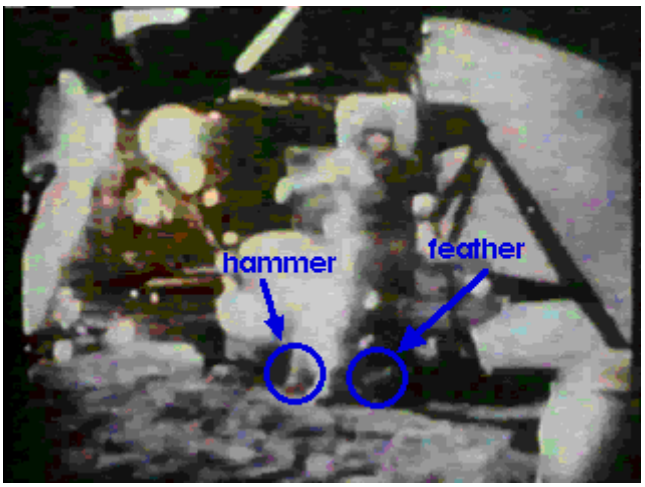
If we cancel the gravity well mass with its balancing potential focus, we are left with the satellite's mass and its potential focus "anti-mass". This is the mass component of the **force** that accelerates the satellite to swing away in its orbit from the gravity well.

* $M_f \; a_f r^2 = (4 \pi^2 X^3 / T^2) M_{sat}$.

If we assume that $M_f = M_{sat}$, then the other two "masses" (potential and gravity) cancel each other, and we are left with:

* $a_f r^2 = (4 \pi^2 X^3 / T^2)$.
* $a_f = (4 \pi^2 X^3 / T^2) r^{-2}$.

Of course that was the acceleration formula Newton already had from Kepler's analysis. We know from Galileo that **all masses fall at the same rate** into a gravity well (under vacuum conditions, as astronaut David Scott beautifully confirmed in 1971 on the moon with his famous hammer and feather drop). Brian Cox has a youtube video of a bowling ball and feathers dropped in a huge vacuum chamber -- https://www.youtube.com/watch?v=E43-CfukEgs.



Maybe the concern with masses is a complete red herring. The Kepler formula says that we only need three observables to know all we need to know about a "gravitational" system: X, T, and r. When we know these variables, we can calculate the acceleration a_f due to the dynamic force of interaction. We realize that mass is a myth dreamed up by Newton. It derives from an observer unwilling to take responsibility for his own creative actions. All creative actions are expressions of resistance to the way things already are. If things are already in a perfect equilibrium (Newtons own law #3), then any resistance to perfection is either sheer stupidity or a cranky way to have some fun spoofing yourself or your "followers".

Nevertheless, G is still an interesting universal constant, and we will explore its ramifications further in this chapter. It is important, however, to know that the

"constant" is actually a dynamic equilibrium containing three variables that work together in such a way that *G* remains constant. This principle is the same as the way distance and time (wavelength and frequency) interact and adjust in a dynamic equilibrium so that the speed of light *c* remains constant for every observer.

Is there a Graviton?

In our earlier theoretical discussions we proposed the notion that gravity is the relaxation of the resistance to unity that occurs when the attention of an observer becomes fascinated with local events and shifts some attention from resisting unity to focus on local details. That focus on local details makes the details seem more real. Resistance to those details makes them more solid and tangible and draws them to the observer. However, that is not gravity, but is the electromagnetic cancellation of space by the interactions of photons and attention particles. An observer's attention magnifies objects, makes them clearer, realer, more solid, and even makes them draw closer in the consciousness of the observer. Gravity is more subtle, because it derives from a **lack of attention**, and is a reaction to a prior action.

Experiment: Put attention on something. Notice how it makes the object clearer, realer, and more solid if you interact with it physically. Put attention on your shirt. Do you feel it as you wear it? Before I asked you to put attention on it were you consciously aware of it? You knew it was there, but not in your conscious thinking mind. Your attention was elsewhere. Notice how objects that are not in the focus of your vision or other sense organ become fuzzy or even fall off the horizon of your attention.

Experiment: During the day's activities be aware as you walk about doing various activities. Notice how you are not normally conscious of the presence of gravity as you put attention on your affairs, but that your body habitually puts out the necessary effort to keep you upright when sitting and able to walk without falling. Pay close attention to the time when you become tired and lie down to relax or go to sleep on your bed at night. Your muscles relax, and your body assumes a horizontal position on the bed or couch. When you fall asleep you even lose awareness of your surroundings, but it is clear that gravity becomes the dominant force in your life, at least with respect to your physical body. As soon as your attention relaxes from its resistance to the unifying tendency of gravity, you begin to reunify with your environment, and your awareness of gravity disappears. When you die, your body dissipates and settles back to be one with the earth that you resisted fully rejoining during your whole life. Your body returns to equilibrium with your environment. Notice the difference between the focus of local attention during waking consciousness and the defocused condition of nonlocal attention during deep sleep.

Ironically, it is your resistance to the earth that enables you to play with her during your life in a physical body. This is the "force" of gravity. Like a stretched rubber band that returns to its original shape when the stress that stretches it is relaxed, every action to resist unity returns to its original unity when the resistance to unity relaxes as it must, because resistance requires effort, exertion of energy, and expenditure of energy resources that in any system are finite.

Many physicists claim there must be a boson particle that corresponds to the force of gravity and acts as its carrier of energy. The problem is that gravity waves and particles would be so faint in our environment that we could not detect them. To date no one has for sure detected such things. The so-called detection of gravity waves in signals from distant binary pulsars (cf., Hulse and Taylor) only consists of the collection of EM signals from the pulsars as they move in their dynamic gravitational orbits. The EM signals related to gravitational phenomena travel at the speed of light, but that does not give us the right to assume that gravity's energetic influence travels at the speed of light. It takes 8 minutes for light to reach us from the sun, but is there an 8-minute lag time in the sun's gravitational influence on earth? The general belief is that gravity waves move at the speed of light as predicted by General Relativity. For arguments on the subject and bibliography on the subject, see **Wikipedia**, "Speed of Gravity".

Experiment: Pay attention during the next thunderstorm you experience. Notice how there is a gap between the flashes of lightning and the rumble of thunder because the sound travels much slower than the light.

The only way to tell about the speed of gravity waves is to have a situation where a gravitational event takes place that could release a measurable wave of gravitational energy. At the same time the event must be visible via light or some other form of EM radiation. The challenge is to detect the gravity wave **and** the EM pulse from the event and distinguish whether they arrive at the same time or at different times. Unfortunately, we have to perfect our detection of gravity waves before we can do the experiment, and we do not currently have equipment sensitive enough for the task. If gravity is faster than light or even instantaneous, then a far distant gravity event, such as a supernova, will pass without our noticing until we see the EM signal, by which time it is too late to catch the gravity signal. We must be able to have ongoing reliable gravity wave detection and then also catch the associated EM signal. So, for now, it is back to theory and let the experimenters develop more sensitive instruments.

Experiment: From a standing position hold a ball in your hand. It has gravitational potential because you lifted it away from the center of the earth by a distance of one or two meters. Relax your grip and let the ball fall to the ground. Notice that you did not exert any force to let the ball fall. You relaxed the force that you had imposed on the ball. Why should there be a particle involved to transmit energy as the ball falls to the ground? The release of energy is in the relaxation of your local grip on the ball, and that is an EM phenomenon, not a gravitational phenomenon. The ball simply returns to its local gravitational ground state when the EM forces imposed on it dissipate. Thus gravity is not a force, it is a **relaxation of prior imposed forces**.

We will begin by exploring quantum gravity to see if we can find a different kind of "graviton" particle that does for gravity what the photon does for EM energy. When we want to identify the basic quantum unit of gravity in the form of mass, we simply work with the universal quantum gravity relationship G. That's its job. It may tell us what a graviton is. G^{-1} becomes our first factor because of the inverted way the mass unit is

presented. We use the inverse of G to see the mass, because G is describing the dynamic negative pole of orbital motion that swings out around the outer focus of the ellipse of an orbit, so it has an inverse "potential" mass combined with the signature of an ellipse ($m^3\ s^{-2}\ kg^{-1}$). This factor tells us the relation between mass and the dynamic geometry of ellipses (X^3/T^2), where X is the semi-major axis of the elliptical orbit and T is the period of the orbit. We must balance out the elliptical geometry in order to see just the gravitational mass itself. There are two ways to do this. The first way is to divide G by the factor ($\hbar\ c$) together with the coupling constant a and then invert the result, as we did to find the Planck Mass ($\hbar\ c\ a\ /\ G$). This cancels out the elliptical geometry and leaves us with a pair of interacting masses.

Einstein's relation tells us that energy is the same thing as "rest" mass transformed by the proportionality constant c^2. So for our second approach we can take c^2 as our second factor. That gives us $G^{-1}\ c^{2,}$, which converts the "potential mass" to its rest energy and reinterprets the elliptical course of the "real" mass into a mass per distance [$(m_x)\ /\ d$], which is the appearance of a mass distributed along a straight line, a sort of 1-dimensional density. So we need to put a constant of distance into the mix in order to find a constant mass. The only constant of distance we have other than our unit radius, is the D-Shift Operator (%). So we plug that in.

* $(G^{-1}\ c^2\ \ \%) = 4.2586\times10^{27}$ kg.

This is an awfully big particle, and using the unit radius it is still in the same ball park (1.348×10^{27} kg). But it is an important particle. It is the "macro-graviton". It defines the quantum mass level at which a cloud of gas in space begins to contract into a ball that can function as a star. Anything smaller tends to become just a large planet or remains a gas ball, depending on certain initial conditions. Of course there are noticeable statistical variations at this large a scale. But on average this is about where it happens. Our planet Jupiter at 1.9×10^{27} kg is just about on the edge of becoming a star. It may have been at the edge in the past and became destabilized somehow and lost some of its mass to make the other planets in our system. Now that we have technology to detect Jovian planets in orbits around stars, we can collect a large sample of these entities and determine statistically and empirically the correct Jovian multiple at which the onset of stardom occurs. Then we will see if the expression we created has any significance or whether it needs adjusting due to some overlooked factor.

Intermediate Bosons and Gravity

Consider the intermediate boson. From a viewpoint as an "outside" observer, a photon (or group of photons) has been moving along merrily at c, and -- wham! -- its energy is suddenly shifted up tremendously by a surge from the vacuum state and a confluence of particles. It suddenly stops and turns its linear momentum into a big fat W boson. This pulls globs of mass-energy out of a nucleon or other particle, causing it to undergo what is called the weak interaction decay, which is really just a sign of the system relaxing back to a state of less stress. The W boson then disappears (returns to vacuum state photons?), leaving the fermion particle pieces to scatter at various angles. Depending on our orientation with regard to time and the boson, an intermediate boson

can also cause particles to seem to draw energy from the vacuum state when stress is added to the local system's confluence of particles.

The extreme end of particle interactions is pair production and annihilation, which is the main role of the Z boson. The Z has a mass that is heavier than the W by slightly more than (10/9) -- a factor of around (1.14).

* $(10 / 9) = (1.054)^2 = (\text{Ss } \pi \text{ \% / As Ao})^2$.
* $(\%^4 / \pi^2 \text{ Ao}^2) = (\text{Ss } \pi \text{ \% / As Ao})^{1/2} = (1.054)^{1/2} = 1.0266$.

We see here an incursion of four D-Shift Operators. They are squeezed into a factor of only 1.14. This is very close to $1.67493^{1/4}$ (ratio of the neutron). The numbers are very interesting.

One important principle about the W bosons is that (despite standard theory) they have no charge. They only differ slightly in their function from the Z's in that the Z's govern the more extreme interactions. This lack of charge actually is good news, since all bosons should be neutral with respect to charge. Like a catalyst they only transmit what is already there. Whatever charge they transmit, that is the charge they seem to have. But they are only messengers and just transmit what is there.

Gravity in the form of the *G* constant plays a key role in the structure and operation of the B_u, Z, and W bosons. The gravity-operation bosons are all bosons that carry "mass". When I say that the B_u, Z, and W have "mass", I am actually being a bit misleading. We often associate mass with stability. Perhaps this is a misconception. You will never see one of these particles hanging around. They are highly transitory. It turns out that EVERYTHING is highly transitory, even the apparently stable proton. Therefore it is better to think of these particles as big bubbles of energy that well up from the vacuum state to echo the energy transitions that occur among the particles. This is simply an expression of Newton's third law of action and reaction balancing. If you drop a rock into the water, there is a kerplunk, and then a big glob of water rises into the air for a moment. Then the water settles back down. In other respects these heavy bosons are no different from photons – in fact they are certain configurations of photons. The only remarkable thing is that the heavy B_u bosons can form a pair that finds a stable range of equilibrium. This allows matter to build into complex structures.

Bias and Identity

Now let's step back and go abstract again for a moment to get our principles laid down for the role of quantum gravity in connecting the mental and physical worlds.

Our theory of quantum gravity at this point is based on the principle that pure undefined awareness has the **option** to exercise decision-making through the **will**. This process occurs through the cancellation operator and the resulting boundary-forming operation. This operation of forming mental boundaries is called **definition**. The process of definition generates **bias** in pure awareness. The awareness is no longer undefined and appears to lose equilibrium. The loss of equilibrium causes a flow of awareness. The

flow of awareness through a boundary is called attention. Attention manifests as desire and resistance. Desire and resistance are the two conjugate aspects of the same bias operation. Desire is an attraction toward a particular defined creation. Resistance is pushing away from a defined creation. Desire and resistance are conjugate forms. This is what we mean by bias. Another word for bias is **identity**. Attention with bias unknowingly and automatically generates a creation of identity on the attention itself. This identity is the **observer**, the participant in creation who either just watches or watches and then gets actively involved. Attention, attracted to a creation or resisting a creation, flows in that direction. This is the beginning of **gravity and later electromagnetism**. A subjective synonym for gravity is **seriousness**. Seriousness means that attention has become **fixated** on resisting a particular creation and thus biased from its natural state of dynamic equilibrium. What we call universal gravity is the serious fixation on the inadequacies of unity. What is wrong with unity? Unity is lonely and boring. It lacks love and companionship. In a word, it is no fun.

The more attention flows into the boundaries of a creation, the more solid and "real" that creation becomes. The natural state of awareness is to be undefined. This is its state of equilibrium. Therefore, as attention flows strongly into a creation, the creation responds with an equal and opposite reaction. The creation develops a bias for the identity that attention has unknowingly created for itself. The echo of biased attention that comes back to the observer from his creation manifests as gravity. If you resist unity, unity will ineluctably draw you toward it any time you relax your guard.

We only experience that all physical bodies attract gravitationally and there seems to be no "antigravity" force. It is there, but ignored. The true antigravity force is the force of desire that generates the solid matter in the first place. When the observer tires of what he originally desired, he wishes it would go away. Unfortunately wishing something away is a resistance that does not work. It is just another desire that creates another creation. But this creation is resistive and pushes against the prior creations. This generates kinetic energy. Kinetic energy is a secondary form of gravity that acts as antigravity, the physical form of gravity's conjugate partner. The kinetic push of resistance is what got things started and was the primary impulse of creation. The joke of creation is that you end up with all the things you resisted in unity, but you also get the complexity of the real world. It might be pretty depressing if it wasn't so outrageously funny. You play your greatest joke on yourself.

The only way to get rid of solid creations is to experience them. Pushing them away or wishing them away just complicates things by getting them all moving around and piling on top of each other. Getting rid of solid creations is a problem of psychology rather than physics. Techniques such as the Avatar Creation Handling Procedure can handle such problems easily, so we won't go there. Our goal in this stage of our discourse is to understand theoretically and then mathematically how gravity works in the physical world. We discuss the mental aspects only so that we understand intellectually the source from which the "mysterious force" of gravity originates.

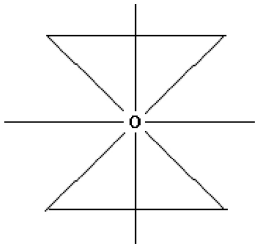
We have shown that mental space can be interpreted either vaguely with general concepts,

or with mathematical precision. Mathematical models include number space, algebraic space, geometric space, and so on. All of these mathematical mental spaces are equivalent and map to each other -- unity underlying the pretense of diversity. We have shown the relation between mental space and physical space. The two are also transformations of the same system. The transformation operator lens of consciousness turns orderly, discrete mental objects such as integer values into random collections of statistics, and turns mental continua composed of random and unpredictable sips and gulps (irrational values) into predictable wave functions. (See chapter 1.)

We also saw that discrete physical events or objects are described by quantum statistics that multiply to form probabilities within an ensemble of possibilities. Continuous physical creations are composed of un-quantized components that add up to unity. We can now include the property of mental bias that shows up in the physical world as gravity. Electromagnetic biases are secondary tendencies generated by resistance. Resistance is the second level of desire. Electromagnetic resistance generates the mechanical forces of physics that show up in dynamic and static systems at all but the largest and smallest scales where gravity dominates. Gravity and electromagnetism both involve resistance, but at different scales.

The way gravity manifests in the mental world is through bias. Bias is a distortion of equilibrium that drags everything toward a particular focus of attention. This bias can be represented mathematically in number theory, algebra, or geometry. Geometry is a simple way to visualize, so we will use geometry to develop our theory. We could use field theory, but that is not necessary. Bias in geometry is a distortion of shapes. Topology is a field of geometry in which one learns to identify common structures underlying distorted shapes.

We Head for the Cones



Gravity Cone

One of the simplest systems of geometry that demonstrates the way distortion works is the conic section. To make a symmetrical cone with a pair of conjugate nappes, mark a point O on a horizontal straight line, and then generate a second vertical line normal to it through point O. Then bisect the right angles and generate two more lines passing through along the bisections. The first two orthogonal lines form our "transcendental" reference frame. The second two orthogonal lines represent our relative frame. We then rotate the relative pair of lines within the transcendental frame pair using the vertical line as our axis of rotation. The result is a double napped cone that looks like a very conical hourglass.

If we then allow a plane to intersect this "hourglass" at various angles, the intersections form a set of shapes that include a point, a line, a circle, an ellipse, a parabola, and a hyperbola. The various curves can have a range of eccentricity and scale depending on the angle at which the plane intersects and its distance from the point where the two cones meet. All of these represent the various manifestations of gravity. The angles of the cones' sides theoretically can vary, but we will set as a standard that the cone sides intersect at their meeting point at an angle of 45 degrees from the horizontal and moving upward in a geodesic along the edge of the cone is equivalent to the velocity of light.

The point where the cone vertexes meet is a singularity, a black hole that lies in the center between the two nappes. A straight line is a photon trajectory that runs at 45 degrees upward tangent to the cone. A circle and an ellipse describe various possible orbits of one object around a gravity well and a barycenter. The plane intersects the cone horizontally in the case of a circle and at an angle less than 45 degrees for an ellipse. Circular orbits are always very balanced kinetically, but the masses of the two objects may be very unbalanced. For example, some planets have nearly circular orbits around much larger stars.

A parabola represents an object that is moving "parallel" to the "opposite" cone edge photon line of a singularity (when viewed from the intersecting plane) and thus an object in such a flight path moves at less than light speed, but never enters an orbit. It has escape velocity, so it just swings by a gravity focus and then leaves the system. Small objects cling to very massive objects (stars, planets, etc.), and if they are somehow accelerated in a trajectory away from the massive object (but at less than escape velocity), they trace a parabola as they fall back to the massive object. We can think of a parabola as the curve formed by a plane slicing the gravity cone at 45°, but not passing through the origin O. We can think of “falling” objects as moving in the lower nappe. The earth is a part of the consciousness “environment” in which we have chosen to experience life. Whatever we throw away from us falls back into our mental space unless it has “escape velocity”. Remember this when you discard things that you no longer want to have around. They stick around in your mental landscape and may come back to haunt you as you shift about in your space of experience.

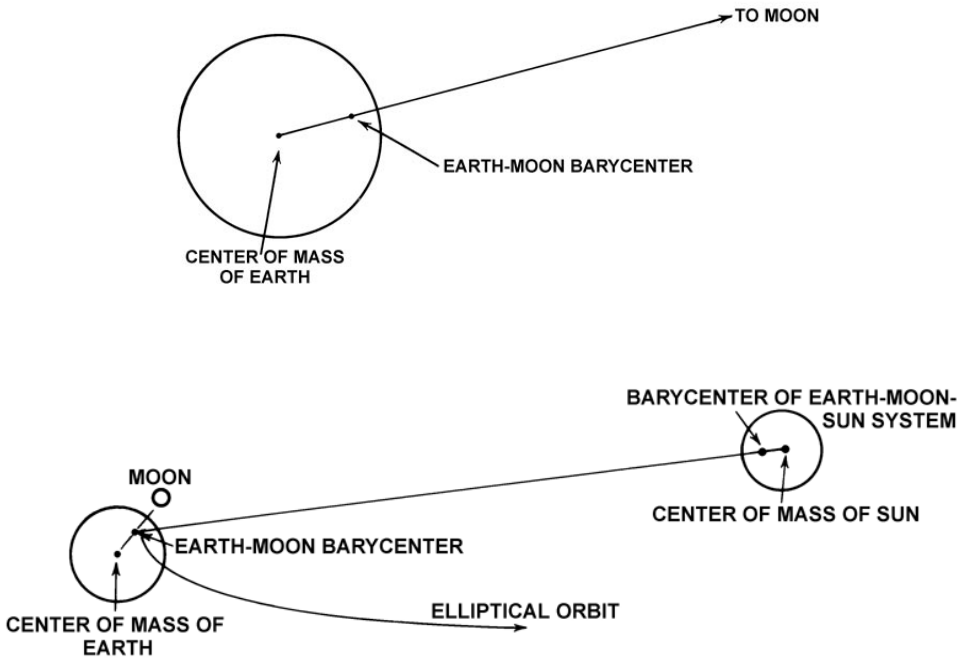
A hyperbola represents an object following the path formed by the intersection of a plane more than 45 degrees from horizontal up to "parallel" to the vertical axis of a singularity, but not exactly through the center axis or it degenerates into pure light. Like a parabola a hyperbola also never generates an orbit, but gets pushed away before ever passing around the gravity well focus. The hyperbola is an expression of strong observer resistance to what is happening. The parabola is an expression of physical resistance based on prior action, and it takes the form of inherent kinetic energy that exceeds the gravitational relaxation tendency.

In our model the gravity well for an elliptical orbit is always at the cone's nexus, and projects by the shortest path (perpendicular) to the intersecting plane that defines the orbit. (For a circle this is the cone’s central axis.) The greater the kinetic energy of an object

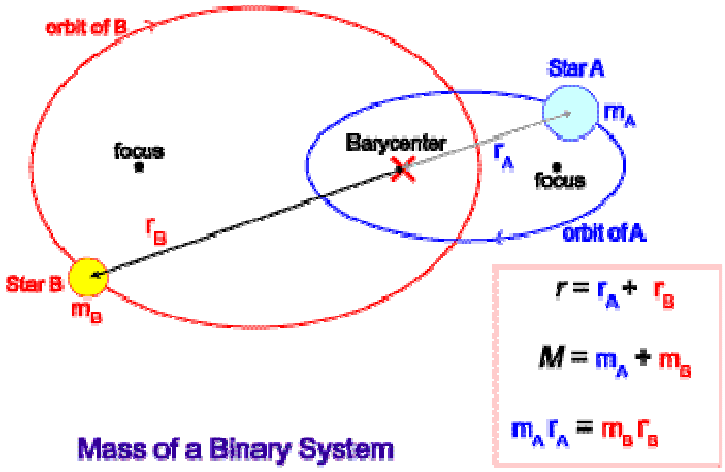
relative to a gravity well, the farther away from the singularity a trajectory will swing in its elliptical orbit. As observers we ride on the earth's elliptical path around the sun, and can view other orbits from many different angles, but the plane through the cone corresponds to the plane of the orbit. Each planet has its own plane, but the planets tend to all be more or less on the same plane angle relative to the cone.

In the real world of physics objects in parabolic or hyperbolic trajectories relative to their gravity well do not fly off to infinity. They eventually come under the influence of another system with a gravity well and are either captured into a stable orbit or flung away again to yet another system.

Only elliptical flight paths can form stable orbits, and circular orbits are a special very balanced subset of elliptical orbits with zero eccentricity. Zero eccentricity is a mathematical idealization. All orbits have some eccentricity due to perturbations. Any system of two bodies in a stable orbit is planar (the plane that cuts through the abstract gravity cone) and has conservation of momentum. Roughly the sun's mass is 2×10^{30} kg, and the earth's mass is 6×10^{24} kg. The sun's mass is so much greater than that of the earth (about 333,000 times more massive) that the sun only has a wobble rather than a visible orbit relative to the earth. The mean radius of earth's orbit is 1.49×10^{11} m. The sun's mean radius is about 6.96×10^{8} m, so the barycenter at about 4.5×10^{5} m is well inside the sun. Of course, every other planet also adds to the sun's wobbles and some mutually cancel or add to the solar wobbles.



Earth-Moon and Earth-Moon-Sun System
APN2002-figure902a, b (public domain),
U.S. Gov. - The American Practical Navigator (NIMA 2002 pdf edition)



Relationship between barycenter, orbital radii, and masses in a binary star system. Image source:http://outreach.atnf.csiro.au/education/senior/astrophysics/binary_mass.html.

A binary system works like a first class lever with the barycenter as its fulcrum. So, in the above example, for stars *A* and *B* the barycenter is at the common gravity well focus for both bodies and $m_A\ r_A = m_B\ r_B$, where *m* is the mass of star *A* or *B* (as noted by the subscript), and *r* is the distance of the given star's center of mass from the barycenter focus. The secondary focus of each orbit is the "potential center" for that orbit and acts as the anti-gravity pivot of the orbit, complementing the kinetic gravity pivot of the primary focus.

In the gravity cone model each type of gravitational interaction involves a conjugate mate. The "degenerate" singularity in the center point is its own conjugate. Each of the others has a mirror reflection of the upper nappe in the lower nappe.

We could define our cone in other ways. For example, if our vertical frame is in the time dimension, then the upper nappe goes into the future, and the lower nappe goes into the past. This is a special cone called the light cone. There are several ways of setting it up. We can let the speed of light (*c*) be the tangent to the cone. All group waves move inside the cone. Slowly moving objects stay close to the vertical time axis. Infinitely fast phase waves would follow the "horizontal" space axes. The light cone separates motions into time-like and space-like. Time-like motions stay in the cone, and space-like motions stay outside the cone. Light stays on the cone's surface.

However, it is important to distinguish that in our model the cone we are talking about is the **gravity cone, not the light cone**, even though light can be involved. All objects (with or without mass) **must** move gravitationally on the **surface** of a gravity cone relative to some other body with mass that serves as the gravity well. This includes everything from photons to black holes, to stars and planets, to subatomic particles. The particular gravity relationship of any object with an external gravity focus determines its trajectory as it moves on the cone. A single object functioning as the gravity well for the system always sits at the center of the cone between the two nappes. Its gravity field is degenerate. As a lone individual, it has no partner relatively speaking, and it has no gravity experience. It just sits there and anchors the gravity cone for a smaller object

that moves in its sphere of influence. Actually, depending on its mass relative to its satellite(s) it will wobble or orbit, taking the satellite as its gravity well. But if it dominates, then it sinks to the center of the cone and tends to stay at or very near the vertex point. It may merge with its satellite partner and may be quite happy if the moving partner relaxes and settles into the barycenter with it!! The central point corresponds to an observer sitting in equilibrium inside a black hole. It is Snow White living happily ever after with the Black Hole Queen. (Chapter 13) She has fully experienced everything, and has no external world. Gravity is nullified for her.

The ideal mathematically **circular orbit** has zero eccentricity and moves at an interval always equidistant from the singularity -- cutting the gravity cone with a **horizontal plane**. The two foci of the circularly orbiting object overlap in the barycenter where the black hole should be. Such orbiting pairs of objects float like a halo above (and reflected below) the singularity at the nexus of the cone, and their orbits are parallel to the horizontal axis. The gravity well floats up the vertical axis to where it is cut by the intersecting horizontal plane.

What makes an object orbit is kinetic energy. Without that it would move to the singularity of the gravity well nexus and behave as if it were a particle with null gravity. The kinetic energy acts as antigravity and pushes the object away from the gravity focal point and up the vertical axis. This tells us that the vertical axis of our frame can be thought of as a dimension of energy. If its kinetic energy is somehow lost, an object will gradually spiral down the physical cone's surface like a marble whirling around the inside of a cone-shaped bowl. Finally it will settle into the center point focus of the gravity well where the nappes meet. We can also call the outer focus of an orbit the potential focus, because the orbiting object loses kinetic energy and gains potential energy as it goes out around the potential focus.

Elliptical orbits occur when there is eccentricity between 0 and 1. An object in an elliptical orbit moves up and down relative to the horizontal axis as it goes around the vertical axis. This means that there is an oscillation in the system between kinetic and potential energy. The reservoir of potential energy (outer focus) is set by the amount of mass energy stored at the center of gravity (inner focus). As an object moves up relative to the vertical axis, it transforms its kinetic energy into potential energy. So the object's height on the vertical axis tells us how much potential energy it has relative to the gravity well.

An object that has escape velocity follows a parabolic trajectory.

* $E = (m_x (v^2) / 2) - (G m_x m_y) / r. = 0.$ (We set energy = $E = 0.$)
* $v_{esc} = (2 G m_y / r)^{1/2}.$

The conjugate trajectory of an object with escape velocity is an object that lacks orbital velocity and falls. It also follows what looks like a parabolic trajectory, but is actually a piece of an elliptical orbit in which

* $v_e < v_{ec} < v_{esc}$,
  where we have an elliptical v_e, a circular v_{ec}, and an escape velocity v_{esc}.
* $v_{ec} = (G\, m_y / r)^{1/2}$. (Circular Orbit)

The circular orbit and the parabolic trajectory are both idealizations that are held only momentarily by real-world fluctuating objects. Elliptical orbits are in the range from $0 < v_{ea} < v_{ec} < v_{eb} < v_{esc}$. The difference between the two elliptical orbits v_{ea} and v_{eb} is simply a relative switch of the foci. Trajectories in which $v_h > v_{esc}$ are hyperbolic.

By convention in our discussions we will always locate the more massive gravity well at Focus 1 (F_1). This appears to govern the motions of the other orbiting bodies. However, when the orbiting bodies have the same mass as the gravity well, we realize that the mass is not the ultimate governing factor, but simply tends to act as a focus for attention. If the ratio of the masses (relative to the barycenter) is the same as the ratio of the radii (centers of objects to barycenter), then we do not need to know the masses, which in any case are not directly observable and measurable the way the radii are.

A parabolic trajectory runs parallel to the edge of the cone. Light represents maximum escape velocity and runs at the tangent parallel to the edge. Unless the center of mass is very great, light easily escapes any orbit and moves into outer space, which is why we can see distant stars but not bump into them all the time.

The hyperbolic trajectory runs parallel to the vertical axis or at an angle that keeps the intersecting plane from intersecting all around either nappe. Since the vertical axis represents the amount of kinetic/potential energy, the hyperbolic trajectory comes from the observer's desire and resistance, his bias that pushes objects away and abandons them after having flirted with them. The asymptotic nature of the hyperbola expresses the unwillingness of the core center to accept the object. The object can only get so close, and then it is pushed away.

The parabola and hyperbola seem like open trajectories. In a sense this is true. However, there is a funny twist to the cone structure that relates to principles of projective geometry. The upper nappe of our hourglass represents physical objects, and the lower nappe (with “negative” kinetic energy) represents the subjective world of thoughts and feelings, the inner world of the observer. It is a mirror that exactly reflects in its conjugate geometry what the observer experiences in the physical world. Your world is exactly what you experience – consciously or unconsciously. The singularity at the center where the cone vertexes touch is the point of **now**, the present moment of experience where the mental world meets, matches, and unifies with the physical world. As we shall see, the mental and physical deeply intertwine, each with roots in the other, and ultimately form a unified system.

The circles and ellipses in the lower nappe represent situations that the observer experiences repeatedly, over and over. For example, the micro-orbits of eating and sleeping and breathing, and so forth are such cycles. Also there are repetitive thought patterns and habits. We can also include the comings and goings of the sun, moon,

planets, and stars as reflected in our circadian rhythms. The outward bound parabolic trajectories are experiences that only seem to happen once and then pass on. People and situations come into one's life, and then, after a while, they are gone and do not seem to repeat themselves. You don't do anything particular, and they pass on. Inward bound parabolic trajectories fall back into your mind space, but not necessarily within the range of conscious perception. Hyperbolic trajectories are similar to parabolic trajectories, but they seem to come right at you. They look like they are headed for a collision, so you may tense up and push, flinch, or react in some way. Then they swing by and move away. The energy of resistance sends the object swinging back out toward its asymptote. However, at the same time, you have sent a conjugate impulse of energy deep into your own mental awareness, closing in on an asymptote somewhere deep in the depths of your mind.

Now here's the twist. The cone is a projective cone. An hourglass nappe extended to "infinity" wraps around and comes back through the opposite nappe. If this sounds puzzling, go back to the discussion of the principles of projective geometry and redo the exercises regarding projections through infinity. Since the two conjugate wings of the parabola and hyperbola are spreading farther and farther apart, one toward infinity and the other toward an asymptote, we have a four-wave mixing phase conjugation system! "Infinity" is not infinitely far away. It is as if there is a mirror set up above and below the cone. The mirror expresses the principle "As above, so below." The mirror reflects the wings back down (up) toward the center. The result is that the parabolic trajectory is just a super big elliptical orbit. In the quantum world, any random free electron can drop in and replace an electron that has left a system when the energy settles down. This is also true in astronomy where comets, planets, stars, and even galaxies can wander from one cluster and encounter another cluster. Our galaxy is heading toward a future collision with our nearest galaxy, Andromeda, about two billion years from now, instead of the originally estimated four billion years. That should be quite an event.

A parabolic trajectory runs parallel to the opposite edge of the cone (the tangent plane parallel to the parabolic trajectory plane), so it will not hit the center vertex unless it has been modified by some other interaction and shifts to running parallel on the edge. Such a modification might involve a scattering event or a warping of the trajectory. The only "parabolic" trajectories that can hit the center are pure EM light rays. These are the only things we can perceive. Everything else is imaginary. We can only perceive at the center point the bundles (lines passing through a point) of light rays that converge on our point of being.

A hyperbolic trajectory can come as close as it pleases. Closeness is relative. But again, it only actually contacts the center if it has degenerated into a pair of light rays that run along the cone's edge on its asymptotes and intersect at the center. So a hyperbola degenerates into a pair of degenerate parabolas. Then we experience it. Otherwise it comes in close and then is pushed away. It is like doing push-ups. You have to pump the energy. When you resist the hyperbola and keep it floating and rocking in its asymptotic cradle, you expand your own sense of self from a point into an area defined as lying between the two vertexes of the closest hyperbola trajectory. This kind of life

tends to become based on fear. It is defined not by the self deliberately, but by the near misses of heavy flying objects. It is a life defined by dodging bullets and bombs -- figuratively or literally.

The subjective side of the story is interesting. Parabolic "orbits" slice through our lives now and then like comets. But then there are the hyperbolic monsters from the deep that come welling up to shake our definition of self from below, even as we are dodging falling rocks from above.

In a collider experiment the area between the hyperbolic trajectories is called the scattering cross-section. When high-energy particles moving at nearly light speed (almost following the plane tangent to the cone's surface) are put on a collision course they scatter off the interaction zone. If they penetrate too far, they get into the Planck region. At that scale, Heisenberg's uncertainty takes over and the identities and locations of particles become unclear. The only thing that is clear is that conservation prevails in the end. If the colliding particles are bosons such as light-speed photons, they go right through each other. But fermions appear to scatter. Or do they? Maybe they DO go right through each other and are distorted by the heavy gravitational field. Thus they emerge bouncing out at different angles, masses, and velocities.

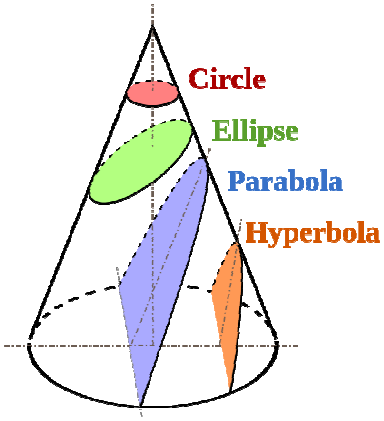
Astronomers have found galaxies that act as gravitational lenses bending the light from stars behind them. This is a milder form of the same phenomenon. Einstein's prediction of the gravitational bending of starlight by the sun's mass is another example.

The W and Z bosons form the massive anchor in the vacuum state that magnifies the total lensing effect of the colliding particles' masses. Inside the proton the B_u bosons and the squark center (an anti-mass down quark) form the anchor for the fundamental fermion.

In our model of the gravitational interactions of mental-physical space the horizontal axis represents the equilibrium point of the vacuum state. The vertical axis represents the level of kinetic/potential energy. Distance on the horizontal axis represents displacement in space due to kinetic energy. The more kinetic energy available, the more expanded the system becomes in space. The origin of the kinetic energy is the bias of the observer. That is why no one can ever find its origin in the physical universe. The origin is at the "origin" of the model, right at the center of mass. The vacuum state vibrates according to the bias of the observer and his "abandoned" creations that are bouncing around in energy space. Ultimately the observer is the source of all gravity. By simply relaxing into his universal center of mass, he can turn off all the gravity and float in the vacuum state.

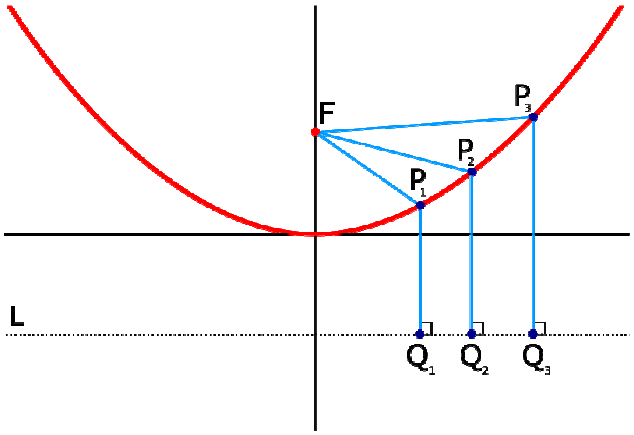
Another way of interpreting the "scatter" of the colliding particles is that they suddenly raise the mass density in the Planck region above the level that is tolerated by the equilibrium of mass density in the current universe. So the excess energy rebounds back out. The proton and its stable atomic increments are the only possible primary outcomes. Electrons, neutrinos and photons plus jets of evanescent mesons, or fatter leptons and baryons pick up anything left over.

We know now that electrons are point vortexes of energy, and neutrinos are quasi-particle packets of mass-energy. So what is the gravity particle, the particle that tells the various objects moving about on the surface of the cone where they should be? If it exists, it must be a massless boson. Let's find it in our diagram. To do that, first we should give a rigorous definition of the various trajectories.

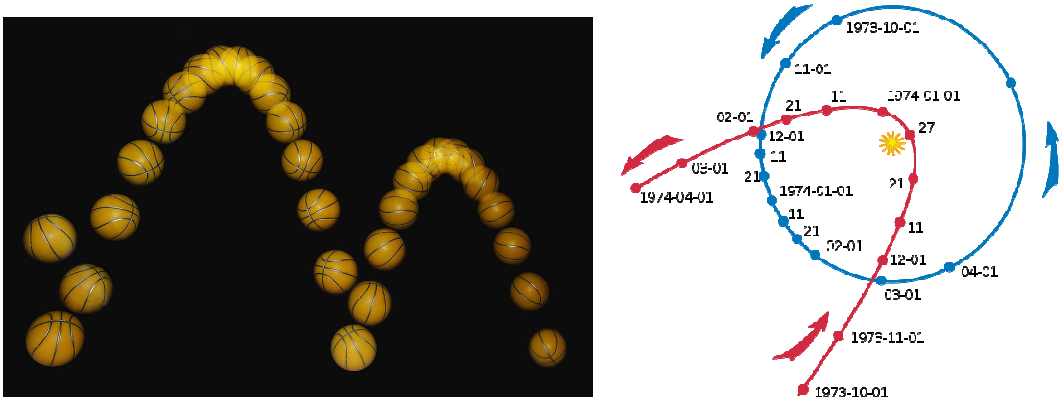


Wikipedia, "Parabola"

PARABOLA -- This is a curve defined by a set of points on a plane that cuts through the cone parallel to a plane tangent to the side of the cone and that are equidistant from a fixed point called the focus and a fixed line called the directrix which is outside the parabola curve. A conjugate parabola occurs as a mirror image in the lower (upper) nappe of the cone. The parabola has a second focus at infinity (the mirror limit of kinetic energy in our system.) Parabolas have a reflectivity property such that any ray parallel to its axis reflects off the curve to the focus. Thus parabolic mirrors can be used to focus energy, motion or other phenomena from a parallel flux to a point. Because the distance from a point on the curve to the focus and via the shortest path to the directrix is equidistant, the eccentricity of a parabola is always exactly 1. The parabola also has an orthoptic property. "If two tangents to a parabola are perpendicular to each other, then they intersect on the directrix. Conversely, two tangents which intersect on the directrix are perpendicular." (**Wikipedia**, "Parabola")

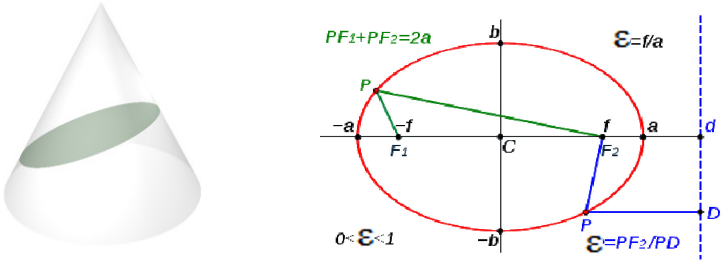


Parabola with Focus F and Directrix L: (FP/PQ) = 1
Wikipedia, "Parabola"



Bouncing Ball Strobe Photo and Comet Kouhoutek's Swing Around the Sun

ELLIPSE -- This is a curve defined by a set of points such that the absolute distance between any point on the curve and the focus point (which is outside the curve and not on the directrix) equals the eccentricity times the length of the perpendicular (shortest distance) from the same point on the curve to the directrix. The eccentricity of an ellipse is restricted to a value between 0 and 1. When the eccentricity is 0, then the ellipse becomes a circle. As the eccentricity approaches 1, the ellipse gets more and more stretched out. Orbits with eccentricity approaching one are very eccentric. At the limit 1 the ellipse degenerates into a line (or a parabola). The ellipse has a second focus and a second directrix mirrored on the opposite side of the ellipse. It also has a conjugate in the opposite nappe. The directrix is parallel to the minor axis. A ray from any focus reflects from the curve back to the other focus and the length of the two rays is constantly equal to twice the semi-major axis -- that is, the semi-major "diameter". This reflecting structure gives it a special "whispering" property. Energy echoes back and forth between the foci from all directions.

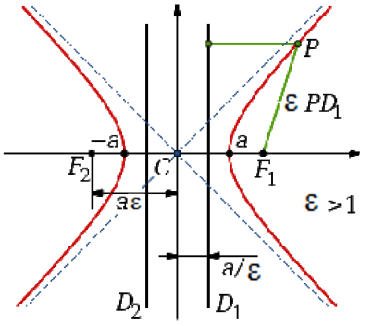


Wikipedia, "Ellipse"

(F_2 is the gravity well focus. Rotate blue diagram counterclockwise 90 degrees for Gravity Cone.)

HYPERBOLA -- This is a curve defined by a set of points such that the absolute distance between any point on the curve and the focus point (which is not in the curve or on the directrix) equals to the eccentricity times the length of the perpendicular (shortest distance) from the same point on the curve to the directrix. The hyperbolic eccentricity is greater than 1. In our model we orient the hyperbola so that the energy axis is the transverse axis and the "space" axis is the conjugate axis. There is a conjugate reflection of the upper nappe curve in the lower nappe, and it also has a focus and

directrix. The two directrices are parallel. The edges of the cone form the asymptotes of the hyperbola. The hyperbola also has a reflection property such that if you connect any point on the curve to the two foci, the tangent to the curve through that point on the curve bisects the angle between the two lines to the foci.



Wikipedia, "Hyperbola"
(Diagram is rotated clockwise 90 degrees relative to our Gravity Cone model)

Each conjugate intersecting plane of a parabola, circle, or ellipse stays only in its respective nappe. The parabola's intersecting plane has the additional restriction that it is parallel to a plane tangent to the cone. Thus each of these has a separate conjugate in the opposite nappe. The hyperbolic intersecting plane has an angle that cuts both nappes.

Now that we have precise definitions of our conic sections, we can ask where would we find the graviton? Let's explore. The positive and negative energies of a moving body tend to gather at the foci of its elliptical orbit. The gravity cone only represents the motions of a single body relative to a gravity well. Each body has its own cone. A massive gravity well cone tends to be very near the focus of its satellite's cone focus. Each particle with mass moves in a curved trajectory on the surface of its gravity cone. A photon moves on the edge of its cone in a straight upward-outward or downward-inward trajectory. It has no mass. The more massive a particle is, the more it hugs in close to the center of mass between the nappes to get close to a focus and follows a curved trajectory. The center of mass for the whole system is the point in the central nexus. The size of the physical world is an exact reflection of the size of the mental world. The two nappes are a conjugate pair, and their conjugate directrices are parallel.

We have covered the cone's center, its surface, and the foci.

The eccentricity is a distortion factor that refers to imbalance in the energy that causes oscillations in the motions. An idealized eccentricity of 1 means the energy passes through the system in a balanced way without oscillating. An idealized eccentricity of 0 indicates that the energy has a smooth kinetic oscillation at a fixed potential level. Circles have eccentricity 0, and the black hole singularity also has the eccentricity of 0. It is a degenerate circle. Eccentricities between 0 and 1 mean that the potential energy fluctuates up and down, but is stable. Eccentricity greater than 1 indicates that variation

in the vertical component of the oscillation dominates over the horizontal component.

The only other component we have not discussed is the directrix. This is not a point, but a straight line that lies outside the trajectory. The directrix is transcendental to the perceived action. She does not get directly involved. Yet she controls the whole operation. She is the lady who directs the show.

The directrix and her parallel conjugate directrix act like a pair of mirrors establishing a resonant cavity in which a standing gravity wave forms. The directrix is a line where a plane orthogonally intersects the plane that intersects the cone. In our space a photon takes the shortest path to its destination. In quantum mechanics we discover that the photon actually takes all possible paths, but most of them cancel out and only the ones that build the straight-line shortest path have constructive interference. The same is true of the graviton. The graviton interaction goes in all directions, but all directions interfere destructively and cancel except for the direct line shortest path between the directrix and the object (e.g., a planet) moving gravitationally with respect to its gravity well. The relationship between that abstract directrix line and the physically measurable line between the moving object and its primary focus, which is usually where the center of mass gravity well is located (e.g., a star) is determined by a **constant** value for that system -- and is called the **eccentricity**, herein symbolized with a non-italicized epsilon ε.

When the graviton propagating from the directrix "hits" the mass-energy medium of a massive object, it "refracts" just like light does when it passes from a medium of air into a medium of glass or water. A refracted ray of light has an index of refraction. A refracted graviton ray is bent by the index of eccentricity for the particular orbit system. It travels the shortest path that is allowed by the eccentricity. **Thus a graviton propagates <u>always orthogonally</u> as a standing wave from an abstract directrix line, through a body in a trajectory, and then "refracts" at a certain angle to the mass-energy gravity well focus point for the moving body.**

The directrix is parallel to the "spatial" kinetic gradient in our model. As the body moves closer to the directrix nearest its primary focus, it accelerates. At its closest point to the directrix the body's speed is maximum. The directrix is a line that fixes a certain quantum potential energy level continuously for the system, although it can be any distance from the moving body. Similarly a photon always moves at *c* although it can have a continuous gradient of frequencies or wavelengths. A directrix has a fixed potential energy value. And it has a conjugate directrix on the opposite side of the boundary. In a circular orbit the two energy values are the same and the eccentricity is 0. In an elliptical orbit the energies oscillate between two values.

Each directrix functions like a mirror. In an elliptic system two mirrors embrace the moving particles between them. In a hyperbolic system two mirrors define the boundary of the interaction "cross section", the no-fly zone into which the particle may not enter. Here are the eccentricities for each type of conic section.

* $$\varepsilon = \frac{\sin\beta}{\sin\alpha}, \quad 0 < \alpha < 90°, \; 0 \leq \beta \leq 90° \,,$$

The cone's axis is by convention vertical, β is the angle between the intersecting plane and horizontal, and α is the angle between the cone's slant generator (edge of the cone) and horizontal. The range of angle α indicates that this is a completely general model for gravity cones. If $\beta = 0$, the conic section is a circle. If $\beta = \alpha$, the section is a parabola, so long as it does not meet the vertex.

* PF/PD = 0 (ε_c circle, 0 finite directrices)
* 0 < PF/PD < 1 (ε_e ellipse)
* PF/PD = 1 (ε_p parabola, 1 finite directrix)
* PF/PD > 1 (ε_h hyperbola)

A second definition of the eccentricity of a conic section is the ratio of the distance between the center C of the conic section and a focus F (CF) to the length of the semi-major axis Ca. Our unitary constant for conic sections is thus:

* **K_G = (CF/Ca) (PD/PF) = 1.**

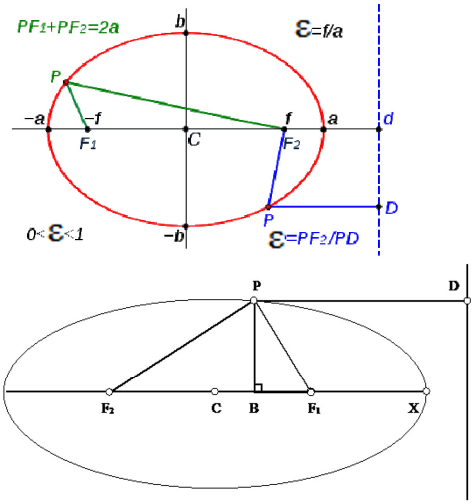
For a parabola both CF and Ca are undefined, because the curve opens out to an effective infinity with no definable midpoint or semi-major axis, and thus we can consider CF/Ca = ∞/∞ = "1". For a circle or vertex point degenerate conic section we have CF = 0 and PD = ∞. PF = Ca. (CF/Ca) (PD/PF) = (0/x)(∞/x). We consider 0/x = x/∞, and thus (x/∞)(∞/x) = ∞/∞ = "1". In this manner we get a universal gravitational constant K_G **= 1** for all conic sections, and that is based purely on geometry.

For the parabola and circle as the two idealized limits of the ellipse (ε = 1 and ε = 0) we take a projective view. The universal constant of gravity K_G in this system is simply the pure number (ratio) 1 that is derived from observables once we get the conic section from observational data. **The masses of the interacting bodies are not relevant.** The masses of the planets have nothing to do with their distribution. Their orbits are determined by initial momentum. Mass is significant only when objects collide and produce a splat or a carom. We need only know the semi-major axis (Ca), the distance CF between the system center C and a focus point (e.g., the gravity well focus F_1), the distance PF_1 from the body on its path P to the focus point F_1, and the shortest distance PD from that position of the body P to the directrix D. Since the resultant is always constant, we only need to know three of the variables. (So, for example, we do not need to know the distance to the directrix if we know Ca, CF, and PF. We know that if Ca = PF = r, we have a circle, and that if PF = PD we have a parabolic trajectory.) This is very similar to Newton's universal constant G with its three component variables Ca, T, and M_{gw}. The beauty of K_G is that, unlike Newton's G, which is only accurate to about three or four decimals due to ambiguities of mass and force, K_G is mathematically precise (at least within the range of classical physics, Euclidean geometry, and our measurement tools). K_G also signifies the value of unity that gravity brings to the foundation of the cosmos. The way the two ratios based on different parameters still neatly form a reciprocal pair suggests the complementary relation that is embodied in the mathematical structure of our unified theory. (See Chapter 13.)

Of course, if we also know the period of a stable orbit and the radial distance between the center of the satellite body and the primary focus, we can figure out the "acceleration". But K_G tells us that any gravitational system is always in **perfect equilibrium**, so we do not need to know the acceleration, only the relative positions of C, F, Ca, P, and D at any moment. Furthermore, we can be without C, Ca, **or** D and still find the answer.

We can interpret a cone in many different ways, assigning different dimensional units to it. For simplicity we want our results to be all in the same units. For example, we can consider all the dimensions in terms of distance. Then the lines on the cone represent the momentary positions of objects in their spatial trajectories. The dimensions can be anything so long as they are consistent. They can represent forces, distances, energies, amounts of money, -- anything, as long as they are consistent. These various labels we put on the model are just transformations of the same dynamic relationship. So we can visualize the whole thing spatially, and then transform it into an energy model.

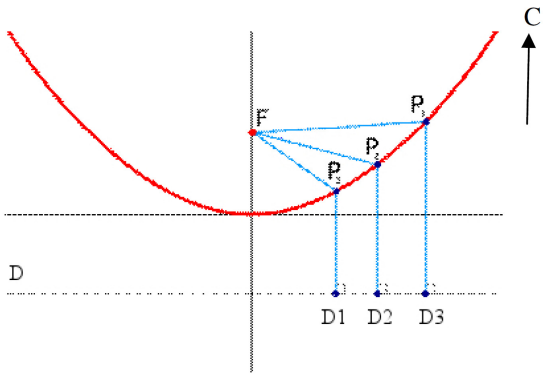
In the drawing below we let PF_1 be the distance from the satellite P to its focus F_1, while PD is the shortest distance from the satellite P to the directrix mirror D, and ε is the eccentricity. CF is the distance from the center of the conic section to the primary focus F. Ca is the distance from the center to the vertex (and equals the semi-major axis). This relation also holds for hyperbolas. Parabolas are open curves with no defined center, so CF and Ca are both infinite and assigned a ratio of 1. PD also equals PF for a ratio of 1.



Ellipse
ε = f/a = CF / Ca
ε = PF/PD
K_{GU} = CF PD / Ca PF = 1

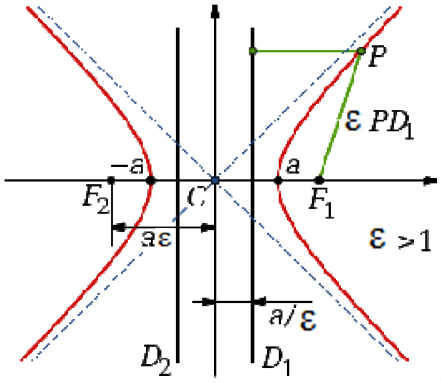
f = linear eccentricity = CF_1
a = semi-major axis Ca
(Also ε = $Ca/CD_\perp$)

K_G = CF PD / Ca PF = 1



Parabola

$K_G = (CF\ PD / Ca\ PF) = 1$
$CF = \infty$
$Ca = \infty$
$CF = Ca$
$CF / Ca = 1$
$PF = PD$



Hyperbola
$K_G = (CF\ PD / Ca\ PF) = 1$

$CF = a\varepsilon \qquad (a = Ca)$
$\varepsilon = CF / Ca$
$PF = \varepsilon \cdot PD$
$\varepsilon = PF / PD$
$(\varepsilon/1)(1/\varepsilon) = 1$

For an excellent animation of the relations between the ellipse and the hyperbola regarding their directrices, go to the following **Wikipedia** address:
http://upload.wikimedia.org/wikipedia/commons/5/54/Ellipse_and_hyperbola.gif.
Source, **Wikipedia**, "Eccentricity (mathematics)".

What About Quantum Gravity?
In these conic sections $(PF)^2$ is the square of the distance between the center of the gravity well and the satellite body. This reminds us of Newton's gravity equation:

* $F_g = G\, m_1\, m_2 / r^2$.

In this equation the r^2 is the same as the $(PF)^2$ in a conic section. Thus,

* $r^2 = (PF)^2 = G\, m_1\, m_2 / F_g$.

Suppose we substitute $(G\, m_1\, m_2 / F_g)$ for the $(PF_1)^2$ component of our diagram.

The next question is: What are the values of m_1, m_2, and F_g?

We are looking for the quantum unit of gravity. We already have our principle of "gravitational" invariance for gravitons dictated by the directrix.

* $\varepsilon^2 = (PF_1)^2 / (PD)^2$.

Expressed in terms of $(PF_1)^2$ we get:

* $(PF_1)^2 = (PD)^2 \varepsilon^2$.

We substitute into Newton's law of gravity:

* $(G m_1 m_2 / F_g) = (PD)^2 \varepsilon^2$.

The eccentricity squared (ε^2) will be a pure number constant. We are looking for the graviton particle at its fundamental quantum level. So we want to solve for ($m_1 m_2$).

* $(m_1 m_2) = (F_g (PD)^2 \varepsilon^2 / G)$.

We know that the force F_g is energy per meter. Because we have substituted Newton's law for $(PF)^2$, we are still operating in distance values. Therefore $(PD)^2$ is still in meters squared. This means that the expression (F_g $(PD)^2$) represents an "energy-meter" or a newton times a meter squared, or a mass times an elliptical orbit signature (Kepler's third law that the square of the period is proportional to the cube of the semi-major axis).

Let's focus on the "energy-meter". In quantum mechanics we find by experiment that energy occurs in quantum units. These units are usually written as "energy-seconds" ($\hbar$) or as "energy-meters" ($\hbar c$). If we are looking for the quantum unit of gravity, then we must substitute into our equation the **minimum quantum value** for energy-meters: ($\hbar c$).

* $(m_1 m_2) = (\hbar c \alpha K_G) / (G)$.

What we have now looks just like the Planck Mass that we derived earlier in this section as we probed the gravity constant. There is a particular dimensionless eccentricity constant ε involved. Now we can make a leap of assumption similar to Newton's leap of assumption when he assumed that the gravitational force between two bodies was mutual and set his gravitational constant at a universal value G. We will assume that this fundamental reciprocal relationship of quantum gravity indeed is the Planck Mass in the form of the B_u pair with a reciprocal dimensionless, massless, eccentricity constant of 1.

Our justification for this is that it makes no sense to assume that the gravitational boson is smaller than a photon, which seems to be what most people do. The photon has no rest mass and has energies that fade away as the wavelength gets longer and longer. The limit for the photon energy is just empty space with perfectly straight oscillation wavelengths. Such almost 0-energy photons are constantly exchanging between any two particles, and we call that empty space. It is a virtual transaction in which nothing happens.

Gravity affects objects with mass, so we would expect it to come from a source with mass. However, the graviton itself is not thought to have rest mass, all of which sounds

contradictory. It easily could propagate at speed c or even much faster. All masses in our universe are built from protons. Protons are built from B_u pairs. Thus we let K_G (the reciprocal eccentricity unity relationship) be the graviton "particle" together with its EM fine structure coupling constant companion a, as components of the Planck Mass B_u Union Boson pair. This tells us the internal structure of the warping of space-time, because we already know the structure of a.

* $a = e^2 / 4 \pi \varepsilon_o \hbar c$.

Along with this finding we come to the revelation that the Union ensemble has a quantum uncertainty that is somewhat akin to Heisenberg's uncertainty. The ensemble only makes sense as a couplet, a pair of masses. One mass alone exhibits no gravitational influence on anything, as there is nothing to influence. It takes two to tango. The graviton, like the photon, always appears as a conjugate pair. However, just like our Heisenberg relation and the Velocity Equation that we discussed in detail before, the mass components of the ensemble have a reciprocal relationship that is governed only by the B_u boson's quantum limit.

* $(m_1 m_2) = B_u^2$.

Compare this to the Velocity Equation.

* $(v_g)(v_p) = c^2$.

We can do the same thing in algebra that we can do in geometry. These two equations are essentially the same equation cast in different dimensional units. The mass m_1 can be equal to m_2, and, on average, this may be so. But quantum fluctuations allow the values of m_1 and m_2 to vary widely within the limits of mass-energy. We only know that the ultimate quantum value is like Heisenberg's $\hbar$ uncertainty and the velocity uncertainty of c^2 components -- it involves a pair in a reciprocal relation. For example, neither mass component can be smaller than the smallest quantum unit of particle mass -- the electron neutrino. If we take m_1 as the smaller of the two masses in the case of inequality, then we get the following relationship (assuming, for example, our hypothetical neutrino mass).

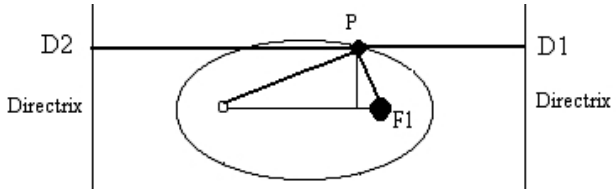
* $m_1 >= (\hbar / c \,\%) >= 1.11\times10^{-43}$ kg.
* $m_2 <= (c^2 \,\%\, a / G) <= 3.11\times10^{25}$ kg.

This 10^{25} value is the mass for a planet a little less than half way between Earth (0.597218×10^{25} kg) and Uranus (8.681×10^{25} kg) in size. Recall that earlier in this chapter we found a simple formula for a boundary between a Jovian planet and a small star:

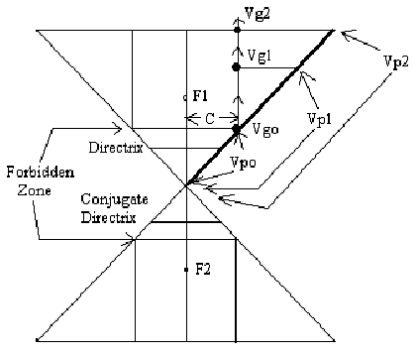
* $(G^{-1} c^2 \,\%) = 4.26\times10^{27}$ kg.

We now have a theoretical derivation of the quantum unit of the graviton, with a formula for computing its wavelength in any given gravitational system. The pair of directrices

in a stable elliptical system set up the graviton's standing wave, resonating in the system as between a pair of mirrors. The mirrors can be embracing the system like a pair of brackets [ ] in the cases of circular, elliptical, and parabolic systems, or they can be in the central region reflecting outward] [as in the case of a hyperbolic system.



Elliptic Directrices: [⊂⊃]



Hyperbolic Directrices: ⊃] [⊂

We have now established a simple and elegant theory of quantum gravity that displays the property of invariance demanded by a quantum system, and avoids all the complications of superstrings, twistors, and other such devices. We use only high-school level algebra, analytic geometry, and the Pythagorean theorem. All of Newton's classical mechanics and Einstein's relativity, including both special and general relativity with its tensor calculus, probably can stand as is, except for some misconceptions about Einstein. So can most of modern quantum mechanics, although I suggest a few revisions, such as the modified quark theory and refinements to Feynman diagrams. We even have a model for a field that generates particles with mass from "seed" particles without mass, as well as various properties and an underlying condition of quantum foam. By a simple, automatic transformation this quiescent field comes alive and vibrates with all the particles, forces, and interactions at the right masses. The problems with masses in quantum field theory are thus resolved and we understand where the mass comes from as well as where the influence of gravity comes from.

We get our gravitational invariance directly from the geometry of conic sections. The geometry of conic sections holds regardless of the units that we use for the various components of the system, as long as the units are consistent throughout. Therefore, the same system that works for pure distances or velocities that contain no masses will also work equally well for a system that involves interacting masses.

The fundamental graviton quantum falls naturally out of this invariance principle when the energy, light-speed, and gravitational constants are applied to the geometry relations of the conic section geometry. Along the way we derive a new graviton coupling constant.

The quantum eccentricity is a universal constant that represents the eccentricity of a graviton-oriented gravitational system, because all other components of the Planck mass are also universal constants. The variable eccentricity factor occurs in all systems based

on conic sections, and remains constant within a particular system's total operation, and is universal with the value of 1 for all gravitational systems. In other words the eccentricity constant represents the gravitational distortion of space-time that a pair of gravitationally interacting masses of any kind generates. The unity constant arises from the perfect equilibrium of all gravitational conic section geometry.

The eccentricity arises from **a perfect sphere of undefined awareness** with 0 eccentricity when the observer pretends to split awareness by pushing the one central focus apart into two foci, "me" and "not me". Rotational dynamics and precession then follow and the three-dimensional cosmos unfolds: (1D) the bifurcation of focus, (2D) orbit, and (3D) precession. One focus becomes the gravity well of the self, and the other focus becomes the potential well of striving to become something one is not. Observation of orbits reveals that, as the "satellite" body approaches and rounds the potential well at apogee, the speed reduces to minimum or even pauses. Then it rebounds back toward the gravity well of the self, accelerating to maximum speed at perigee. The tendency is always to return to the self. Parabolic and hyperbolic systems escape from one definition of self and find (randomly or deliberately) a new definition of self. As denizens of Planet Earth, we define ourselves as Earthlings. If our civilization achieves "escape velocity", we will be able to redefine ourselves as Martians, Sirians, or whatever we prefer. This is a general principle, and does not merely refer to astronomy.

The eccentricity constant K_G unifies gravity with all the other forces and constants. Electro-gravitational unification is built into the relation via α. Gravitational "attraction" is determined by the mass-energy potential. "Anti-gravitational" inertial "pull" is determined by the kinetic energy of electrical systems. The two are equivalent, but opposite. They are a conjugate pair. Magnetic forces are secondary echo effects that show up normal to the other pair, and are described by Maxwell's equations. They are due to further resistance. Each force -- gravitational, electrical, and magnetic -- is a residual effect of resistance, resistance of resistance, and resistance of resistance of resistance. Our world is built up from layers of resistance. The so-called weak force mediated by the intermediate bosons is really a gravity-energy phenomenon as opposed to a gravity-mass phenomenon. A planet keeps recursively manifesting itself and its gravitational unification tendency. A W or Z boson is an energy bubble that boils up from the vacuum state and then pops. So its gravitational effect is very transitory. Otherwise it is the same as ordinary gravity. It just operates in a short time frame and at a short distance interval and then dissipates without becoming a stable gravity well. Gluons are theoretical particles used to explain theoretical exchanges of energy inside the nucleon. The force involved with the gluons is not a separate force. It is simply the harmonics of the interacting waveforms of electromagnetic force and gravitational pseudo-force inside nucleons. With our model of the nucleon we can now construct a precise theory of Lens Harmonics that shows how each combination of quarks and nucleons occurs as a wave pattern of the lens vesicle and its surrounding structure.

The B_u ensemble appears as a proton or neutron moving on the surface of the cone. The cone is a non-local structure of geometry. It contains the whole "history" of the B_u

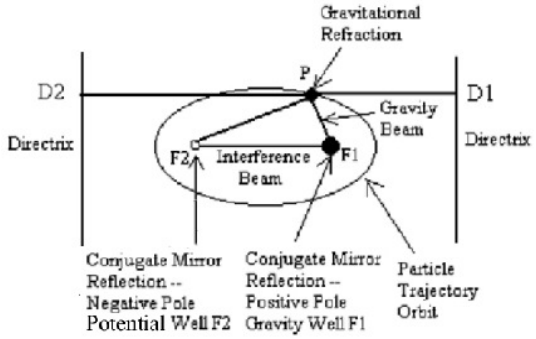
ensemble's time evolution, or any other gravitational system we wish to model.

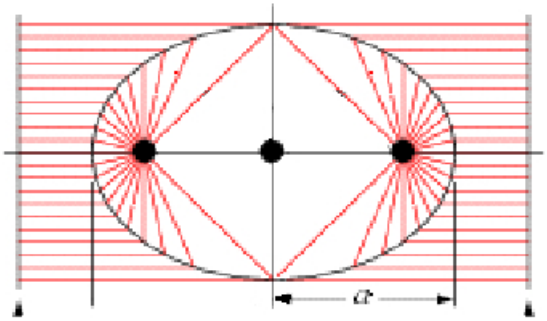
Professor has a lot of fine intuitive ideas of how things should be. One of them is his idea of the importance of the cone structure. Another one is the idea that the collapse of the wave function has something to do with the graviton. Unfortunately he got a bit carried away with his interest in asymmetry, complex fields and twistors, all of which are extremely fascinating but not necessarily germane to the quantum gravity issue. On the other hand, his discovery of quasi-crystalline structures and tilings is very much relevant, because the recently discovered occurrence of such things in nature is evidence of macroscopic non-local operations. Even Buckyballs fall into this category of non-locally generated objects.

To follow the graviton trajectory, refer to the appended drawings as you read the description below. A graviton trajectory is in hyper space and the physical particles in trajectories act like beam splitters.

In an elliptical orbit the resultant graviton wave (the graviton trajectory) passes orthogonally from the directrix D to the object P in the trajectory, curves with its own version of Compton scattering, and goes straight to the focus F_1. Then it "tunnels" straight to the other focus F_2, heads straight back to the object P, makes a sharp turn and then via the shortest route, goes to the conjugate directrix D_2, from which it reflects back along the same basic path. The graviton wave packet reflects back and forth in this fashion between the directrices as the particle moves in its trajectory transferring the planar energy that keeps the particle on its conic section path. The two directrices are like mirrors, and the tangent to the ellipse at the particle's location acts also like a type of conjugate mirror. The bending of space/time occurs in the vicinity of the particle and at the foci. There the graviton trajectory bends tightly as it slingshots around the energy node. The path between the two foci via the particle in a stable elliptical orbit is a constant distance equal to the major axis. You can think of the particle P as a beam splitter. One beam goes back and forth between the directrices, and one takes a detour through the foci, running along the major axis between the foci parallel to the main directrix beam. The main directrix beam scans orthogonally back and forth between the directrices as the particle orbits. A physical elliptical orbit is mirrored in the mind as a mental elliptical orbit with a mental particle.

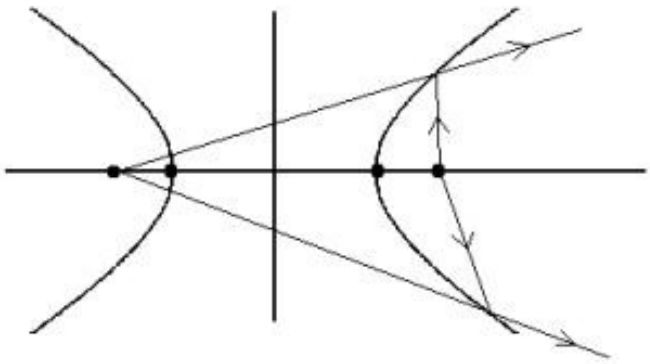
* $D_1 \rightarrow P \rightarrow F_1 \rightarrow F_2 \rightarrow P \rightarrow D_2 \rightarrow P$ .....



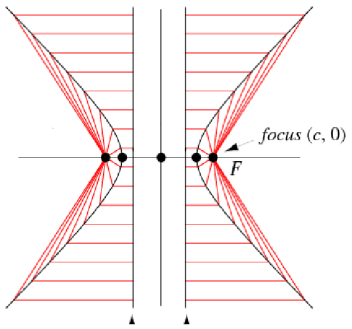


Ellipse Beams

In the case of a hyperbolic trajectory the graviton wave-particle trajectory goes from the physical world directrix D_1 to the physical particle P_1, and thence to its focus F_1. From there it tunnels along the axis through "infinity", only to well up from deep inside the mind, arriving at the mental focus F_2, from which it refracts to the mental image of the particle P_2, bending again to reach the mental directrix D_2. It then reflects to P_2 and winds its way back. There is a space between D_1 and D_2 that appears to be a no-fly zone. The beam tunnel that is always parallel to the central axis goes both ways, through infinity and through the central region and the directrices. In this way the graviton reflects, passing between the subjective and objective worlds just like photons do with their conjugate pairs. The system works the same way hyperbolic mirrors do, using the principle of conjugate photons to explain the conjugate reflections. When the graviton leaves the directrix, it takes the perpendicular shortest path to the particle. Then it refracts, bending its path to head to the focus. The conjugate ray to the path from particle to focus is a ray coming into the convex "surface" of the trajectory. This conjugate graviton reflects off the particle and goes directly to the other focus. It appears that the back-propagating reflection off the convex side goes off into space, thus attenuating the system. That ray also loops around at "infinity" and eventually feeds back into the system coming in as the conjugate reflection into space from the mental nappe. If that sounds weird, think of the directrix as having the property of a conjugate mirror. When the reflected rays go off the convect trajectory, they hit the directrix, which reflects them back to the respective P_1 or P_2 particle. Ordinarily the rays come in normal to the directrix, but not the back-propagated rays. Study the diagrams.



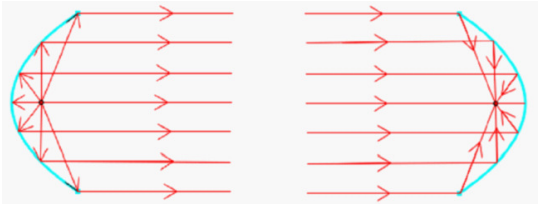
The Reflection Property of a Hyperbola
http://portal.tpu.ru/SHARED/k/KONVAL/Sites/English_sites/G/c_HyperProp_f.htm



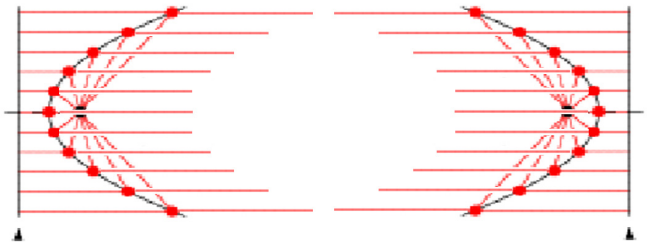
Hyperbola Beams
Based on sketch in http://mathworld.wolfram.com/Hyperbola.html

In a parabolic system the graviton goes from the directrix D_1 to the physical particle in its trajectory P_1. Then it splits and part goes to the focus F_1 and then reflects back to the particle P_1. The other part passes right through the particle and continues parallel to the axis of the parabola along its straight trajectory that is orthogonal to the directrix, heading toward "infinity". Eventually it shows up coming in parallel to the axis of its conjugate parabola or another parabola governed by a gravity well, and goes to its focus (which constitutes its F_2). From there it goes to the mental image of the particle P_2 and splits, part going to the conjugate directrix D_2 and part reflecting back to the physical object P_1. It shows up partly reflecting off the conjugate parabola's mental image P_2 into its focus F_2, and partly going straight to the second directrix D_2. It echoes in this manner between the mental and physical states or possibly slingshots from one system to another until it is captured by another gravity well.

* $D1 \rightarrow P1 \rightarrow F1 \rightarrow F2 \rightarrow P2 \rightarrow D2 \rightarrow P2$ .....



Reflective Property of a Parabola
http://jwilson.coe.uga.edu/EMAT6680Fa08/Wisdom/EMAT6690/Parabolanjw/reflectiveproperty.htm



Parabola Beams
Based on http://mathworld.wolfram.com/Focus.html

In tracing the paths we must remember that, like photons, the graviton rides on a conjugate quantum wave function. It is running in both directions at once. Also, like a photon trajectory, the graviton trajectory is the resultant interference pattern of a phase conjugated quantum bubble.

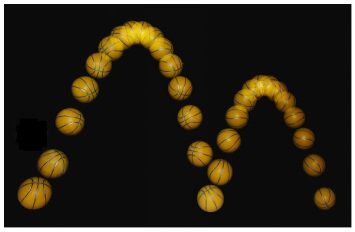
Matter and Energy: What are Directrices?

In our brief introduction to projective geometry we mentioned the duality principle (for example, that two intersecting lines form a plane, and two intersecting planes form a line.) The system of conic sections is a projective geometry system. Each conic section is generated by a plane intersecting a Gravity Cone that is in turn generated by two intersecting lines that have been rotated on an axis of symmetry. We find therefore that all gravitational trajectories and orbits are planar. However, the gravitational system is not limited to the plane, since it depends on the cones and the directrices. The directrices are lines generated by planes that intersect the trajectory plane, presumably at the orthogonal angle. They act like magical mirrors that are perfectly parallel and reflect the gravity energy beams back and forth.

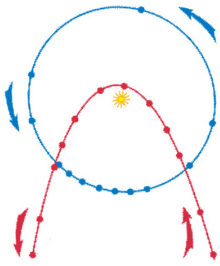
The question arises: what are these mirrors made of? In our model the particle in the trajectory is made of matter that has some mass. Otherwise it would not obey the rules of gravitation. Free photons involve no rest mass and move in a straight line, so they can only skim along the edge of the cone following, and in fact establishing, its asymptotes. The other material portion of the system is the gravity well located at the primary focus. The secondary focus we can call a potential energy well. The behavior of the particle in an orbit is that as it nears the primary focus, it loses potential energy and converts it to kinetic energy. As it nears the secondary focus, it gains in potential energy and loses its kinetic energy. This is also borne out by the fact that bodies in orbits with short radii move faster, and bodies in orbits with long radii move slower.

Potential energy is invisible and we can only perceive it as a mechanical instability in a system. We do not see a physical object at the secondary focus, but we can locate it by carefully observing the dynamics of the system. Conservation of momentum ensures that the potential energy focus maintains a fixed and balanced relation with the primary gravitational focus.

The directrices seem not only invisible they are not even on the cones. They are, however, on the intersecting plane. The parabola provides a clue and is readily available for study in our gravitational environment.



Bouncing Ball



Comet

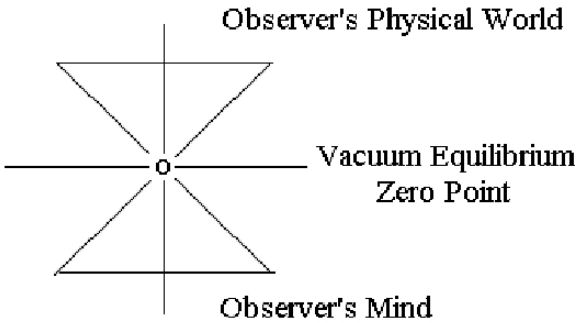
In the above two images we have gravitational parabolas with almost the same relative eccentricity. The comet is swinging around the gravitational well of the sun and then shooting off back into space. The ball is arcing up in the air around its potential energy well and then dropping back to earth. It then bounces several times, as it gradually loses its momentum due to various damping influences. Its gravity well is the earth's center of mass. If it were not for the earth's broad surface, the ball would stabilize into an elliptical orbit. Instead, we see it reflected from the surface according to the rule that the angle of incidence equals the angle of reflection. The equally timed strobe lights let us see the variation in the ball's speed, so we know the high point is when the ball moves slowest. On the contrary, the comet moves fastest as it turns around the sun. The two examples show the two conjugate foci (kinetic and potential) of an elliptical orbit expanded into two parabolas. The floor against which the ball bounces serves as a projection of the directrix mirror that is orthogonal to the plane of the ball's central trajectory axis. We can visualize a gravity ray rising perpendicularly from the floor to the center of each ball in the image. All of these gravity rays are almost exactly parallel, since the ball is small and distant from the earth's center. From this we realize that the parabola actually has two directrices as I show in the drawing of Parabola Beams. The floor acts like a directrix mirror at infinity and reflects the ball back out to its potential well. If the ball kept falling toward a tiny but highly compact earth, the planet's gravity well would draw the wings of the parabolic trajectory in to an elliptical path with a kinetic focus. On earth we often make use of a parabolic mirror to gather incoming solar radiation at the mirror's focus. We can also turn this around and place a source of radiation at the focus and then project it as a parallel beam. The technology of optics is a sophisticated application of this principle.

The fact that radiation can be manipulated in this way by mirrors and lenses tells us that there is a close relationship between electromagnetic radiation and the gravity rays we have been studying with our model. We will explore aspects of this in the next section of this chapter.

We have a final question about our graviton model -- how fast does our hypothetical graviton particle exchange energy? Does it operate at light-speed as most physicists assume? To find out we can run a transformation on the graviton mass equation and recast it into the form of a velocity equation.

* $(v_1)(v_2) = c^2$.

This seems to tell us that both of the conjugate graviton waves can travel together at the speed of light, or they can "diffract" in such a way that one moves more slowly and the other moves faster than light, exactly like photons. The principle would also be the same. All that we know about gravity implies that it is the interaction of two or more waves that tend to handshake in boson fashion. Looked at as a group of waves, the ensemble moves at less than light speed. Looked at as a set of phase waves, each phase wave is moving faster than light. This is a function of the observer's viewpoint. However, there is no need for gravity's speed to be the same as light's speed.



Let's go back to our concept of the Gravity Cone. The cone is the non-local superstructure of the graviton. When the Observer takes a particular viewpoint of the graviton, this viewpoint smeared out through space/time becomes a plane. This plane intersects the graviton cone at some angle in the upper nappe. Each plane has a conjugate plane that intersects the lower nappe. The particular orientation of the plane's intersection determines what the observer sees when he looks at something. The directrices are sub-viewpoints set up in the intersecting planes. They act like mirrors orthogonal to and intersecting the plane that cuts the cone, reflecting the graviton energy back and forth in the observer's field of vision -- that is, the intersecting plane. All the action that the observer sees, such as particles moving about, is on the surface of the cone where it intersects with the observer's viewpoint plane.

With this model in mind, we can now analyze the full dynamics of graviton wave motion. Graviton wave components that move along the tangent edge of the cone directly to or from the nexus -- if the observer's plane touches the edge of the cone -- move at the velocity c. Graviton wave components on the surface of the cone of bodies moving in conic section curves are v_g group wave components. These are sub-luminal. The components in the upper nappe that are mirrored in the lower nappe are connected non-locally. They move in tandem like an image in a mirror, but that motion is independent of the distance between the objects. This is because the Observer's viewing planes, which are also like a mirror set, unify them. One reveals a mental event, and the other reveals a physical event. The two coincide in the Observer's consciousness. The wave forms that connect the upper and lower nappe are always super-luminal phase wave components v_p. So the Gravity Cone model is like a wave guide.

Of course, we are talking about and visualizing the whole model. This suggests that the Observer can take a viewpoint that is 3-D spatial or even 4-D time-spatial and holds the whole cone (mental and physical portions) in his awareness. In that case specific objects move at sub-luminal velocities, but the information of the whole comes to him in a simultaneous moment. This viewpoint is at the center of the cone or the center's conjugate location, which is outside and embracing the cone.

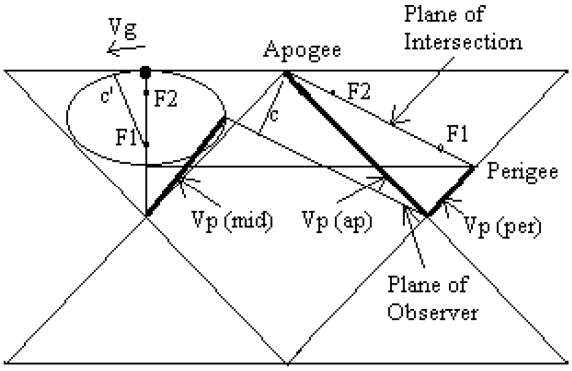
Penrose has suggested that the physical evidence of a single graviton is the collapse of the quantum wave function. How can we test his hypothesis? The energy level of the B_u particle is 10.45×10^{26} eV (1.045×10^{18} GeV) on the average. This is way out of our

league for the collider business. It is the energy level of the cosmic particle, the energy of super-gravity.

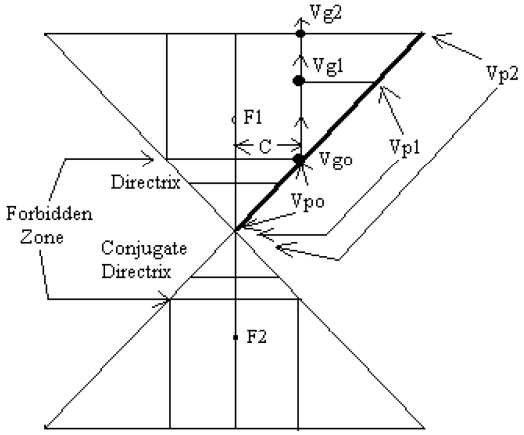
In the next section of this chapter we will explore the strange phenomenon of the collapse of the wave function and its relation to quantum gravity. This will lead us to look at the physics of detectors and how we measure quantum events with macroscopic devices. This will also lead us to consider some of the fundamental principles of thermodynamics. Along the way we may consider some ways to finesse our way into a closer look at the B_u ensemble.

I have appended some crude sketches to give the reader an idea of what we are talking about.

The Geometry of Gravity Cones

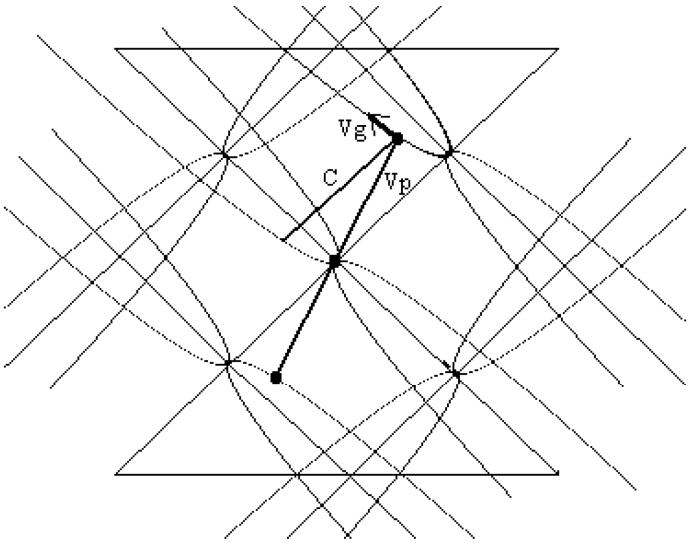


The slanted Plane of Intersection generates an elliptical orbital trajectory along the edge of the cone, shown here from two views (rotated by 90 degrees). The "group velocity" is maximum at perigee and minimum at apogee. The "phase velocity" is maximum at apogee and minimum at perigee. The group velocity (speed of the satellite) is always less than c; and c manifests as the distance between the Plane of Intersection and the Plane of the Observer. The latter is parallel to the Plane of Intersection and passes through the center point between the nappes of the cone.



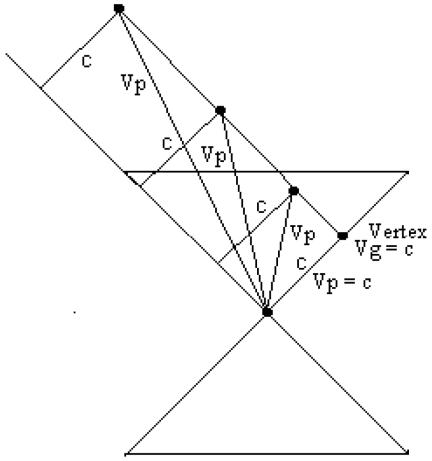
Hyperbolic Trajectory
Parallel to Cone Axis, "Side On" View

The group velocity is maximum at the vertex v_{go}. The phase velocity is minimum at the vertex v_{po}. The group velocity is always less than *c*; *c t* is the distance between the intersecting plane and the central axis, where *t* is the time it takes for light to reach the axis.



Parabolic System

The particle moves at the group velocity on the trajectory along the cone's surface parallel to the tangent plane opposite it. Light speed is the distance between the particle and the tangent plane. There are mirrored reflections on the upper intersection plane from the lower conjugate plane. The group velocity is maximum at the vertex and (in an ideal parabola) equals *c* for a tiny moment at the vertex. The group velocity decreases as it moves away from the vertex. Conjugate particles are connected between upper and lower nappes through the center point. The relation between the particle and the center point is always superluminal except at the vertex, where it is *c*. Parabolic orbits are idealizations. No massive particle follows this orbit. (Cone not tilted in drawing for clarity.) The parabolas either terminate by falling to rest in or on the gravity well or into orbit around another gravity well if the path reaches escape velocity.



Side View of Parabolic Orbit Parallel to Cone's Edge

Maximum speed at the vertex has escape velocity and hurls the particle out to "infinity". Photons travel at light speed along the tangent to the cone's edge from the vertex to the Observer's center between the two nappes generating direct perception.

Gravitational Phase Conjugation and Index of Refraction

In the previous section we built a model of quantum gravity based on the geometry of a pair of conjugate cones and the various conic sections. In our model particles move along the surface of the cone, and their trajectories are determined by the conic section curves generated when the observer establishes a viewpoint. This viewpoint can be interpreted in our model as a plane that intersects the cone at some angle. That intersection angle ranges over + / - 90 degrees relative to the vacuum equilibrium zero point, which is represented graphically as the horizontal axis. Each positive angled plane has a partner with negative angle. Planes that intersect only above the "horizon" have reflections below the "horizon".

We also proposed in our model that the upper nappe represents our physical world of experience, and the lower nappe represents our mental world of thoughts and beliefs. The "upper" and "lower" orientation is strictly conventional. The two cone sections match. Whatever trajectory is formed in the upper cone is a reflection of a conjugate trajectory formed in the lower cone. The reflection is projected from one nappe to the other through the central point "lens". Thus there is always a set of four conjugate curves generated whenever an intersection occurs. In the case of ellipses and parabolas, there are two crisscross curves in each cone. In the case of the hyperbola, the two sets of planes and curves are parallel to each other, and each plane slices all the way through both cones along the cones' vertical axis, though not necessarily parallel with the cone axis.

In this way we can interpret the conic sections as a FOUR-WAVE MIXING PHASE CONJUGATION system. The whole system functions like a coherent "gravity laser". We recall that the principle of four-wave mixing phase conjugation is completely general and applies to any system that is composed of interacting waveforms. Therefore, if gravity expresses itself as a waveform, it must interact in this way. Circles and the center point are degenerate cases. The center point acts as the non-linear conjugate mirror between the upper and lower nappes. Particles with mass move about on the cones' surfaces. The foci of curves act as conjugate mirrors with respect to the relation between particles and their directrices, another set of conjugate mirrors.

In our last section we described how the graviton energy reflects back and forth between the directrices in the intersecting planes. The gap between the directrices ("anti-gap" for hyperbolas) is just like a resonant cavity of a laser, except that the gravitational waves are bent by the presence of massive particles. The bending is quite similar to the refraction that occurs when light passes through dense media. Just as light has an index of refraction for various media, so gravity has an index of eccentricity for various types of curvatures in space/time caused by the presence of massive particles.

In the case of light we find that the speed of light in free space is given by:

* $c = (\omega / k) = 1 / (\varepsilon_o \mu_o)^{1/2} = \lambda f.$

However, if the light passes through a denser medium, then the relationship changes by a dielectric constant k_d and a relative permeability constant k_p, each of which is special for the particular medium. Thus the velocity of light in a medium v_m will generally be slower than in free space.

* $v_m = 1 (k_d \varepsilon_o k_p \mu_o)^{1/2} = c / (k_d k_p)^{1/2}.$

If the object is transparent, then k_p approaches 1. So the index of refraction n is the ratio of the speed of light in a vacuum to its speed in a medium.

* $n = c / v_m = (k_d)^{1/2}.$

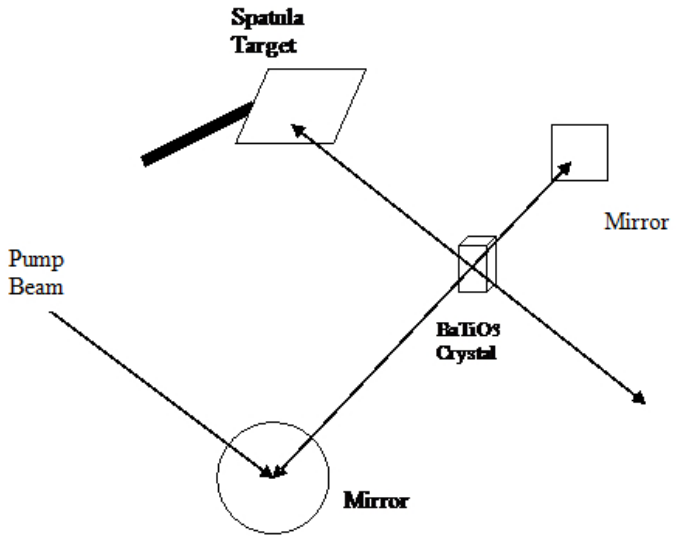
The speed of light equation derived by Maxwell basically has the same form as the Velocity Equation. Instead of writing the group velocity v_g and phase velocity v_p, Maxwell wrote a particular pair of constant values that were assigned arbitrary dimensional units for the convenience of solving certain types of problems in electromagnetism: ε_o and μ_o.

The index of refraction for light is a pure number since it is a ratio of velocities. The same is true when we look at our model in terms of velocity. Let's assume that we have a point P on an elliptic trajectory. The two foci are F_1 and F_2. This gives us two "gravity beams", PF_1 and PF_2. The perpendiculars from the point P to the directrices form lines PD_1 and PD_2. We can interpret all these line segments as velocities. The eccentricity ε is a pure number, an index.

* $\varepsilon (PD_1) = (PF_1).$
* $\varepsilon (PD_2) = (PF_2).$

This relation holds for all the conic sections.

The way in which the gravity waves refract and reflect to form "beams" through the plane of intersection is very reminiscent of the way that a four-wave mixing system sets up a quantum bubble that will carry out automatic tracking of a moving object. Recall that if you insert a reflective object into the macroscopic quantum field bubble of a phase conjugating system, a beam will form between that object and the nonlinear pumped medium. As you move the reflective object about, the photon beam will automatically follow the object.



Four wave mixing auto-tracking where a pump beam is injected into a $BaTiO_3$ crystal. The transmitted wave is reflected by the mirror at the upper right. "If the ray reflected from the metal spatula's surface faces the crystal, a resonator is formed by the spatula and the crystal and the laser oscillates even though there is no active medium. Oscillation continues even if the direction of the spatula is changed." (Jun-ichi Sakai, **Phase Conjugate Optics**, p. 151.)

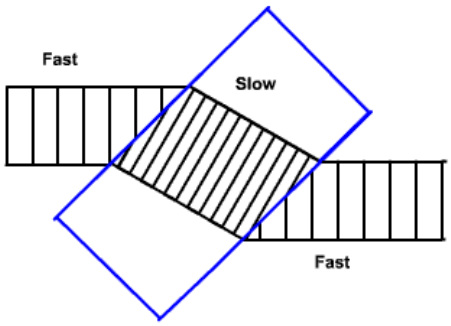
The same thing happens in our gravitational system. For example, as a planet orbits a star, the coherent quantum gravity bubble formed by the "pumped up" nonlinear gravitational medium of a large mass automatically coalesces into a gravity beam that runs between the centers of mass of the two massive objects, reflecting back and forth. The principle is exactly the same. The smaller massive object acts as a reflector, and a beam forms between it and the gravity well functioning as a nonlinear reflecting medium. As the object orbits the gravity well, the graviton beam to and from the gravity well automatically tracks the object's orbital motion.

When the orbit is not circular, but elliptical, then the central focus (the pumped core medium in the four-wave mixing scheme) is split into two foci. One has positive mass, and the other has negative mass, and they form two poles. A virtual beam also forms between the two foci. This beam is parallel to, but shifted a distance from, the beam that runs between the two directrices and through the orbiting object. This is similar to the way a beam of light gets shifted a certain distance when it passes through a refractive medium such as glass. When it emerges from the glass, it resumes its normal passage through the air or space. Snell's Law gives the angles by which the light beam bends when entering and exiting the refractive medium.

* $n_1 \text{ Sin } \angle_1 = n_2 \text{ Sin } \angle_2$.

Here n represents the index of refraction of a medium, and $\angle_1$ is the angle of incidence, and $\angle_2$ is the angle of refraction. Of course, some of the light also reflects, with the angle of reflection equaling the angle of incidence. The angle of incidence is between the wave front and the surface of the denser medium that the wave front encounters. We can also call it the angle between the trajectory of the photon and the perpendicular to the medium's surface. The angle of refraction is the angle that the wave front inside the

denser medium makes with the medium's surface or that the photon trajectory makes with the perpendicular inside the denser medium. When the wave front bends, the wavelength must shift. When the angle gets smaller inside the medium, the wavelength between wave fronts gets shorter.



A_1 A_2 A_1

Sketch by Ron Kurtus,
http://www.school-for-champions.com/science/light_refraction.htm#.VGtAi8stBMs

When the beam enters the glass (blue edged rectangle) at a given angle (A_1), it bends to a new angle (A_2). When it leaves the glass, it bends back to its earlier angle. Its frequency remains constant, but the wavelength shortens. Thus the velocity slows. The wavelength is related to the velocity as follows:

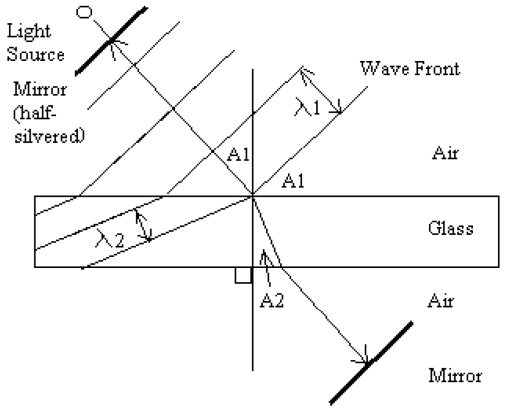
* $\lambda f = v$. (The phase velocity of light)

Here λ is the wavelength, v is the velocity, and f is the frequency. The frequency does not change as the light transits the glass, so the velocity **must** change. The speed of light is determined by the relation of its wavelength to its frequency. In free space it is always c. However, when the wavelength shortens as the wave front refracts, the speed of light drops -- as long as the frequency is unchanged. When the light exits the denser medium, the bending is reversed and the wave front continues on at its original velocity and angle. But the beam or ray has been displaced a relative **parallel** distance in space by its zigzag passage through the denser medium.

Why does the gravity beam exit its passage through the denser gravity field of an elliptical orbit resuming its path without displacement in space? The light beam refracted in glass is only affected in **one direction**. The gravity beam loops around and is bent in **two opposite directions that cancel each other**. The foci are nonlinear media in a conjugate mirror system. They function like conjugate mirrors and reflect back a conjugate beam exactly at the angle of incidence retracing its path reversed in time. The beam between the foci is a virtual beam generated by the opposite masses of the foci, potential and gravitational. This is just like the case of a pair of virtual particles created from the vacuum state by the Z boson operation. Time displacement is negligible, as we shall see, because the graviton propagates at a superluminal speed, and because of the time reversal.

You can get the same effect of restoring the distance displacement with light by using a

mirror to reflect the beam that exits from the glass back through the glass along the same path it exited. The light beam will retrace its path, passing back through the glass, bending back and returning out the other side of the glass along its original trajectory. You can get the phase conjugation effects of the gravitational system with light by using a phase conjugate mirror. For example, you can mimic the auto-tracking feature and the incident-angle reflection feature. Thus, by using phase conjugation techniques for the foci, ordinary mirrors for the directrices, and a refractive medium for the "orbiting object", we can build an actual working model with light of how gravitational waves reflect and refract in a solar system.



Refraction of a Light Beam as it Passes Through a Pane of Glass

The index of refraction for light varies not only with the medium, but with the frequency of light. So light of different frequencies bends at different angles, leading to the principle of dispersion. This is the principle used in prisms to separate colors of light.

If the light source originates in the denser medium, at a certain critical angle $\angle_c$, it will achieve total internal reflection and no longer refract. This corresponds to an angle that according to Snell's Law equals or exceeds 90 degrees. The sine can not exceed a value of 1. After that its value reverses and begins to decrease. Thus 90 degrees corresponds to a dimensional shift. We can use this principle to model the way that photons turn in on themselves to form particles.

The micro-scale explanation of refraction provided by QED involves the interaction of photons with the molecular structure of the refracting medium. However the principle of Snell's Law operates without regard to any of that detail the same way that thermodynamics laws work without going into the details of each microstate or even the material of the medium. We can use the principle of Snell's Law and pretend that we are talking about a single photon moving through space. In space the index of refraction is 1. However, the photon moves with a wavelike motion, and has energy determined by the frequency of the waves. As the frequency increases, the wavelength gets shorter. This increases not only the energy, but the energy density. This density occupies space because of the wave motion of the photon. As the photon oscillates, it deviates slightly from a straight-line trajectory, first to one side, and then to the other side. This creates a slight angle. We can use this slight angle, plus the concept of energy density, to apply

Snell's Law in a thought experiment and predict the eventual formation of particles from high-energy photons.

We can assume the same tiny angle with respect to space, and, instead of varying the angle while keeping the refracting medium constant (as in the case of a light beam in glass), we vary the energy in the vicinity of the photon. This is like modifying the density of a refracting medium (a self-interacting refractive medium!) and increasing its index of refraction. At the point of a 90-degree shift, the index and the sine of the angle become reciprocals. So for example, glass has an index of 1.5, and a critical angle $\angle_c$ of around 41° 50'. We imagine a beam passing through an empty container with a smooth, flat, non-refracting boundary. We gradually introduce a refracting gas that incrementally increases the index. We begin with an empty gap and an internal beam at 41° 50'. So at the start, with empty space inside and outside the container, (n_1) equals 1 and (Sin $\angle_1$) equals .666 and (n_2) also equals 1 and ($\angle_2$) also equals .666. As we add gas to the container, (n_1) increases. Since (n_2) remains constant, the exiting beam is pulled down toward the surface of the container. The angle increases until it reaches 90°, at which point the beam refracts along the surface of the container's boundary and no longer exits. At this point and beyond it the beam can only reflect internally from $\angle_1$ or any larger angle.

If we have a photon moving through space with a wave motion, the photon trajectory always differs very slightly from normal to the wave front in one direction or the other. Let's pretend that the divergence from normal is 10'. This gives us a value for (Sin $\angle_1$) of .0029. The value of n_2 is fixed at 1. So Sin $\angle_2$ = Sin $\angle_1$. And we hold ($\angle_1$) constant.

* n_1 (Sin $\angle_1$) = n_2 (Sin $\angle_2$).
* (1) (.0029) = (1) (.0029).

However, we can increase the index value of n_1 until Sin $\angle_2$ becomes 1. That means that n_1 must become the reciprocal of Sin $\angle_1$, which has been held constant. We therefore find that when the index n_1 reaches the large value of 344.827..., the photon does a dimensional shift and wraps around on itself.

* (344.827...)(.0029) = (1) (1).
* n_1 = 344.827...

Thus, given a divergence of 10' from normal of the photon relative to its wave front, an energy density refraction index of 344.827 will cause the photon to chase its own tail and turn into a mini black hole. If we keep the amplitude of the wave the same, and just vary the wavelength, as the energy increases, the angle of divergence from normal also increases. This lowers the required n_1 index value considerably. In fact, as the wavelength decreases at very high energies, the divergence from normal gets closer and closer to 90°. By the time it has reached 45°, for example, Sin $\angle_1$ already is at .7071. This only requires that n_1 = 1.414.... That is less than the index for glass.

If we place the wave front horizon at the "zero point" of a photon oscillation, the wavelength extends above and below the horizon. Low energy ELF waves are quite flat. The energy of the photon at the critical "particle" threshold wavelength (λ_c) is

* $E = h\ c\ /\ \lambda_c$.

When the wavelength shortens so that it passes through the zero point at almost exactly 90°, the index of n_1 falls to 1, and we get the same effect of 90° dimensional shift. From the Einstein relation,

* $E = mx\ c^2$.

We combine the two energies:

* $mx\ c^2 = h\ c\ /\ \lambda_c$.
* $mx\ c = h\ /\ \lambda_c$.
* $mx = h\ /\ c\ \lambda_c$.

The critical wavelength (λ_c), according to our calculations is around 3.16227766 meters, the uncertainty spatial interval for the lightest neutrinos. Working backwards, we find that the energy at this wavelength is around 6.626×10^{-26} J.

So we use

* $E = \hbar\ c\ /\ \%$.

We get a natural quantum unit of energy at 10^{-26} J. At around 10^{-26} J the photon energy starts to oscillate into neutrino particles. But neutrinos do not really have a stable particle configuration. They tend to oscillate and shift about.

At around 8.2×10^{-14} J, the wavelength reaches 2.4241×10^{-12} m. At this point the photon whips around into a whirlpool and takes on a charge -- the electron vortex. This is still not a "true" particle. It is a sub-component that depends on the proton. But it does keep a stable particle shape. So this is the beginning of the window for "stable" particles.

The first truly stable particle is the proton with energy of around 1.5×10^{-10} J. This corresponds to a wavelength of 1.3252×10^{-15} m.

Having taken this brief digression to explore indexes of refraction and the creation of particles with mass from pure energy, let's continue our discussion of the gravity cone from the standpoint of velocity. Dividing each distance component by a unit of time such as a second reinterprets all the distances into velocities.

In our model the distances of various trajectory curves from the central point are relative.

The observer's viewpoint can shift about, and the particles can slide up and down as they curve around the cones. We want to find a distance (i.e. a velocity) that remains constant no matter what kind of conic section shows up. This would be a nice candidate for *c*, the velocity of light in our system.

We find that, no matter what sort of conic section curve we generate, there is always a constant distance (velocity) for each figure. It may be oriented in different ways, but it is always there. Let's describe it.

In the case of the ellipse, the conjugate intersecting planes are parallel, reflecting across the vacuum equilibrium line between the upper and lower nappes. Therefore, each orbit can be thought of as a series of end points for a bundle of line segments that runs through the center point. The length of each line in the bundle is the same. That is, the distance between the particle orbiting in the upper nappe and its conjugate particle in the lower nappe is always the same, even though the motion and position of the particle may appear to change. This is the orientation for an invariant "velocity" for ellipses. But it is a derivative constant and not the fundamental constant that represents *c*.

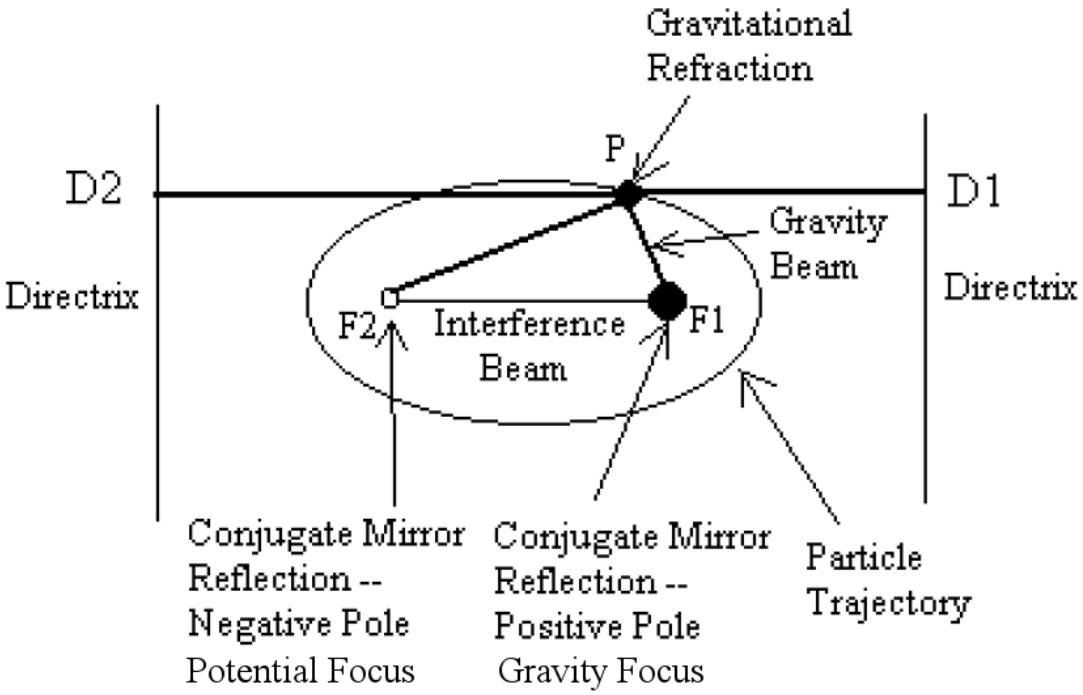
All four directrices are mutually parallel, so the lines that reflect between them are all equal. The true value of *c* in our model is the perpendicular shortest path from any point in any particular elliptical trajectory to the plane that passes through the center point and is parallel to the intersecting plane that generates the trajectory. This path is always a constant for any ellipse and is also equal to the corresponding orthogonal paths for all three of the other conjugate ellipses that form the four-trajectory conjugate ensemble in the cone structure.

Earlier we made a simple model of the Velocity Equation using a standard rectangular microwave klystron tube. We showed that a klystron tube splits a microwave into its three component velocities, each moving differently. The photon moves at *c* zigzagging back and forth bouncing off the walls of the tube at a certain angle. Because of the zigzagging, its actual progress down the tube slows down to less than *c*. This forward progress of the photon down the tube is called the group velocity. On the other hand, the wave front is orthogonal to the photon trajectory, and, as the photon zigzags down the tube, the wave front flashes back and forth up and down great sections, or even the whole length, of the tube at superluminal velocities. This is the phase velocity of the microwave.

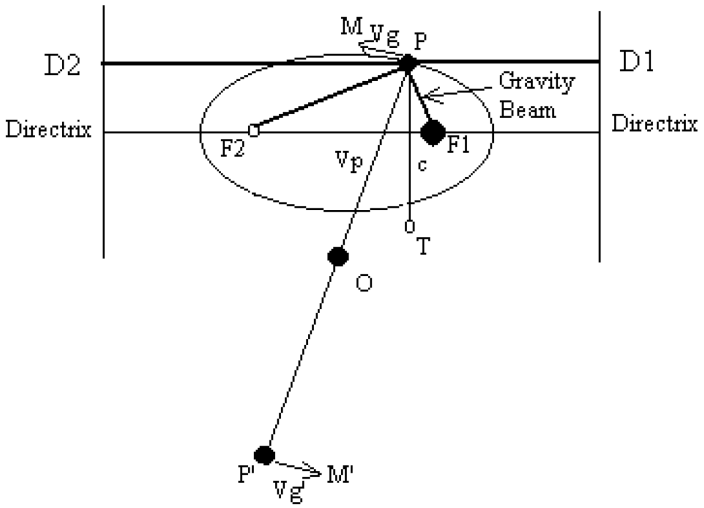
In our model of the elliptical gravitational system, the corresponding gravitational “velocity *c*” is the constant light-velocity vector the orbiting object P maintains normal to the parallel plane that passes through the center point. The group velocity is the varying speed at which the orbiting object travels in its orbit. It can be represented by the kinetic motion vector which is tangent to the trajectory at point P in the direction the object is moving. When the object is at its perigee its speed is fastest. When it gets to its apogee, its speed is slowest. But the orbiting object's speed is always less than the speed of light.

The phase velocity of the orbiting object is represented by the exchange of gravitational energy between the orbiting object and the observer at the center point O. This is the graviton vector PO. The observer is interacting with the system and actually controls it from the central point through his superluminal will vector OP, -- that is, the conjugate to the superluminal graviton vector. The whole physical system is also mirrored inside his mind (the lower nappe). The graviton exchange velocity vector is **always superluminal**, because there is no orthogonal line between any position of the orbiting object in its orbit and the central nexus point O.

The only orthogonal to the geometry of the trajectory goes from O to focus F_1 (or the center of the circle in a circular orbit). Thus all possible lines PO are greater than *c*. However, each PO when added to its lower nappe conjugate OP' also has a constant value. This is the bundle constant referred to above.



The elliptical orbit forms between two hyperspatial directrices with the gravity well as one focus F_1 and the potential well as the other focus F_2. The two foci form a particle pair with a resultant beam running between them. The gravity beam forms between the particle and the gravity well. The potential beam forms between the particle and the potential well. The beams between particle and the two wells reflect as in phase conjugate mirrors. The beam reflecting between the directrix "mirrors" refracts at the particle. The interference beam between the two focus wells is parallel to and displaced from the directrix beam in the same way that the light beams on either side of the glass are parallel and displaced.



Beam Components of a Gravity System

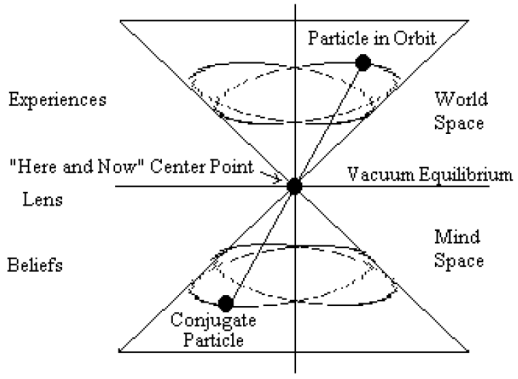
OP =	R-beam (Resistor) -- (Vp)
PO =	A-beam (Attractor) -- (Vp)
PF1 =	G-beam (Gravity)
F1P =	I-beam (Inertia)
PF2 =	K-beam (Kinetic)
F2P =	D-beam (Detractor)
(D1PD2) =	P-beam (Pump)
PT =	C-beam (Retarded) -- (c)
TP =	C-beam (Advanced) -- (c)
PM =	M-vector (Motion) -- (Vg)
P' M' =	M' -vector (Mental) -- (Vg)

The pump beam sets up a resonating gravity bubble in the cavity between the directrices. The orbiting particle acts as a moving reflector. The gravity well serves as the nonlinear conjugate medium. A gravitational "probe" beam forms between the particle P and the gravity well focus F_1. Another beam forms with the potential well focus F_2. The beams form according to the phase conjugation auto-tracking principles. The focus is split, so the resultant attractor/resistor beam "lases" between the particle P and the origin point O. The conjugate wave of this is the observer's will that consciously or by default directs the attention and also sustains the nonlocal physical laws that govern the system. In a circular orbit the two foci are combined and you see a simple 4-wave mixing phase conjugation auto-tracking system. The visual perception proceeds by the shortest (normal) path from the particle to the observer's perceptual plane that is parallel to the orbit. It then matches with the mental image that is projected in the observer's mind (lower nappe) to the observer's perceptual plane. There is a lag time as visual data passes from T to O in the observer's plane.

In the case of the parabola, the conjugate intersecting planes are also parallel, but run parallel to the tangent edge of the cone. The distance from a particle in the upper nappe to its conjugate in the lower nappe is the same, but the sign is reversed and the conjugate reflection is mirrored outside the lower nappe in the gap. We can start from the vertexes of a pair of conjugate parabolas and run a line from an upper particle P to its lower conjugate particle P'. This defines the "origin" or zero orientation of the parabolas. Then, as the particle swings along either arm of its trajectory, a perpendicular to the parallel plane will be equal to a perpendicular from the conjugate particle to its parallel

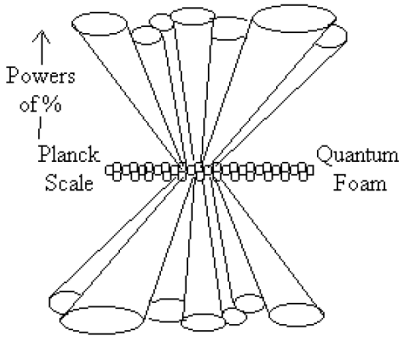
plane. Because the two intersecting planes are parallel, any perpendicular between them will always have the same distance. The value of "gravitational" *c* in the physical world represents the shortest path vector distance between any point P on the parabola trajectory and the plane tangent to the cone's edge and parallel to the intersecting plane that defines the parabolic trajectory.

When the moving object nears the vertex of its trajectory, its velocity increases. At the vertex the velocity instantaneously equals *c*. This is the light-speed slingshot that propels the object around the focus and off toward infinity. (Light having no rest mass has no limit to its propagation.) The parabolic trajectory is an idealization. There is no such infinite trajectory in real life for solid objects. There are only approximations to it for intervals of time. Light from an object at its "parabolic" vertex travels down the tangent to the center point. The observer can adjust his lens at the center point O so that the central plane tilts to put any point P on the parabolic vertex and thus accessible to direct perception at the center point O. Otherwise the light from P proceeds normal to its unadjusted trajectory plane and arrives at a corresponding point on the unadjusted parallel central plane outside O. The center plane is like a movie screen. The photons from the various objects on the cone's surface project down from World Space and up from Mental Space onto the screen, just like a movie. This creates an illusory light show of perceptions in the present moment.



Projection of Beliefs into Experiences

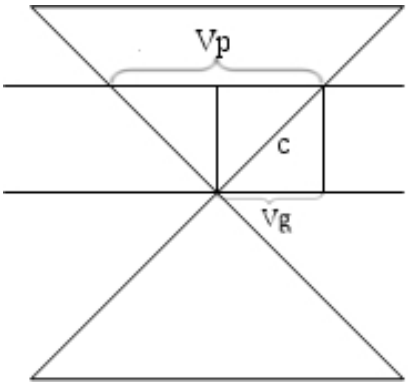
The screen is made of quantum foam -- the Seven Dwarfs and their magical "Prince Charming" gems that we introduced in the last chapter. These can generate multiplicities of cones oriented at any angle.

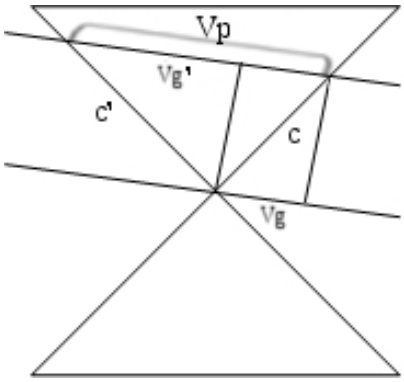


Expanding from the Planck Scale

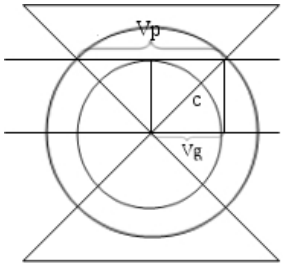
A Multiplicity of Gravity Cones Projects from Quantum Foam

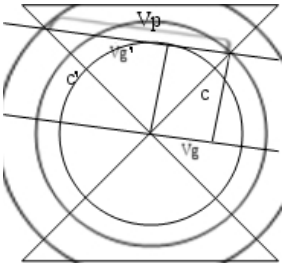
Shifting of the central plane by an observer does not really involve much. The cone is generated from a bubble of quantum foam. You just rotate the tiny quantum bubble at the center O by the angle you want in order to reverse project any point P into the center point O. This shift of viewpoint allows direct perception of any object in the here and now. The phase velocity becomes *c*. We can call this a reverse parabolic projection. Instead of being experienced as an illusory form, the object is experienced as pure light.





On the left above we see a circle viewed from the side. The line of vision goes along the edge of the cone from the observer point at the center. The plane is horizontal, so the angle is 45 degrees. Viewed from the side we might say Vg = 1/√2, then Vp is √2, and c is 1. On the right is a cone with a tilted cutting plane. This produces an ellipse. The observer's line of vision is along the edge c. The ratio (viewed from this angle) is Vg / c = c / Vp. Vp embraces the major axis of the orbit, and Vg is the relative speed along the orbit – measured by the amount of time it takes to travel a given distance. The short Vg represents a faster speed than Vg', because it is closer to the central nexus than Vg. Vg also travels a shorter distance than Vg'. The speeds of c and c' are equal but travel different distances. The mass-energy density increases closer to the crossover point at the nexus of the cone. The kinetic energy is ½ mc^2, where *m* is the mass density in the vertical direction. The circular cone shows this clearly. One side of the cone is a photon path, and the other side is its wave front. The orbit path is always a straight line tangent to the edge of the cone, and the gravity beam goes from the orbiting object directly to the gravity well (star). For the circular orbit the speed is constant, so the orbiter might as well be stationary.





In "real" space we experience only the plane that cuts through the gravitational energy cone. The gravity beam for the circular orbit in our perception is the radius of the circle

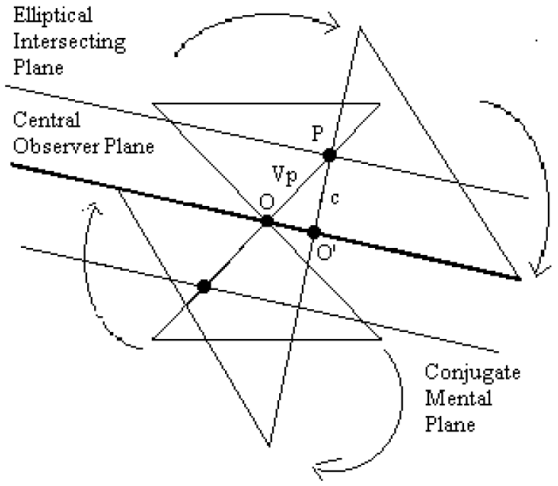
where the plane cuts the cone, but the cone shows the difference in mass-energy density at various heights from the central nexus. The gravity wave moves like an expanding bubble from heavy to lighter density, and in the plane that cuts the cone, it appears to radiate from the central axis out to the orbit forming a phase wave along the orbit. Kinetic energy increases as the object nears the gravity well focus, and potential energy increases as the object nears the potential focus. In an elliptical orbit the gravity well focus in real space (the conic section plane) is at the perpendicular from the central energy nexus to the orbital path. The potential focus is an equal distance from apogee as the gravity well focus is from the perigee in the orbit plane. Again, the gravity wave from the central cone nexus radiates outward and, following the shortest path perpendicular to the cutting plane, first hits the gravity well focus of the ellipse. Then it appears to those in the conic section Flatland plane to spread out from the focus to the orbit, hitting firstly the perigee and lastly, the apogee of the orbit. Once again, c is faster than the orbiting body's speed, and the phase wave front washes over the orbit at a speed faster than c.

If we put the observer on a planet orbiting a star, then the star appears to go around the planet. Sunlight takes about 8' 20" to reach our planet from the sun. If we assume such a planet has a circular orbit, then its speed is constant, and relative to the gravity cone might as well be at rest. The parallel planes that pass through the focus origin and the orbiting body are like the walls of a gravity klystron. The gravity wave passes from the star to the planet just like its EM radiation. If we assume it passes at the same speed, then that speed is c. The wave front is orthogonal to the graviton path (moving upward and outward from the density nexus), so it forms the opposite side of the gravity cone. As the graviton proceeds from the star to the planet the wave front sweeps the diameter of the orbit (up to the major axis of an elliptical orbit). The graviton particle group wave travels half that distance – that is, from the planet to the central axis. That is the radius of the orbit and the graviton's Vg. The diameter (axis) is the graviton's phase wave component, and it defines the width of the orbit in space-time. The vertical height of the "klystron" along the axis indicates the potential energy level and balances the kinetic energy of the orbit as defined by the radius (Vg). In ellipses the klystron height is always constant. The diagonal path of the graviton gives its actual relative speed, because the energy density gets higher toward the central axis of the gravity well. So the gravity wave as if has to travel farther.

In the case of an elliptical orbit, the parallel planes tilt. The gravity wave seems to oscillate between the short diagonal c and the long diagonal c' while the "klystron" width between the planes remains constant. We must draw a perpendicular from the origin to the orbital plane. Vg' is then the distance in the orbital plane the graviton particle travels from where the perpendicular cuts it to the apogee point. Vp is again the length of the orbit axis, since the wave front as usual sweeps that entire axis as the gravity wave moves from the origin to where the orbit plane intersects the path of the graviton particle. The gravity wave is weakest when it reaches the apogee, and is strongest when it reaches the perigee. We experience this as the faster motion of the orbiting planet at perigee and slowest motion at apogee. The basic ratios remain constant: Vg'/c' = c'/Vp; Vg/c = c/Vp. What we experience as the motion of the planet in its orbit is a reflection of the

gravity oscillation in the elliptical case. A circular orbit is in equilibrium and the gravity well star and the planet are relatively motionless.

Tilt and Slide of Ellipse into Parabola for Pure Light Direct Perception



When a projectile is hurled into the air from the earth, the parabolic slingshot principle is reversed. At the parabola's vertex the velocity becomes zero. This inverted parabolic trajectory is closely approximated in physical systems. But the slingshot version does not happen because of relativistic constraints. You can only experience it as the slingshot vertex of pure light called enlightenment. However, we can think of physical World parabolic "orbits" as very eccentric orbits with eccentricities of nearly 1. They occur in meson interactions, in which a quark may slingshot so tightly that it reverses in time. If we assume that our cone has a 90-degree spread at its vertex, then the normal vector from the parabola's vertex to the cone's vertex at the center follows the cone's edge and represents c. The distance from any other position P on the parabolic trajectory to O other than the vertex is $v_p > c$. As the object swings out past its maximum velocity at the vertex of its trajectory (very close to c), its group velocity gradually and continually decreases. Of course we know that its outward path is just the reversed parabola path. When the object reaches zero velocity, then it begins its fall back to the inner focus and vertex. It closely resembles the oscillation of a spring. Thus there are no persistent parabolic orbits in nature, only momentary approximations.

If we look at the parabolic gravitational trajectory in terms of our EM klystron analogy, we find that the two sides of the cone are mutually orthogonal, so the gravity wave experiences its cutoff point. The group velocity goes to zero (there is no oscillation), and the phase velocity goes to infinity (becomes undefined). When the gravity wave reaches the moving body, the wave front defines an endless trajectory. The physical body gradually loses speed as the gravity wave moves along at its characteristic velocity

In the case of the hyperbola the parallel planes are vertically oriented and each plane passes through both nappes. In the middle on both sides of the central point is a forbidden zone into which the trajectories may not enter. The observer has a resistance

to these objects. The value of vector *c* is one half of the shortest distance between the parallel conjugate planes. If these planes are perpendicular to the vacuum equilibrium horizon that passes through the central point, then *c* is the shortest vector from a point on the trajectory to a point on the plane that intersects the cone's vertical central axis. This extreme tilt to the projection plane is evidence also of the observer's resistance. He is looking away from the light. Since the light counter-propagates, the only way you can "look away" from the light is by turning 90 degrees. Under this condition you see no light, but just imagine objects lunging at you. It can be pretty scary. The whole World is threatening to pound on you, and you can not see a thing. A 90-degree oriented hyperbolic plane represents the "Dark Night of the Soul." Unknown stuff, which you also can not actually see, comes surging up from the hidden depths of your Mind. All of this is due to the observer's angle of viewpoint. All he has to do is shift his viewpoint to face things straight-on and everything becomes clear. Try it.

The hyperbolic group velocity, as usual, is the velocity of the object in its trajectory. It is represented by a kinetic vector tangent to the trajectory and oriented in the direction of the object's motion. The gravity wave vector represents the phase velocity from any point P to the center point O. As usual the phase velocity is PO and is always larger than *c*, which in turn is always larger than the group velocity of P in its trajectory.

A universal principle of this model of gravitational/potential velocity is that the observed motion of the object in its trajectory (the kinetic vector) will always appear orthogonal to its light-speed "vector". In our klystron model we found that the ratios of the component velocities formed a "twisted" pattern of similar triangles:

* $c / v_p = v_g / c$.

However, in the klystron case, v_g and v_p are proceeding parallel along the tube, and *c* is a diagonal that crisscrosses the tube's width. In the case of conic sections v_g and *c* are normal to each other, and v_p is a diagonal which is also normal to v_g, but not to *c*.

The whole system follows Newton's laws of motion.

I. Inertial Momentum Law: The object P has kinetic energy that expresses as motion. The motion is inertial momentum and continues until acted on by forces. The group velocity expresses the inertial motion of P, always tangent to the orbit, and thus tangent to the cone.

II. Force Law: The gravitational force curves the trajectory of P via the tractor G beam F_1 P according to Newton's law of force in its gravitational form:

* $Fg = G\ (MP)\ (MF_1) / (F_1\ P)^2$.

(MP) is the mass of the orbiting object, and (MF_1) is the mass of the gravity well at F_1. F_1 P is the length of the tractor G beam that forms between the orbiting object and the gravity well object at F_1.

III. Equal Action Law: The inertial I beam (P F_1) generated by the kinetic motion of P balances and equals the tractor G beam at every point of P's trajectory, but, as a vector, is oriented in the opposite direction. The potential K beam F_2 P and its conjugate detractor D beam P F_2 balance each other and relate to the G beam and I beam as follows:

* $(F_1 P) + (F_2 P) = 2 Ca$,

where Ca is the semi-major axis of the orbit.

The whole system appears attracted to the observer's Origination center point O. As the system settles down kinetically, it will tend to shrink and sink down the cone into the O point. This is the attractor A beam PO (which is due to relaxation of the system). A resistive will R beam (usually running as an automatic habit) counterbalances the relaxing "attractor" beam and keeps the whole thing going in both Mind Space and World Space.

There is another way of looking at the system. The angle of the cone can change as the group velocity changes if we want to hold the intersecting plane normal to the cone's axis. The two ways of looking at the system are equivalent. One view keeps the cone still and tilts the intersecting plane. The other view keeps the plane normal and varies the angle of the cone's edge.

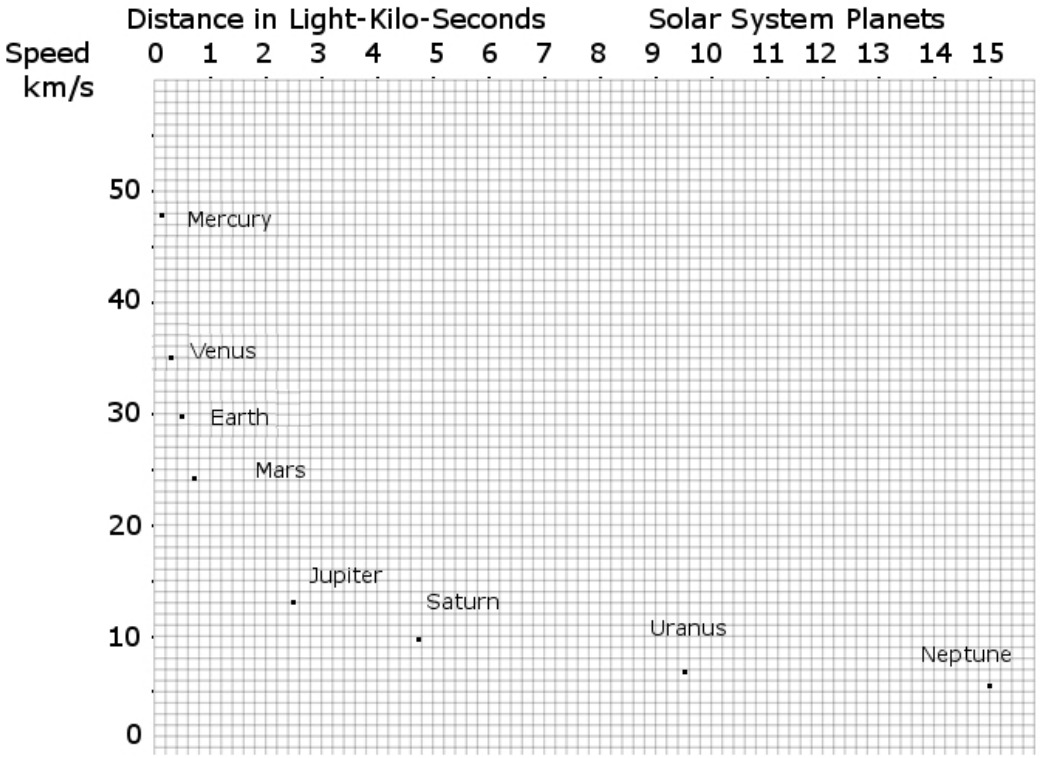
The angle that the cone's edge forms with the vacuum equilibrium depends on the relative value of the group velocity. If the group velocity is relatively motionless, the cone degenerates. As soon as the group velocity begins, the relationship between it and *c* and the phase velocity begins. We can follow its evolution most easily by assuming a circular orbit. Then the intersecting plane is not tilted, but runs parallel to the vacuum equilibrium plane. When the group velocity is very small compared to *c*, the cone's edge forms a very acute angle with the vacuum. Thus the ratio c / v_p is very small. As v_g moves faster, the cone's width increases. We can always find the ratio between v_p and *c* by the Pythagorean relation, but v_g is usually the observable that the attention goes to. So we calculate from there. As v_g approaches the speed of light, the ratio c / v_p approaches 1. The cone's angle approaches 90 degrees, and v_g, v_p, and *c* all become equal. The cone degenerates into a spindle of height $v_p = c$. Effectively we have a black hole. The orbiting object is now a photon whirling around a center of mass.

The size of the cone is relative. The ratios say nothing about the distances. The Planck length is our only limitation. And, of course, if $v_g = 0$, then there is no orbit and the cone degenerates.

The conjugate G beam and I beam pair balances and holds the object in its circular orbit just as if there were a material beam between the gravity well and the orbiting object. If the orbital radius stays the same and the velocity increases, then we know that the gravity well mass must increase correspondingly. Otherwise the orbital radius will increase and the beam will stretch.

The whole system is defined by the belief system of the Observer and operates pivoting as a phase wave projection from the central point of awareness.

Thus the whole system is a cleverly balanced light show, and the Observer does ALL the "work". He creates it, he maintains it, and, when he's done playing with it, he dissolves it all back into his projector Lens at Source point O. (**Caveat:** The speeds associated with the "gravitons" and "photons" are uncertain, because we do not yet have a physical way to measure gravity wave-particles. Thus, although the cone model describes the behavior of gravitational interactions, how to interpret the energy gradient and the directrices in physical terms awaits further research. The mathematical model seems to fit the gravitational paths of objects, but the interpretation of the various components remains open to discussion. The labels I attach to the model are tentative markers for such discussion purposes only.)



The above chart shows the asymptotic Keplerian decline of speed as planets move farther from the sun. The mass of the planet is not relevant. The sun as the gravity well anchoring our solar system moves at infinite velocity relative to its own center of mass (as does everything else relative to its own center of mass), because it takes no time to get to right where you are in the moment. Pluto and other more distant objects move even slower than Neptune. The asymptote for extremely distant objects is no measurable orbital motion relative to our sun.

Each gravitational system has its gravity well that serves as its central singularity (the

nexus of the gravity cone). For elliptical orbits the area of the orbital plane is πcd, and the speed of travel in the orbit is thus πcd/T, where c is the semi-major axis, d is the semi-minor axis, and T is the period. The velocity of the moving object at any point in its orbit is 2 πcd / T r Sin φ. The perpendicular component of the acceleration is $v^2/R = (4\ \pi^2c^2d^2 / T^2r^2Sin^2\varphi)\ (c\ Sin^3\ \varphi\ /d^2) = (4\ \pi^2c^3\ Sin\ \varphi\ / T^2r^2)$, where R is the radius of curvature and r is the distance from the orbiting object to the gravity well. So the acceleration relative to the gravity well is $(4\ \pi^2c^3 / T^2r^2)$. The $4\ \pi^2$ is always constant, and, as Kepler discovered, (c^3 / T^2) is constant for any gravity system organized around a given gravity well, and $(c^3 / T^2) = (3.36\times10^{18}\ m^3/s^2)$ for our solar system planets. We separate the constants from the variables, and find that this constant interaction between our solar system average orbit radius and period when divided by the mass of the sun is $1.69\times10^{-12}\ m^3/s^2\ kg^{-1}$. This equals a universal constant, $(G / 4\ \pi^2)$. We find that Newton's $G = 4\ \pi^2\ c^3 / T^2\ M_{gw}$, where c is the semi-major axis, T is the period, and M_{gw} is the mass of the gravity well. M_{gw}, c, and T can all vary according to the system, but will balance out to equal $G / 4\ \pi^2$. So that really should be our universal gravitational constant, along with our gravitational unity constant that is completely independent of the masses of the bodies involved and fits all conic sections in the way I explained above.

* $K_G = (CF\ PD / Ca\ PF) = 1.$

The variable components of *G* change with different gravitational systems. For a parabolic system centered on the *x* axis at (*p*,0), we can use the simple equation $y^2 = npx$, where *n* is some constant, *p* is the focus, and $x = -p$ is the directrix ($p>0$). Changing the sign reverses the orientation. We can center it on the *y* axis with $x^2 = npy$, and invert it by changing the sign. A projectile has the equation $y - M = -np(x - ½\ R)^2$, where $M = v_0^2\ \sin^2a / 2g$ is the maximum height the projectile reaches, $R = v_0^2\ \sin 2a / g$ is the range it travels, *g* is gravitational acceleration on earth, and *a* is the angle of the projectile's launch.

The equation for an ellipse on the *x* axis is $x^2/b^2 + y^2/a^2 = 1$. A simple equation for a hyperbola with focus (*c*,0) and directrix $x = c/\varepsilon^2 = a/\varepsilon$ becomes $x^2/a^2 - y^2/b^2 = 1$. All the equations for conic sections can be adjusted so as to orient the figures in any direction with Cartesian coordinates (or polar coordinates). However, in our model we set a convention of orienting the cone along the vertical axis and the orientation of the conic sections then follows that model in the three-dimensional space, which means that projectiles and balls that bounce on the ground appear in our mental nappe.

The Quantum Leap

We have calculated a very fast speed called the Planck Velocity. This velocity is based on the ratio between the volume of a sphere and the area of a circle. That ratio of geometry is then related in a ratio to Planck Time, which is the fundamental dimension for ladling out energy. Orbiting objects sweep out equal areas on the orbital disk in equal amounts of time. And of course each orbit has a mean radius and sweeps out a complete disk in a single complete orbital period. This is the connection between a circular (elliptic) area and time. The graviton's wave on the other hand, propagates in all directions just like a photon's wave, filling the area of a sphere within a unit of time. Both of these events --

orbiting and radiating -- are occurring simultaneously over the same units of time. The particle is sweeping through an orbit of fixed area, and the graviton's wave is propagating a spherical bubble into 3-D space at a fixed speed. The gravitational well generates a beam of length *r*. In one second its graviton "radiation" may extend from the singularity to fill a spherical space with a bubble radius of 10^{42} m, encompassing the universe. Planck Time is based on the minimal unit of energy. All time is a measure of change in energy status. It may be periodic, or it may just tend in a particular direction. A pendulum clock is periodic. Entropy is a directional tendency for all defined systems, but does not necessarily have a precise period. Generally we prefer periodic timekeepers just like we prefer periodic measuring rulers, with equal distances marked out on them. But there's no reason we couldn't use wiggly, stretchy rulers and non-periodic clocks. Some cultures prefer that way of looking at space and time. A lady once told me her boyfriend was always late for dates, but never by any predictable interval. That must have been an interesting relationship.

Planck Time is determined by the minimum quantum of energy that will interact and thereby generate time. It is the tiniest quantum unit for tracking change. Unfortunately it is so small that we do not have a really accurate measurement of it. Also, it is at a level of creation where uncertainty totally swamps any particular measurements. Nevertheless, we can get a pretty good ballpark estimate. My calculation puts it at around $(4/3)\times10^{-42}$ s. Other versions vary slightly. It doesn't matter. What does matter is the value of the spatial interval that we choose. This is the metric in space to which we attach our Planck clock in order to look at velocity of change, whether transformational, translational, or rotational. If we use the Planck length, then we get *c* as the Planck Velocity. However, if we use a measure from the scale of our usual viewpoint, such as $R = 1$ meter, then we get a value of 10^{42} m / s, which gets you across the universe in a blink of an eye. If we use the D-Shift value 3.16227766, then we get pretty much the same answer. The ratio is completely washed out by the immense scale. If we use the Compton radius for an electron or a proton, then we get something else in between. Is there a criterion for choosing?

We know that the speed of light is constant for all observers as far as we can tell. Either gravity goes at *c* or it doesn't. Well, maybe it does both!! And our Gravity Cone suggests that it depends on how you look at it. We recall that light has two components that form a conjugate pair. One is retarded light and travels from the object to the observer. The other is advanced light, and it travels from the observer to the object. If no one observes, then whether or not there are photons, or light, or anything else, is a moot point.

When photons begin to run around in circles and generate particles, mass, charge, and so forth, then we can begin to see things. If there are no charged terminals such as electrons, then there is no place for photons to land, and they just fly around forever as un-collapsed wave functions. As soon as an observer takes a position and makes a measurement, he detects a photon -- or perhaps many, many photons. When the photon curls into a terminal, it becomes like a wave guide. Wave guides split light into group waves and phase waves. One wave goes around in a circle, and the other goes off into mental space. The former is the source of the "left-handed" spin on the neutrino. The latter is the

right-handed pool of advanced waves in the mind of the observer. When the observer observes something, he sends an advanced wave of attention to the object. It moves backward in time like an antiparticle. It is an anti-photon. It stimulates the object to emit a retarded photon (or perhaps grabs some un-collapsed photons that the object is emitting and collapses them into the observer's reality), and the two photons travel together to the observer. The advanced photon does not really make a round trip. It travels from the present into the past. To the observer it may seem as if it jumped suddenly from the observer's mind in the present to the object's condition in the past, and then propagated back to the observer. **This is the quantum leap**.

The quantum leap is superluminal and essentially instantaneous. Both theory (Bell, 1964) and experiment (Clauser and Freedman, 1972; Aspect, et al., 1981) have shown that the collapse of the wave function is non-local and simultaneous between correlated particles to the resolution of our instruments. Bell's theorem showed that the "entangledness" prediction of quantum mechanics has a degree of non-locality that cannot be explained away by any local theory." (**Wikipedia**, "Bell's_Theorem")

I propose that the collapse of the wave function propagates at approximately a speed of ($v_P = 10^{42}$ m / s). I choose this value because it defines the scale at which we, the observers, function. We set it by the value of R that defines the ratio between the quantum charge unit e and the speed of light c. This ratio gives us the illusion of a particle called the proton that appears to have mass and is the foundation of our physical universe. The Planck Velocity is the speed of the **will -- the observer-graviton phase velocity.** The observer, of course, can deliberately decide his scale of reference and vary the speed of his attention, just as photons can be sent through various refractive media. But the default "free space" value is set by the "here and now".

In our model the "here and now" is located at the center of the cone (O), the point where the two conical nappes join. Every point on a trajectory curve that a moving particle may occupy forms a wave function that maps through the "here and now" point O into the mental image that reflects in the lower nappe. The field of beliefs and their mutual interactions is reflected faithfully in the field of experience and vice versa. There may be distortions, but the conjugate image also reflects the distortions. The quantum foam screen at the vacuum equilibrium forms the parallel plane that passes through the center point. Mind Space and World Space both project onto the quantum foam screen to give us the impression of the moment, a frame from a movie of all the various trajectory wave functions and their various dynamic denizens.

One of the principles of this model is **truthfulness**. The cones are always perfectly honest. The magic conjugate mirror never lies. The quantum foam displays whatever is happening in the Mental and World Spaces. Furthermore, whatever is in your mental realm will be faithfully reproduced by your physical world. There is no cheating or stealing. And there are no shortcuts. The rays pass in straight-line c paths through the parallel center plane, and the superluminal phase rays pass right through the O-point of the observer's Origination lens of awareness from his Mind to his World, and from his World to his Mind.

You can drop straight down from a circle above to a circle below, but you will not be on the conjugate point. That is on the opposite side. If the orbit shifts to elliptical, you will find yourself way out of position, even though you are on one of the conjugate ellipses. This image reversal and displacement is the source of a lot of confusion in the world -- as we began demonstrating in chapter 1 of this book. The distance between a point on an upper nappe curve and its conjugate below may be very, very far. But the connection is made via superluminal phase waves and they travel virtually at infinite speed (at least 10^{42} m / s). Recall our discussion of the klystron wave guide. The photon's wave function is split into three components. The wave front reflects from side to side following a zigzag path down the tube at the speed of *c*. The wave itself progresses down the tube at the group velocity, which is slower than *c* because the wave has to zigzag back and forth. The phase wave is generated by the interaction of the **wave front** with the side of the tube. The wave front is orthogonal to the photon wave packet. This wave flashes back and forth down the tube at superluminal speeds. It has no speed limitation, but it gets this freedom to roam superluminally in space and time from the trade-off of a boundary imposed on it by the klystron tube.

In the same way the particle P on the cone's surface moves as a sub-luminal group wave along its trajectory as a result of the interaction of inertial-gravitation forces. It maintains a constant relationship with the parallel plane via its orthogonal relationship. Remember that the photon's wave front is also normal to the direction the photon moves. The group velocity is the resultant actual forward kinetic motion of the photon. This is true in our cone model as well. The particle moves in a resultant trajectory that is on one of the intersecting planes. Its invariant connection to the parallel plane is orthogonal. The particle trajectory is a wave front normal to the photon that has been warped by the gravitational effects of the masses involved in the system. The phase velocity vector goes from the tangent at point P on the trajectory to the center point. It is also normal to the kinetic vector. But the v_p vector is NOT normal to the *c* vector. It forms an acute angle as in the klystron. The phase velocity lines that pass through the center point in the case of the ellipse pivot like levers. They get "velocity leverage." The limitation imposed by the fixed point allows them to wave back and forth over huge distances just like the phase wave that whips back and forth inside the klystron tube.

However we have achieved something remarkable here in our model which does not occur in the case of the klystron. We have shown how information can be transmitted faster then light! The superluminal phase strobe in a klystron tube can not transmit information. The superluminal collapse of the wave function in the case of quantum correlated particles in the EPR experiment gives us no control over the whole non-local field of information. The receiver gets information faster than light, but it is garbage, because he is only getting half-bits at a time!!

With our cone the situation is totally different. The lower nappe is the observer's own mind, his consciousness. Everything that is in his physical world is reflected simultaneously and instantaneously (at the Planck Velocity) in his mind. He can focus his attention down any particular ray belonging to any particular trajectory and see what's

happening. This happens instantly. He uses the superluminal property of the attention's attractor (A) beam. He can also shift his attention about in his mind to another trajectory or point on the same trajectory, and the attention shifts over immediately. He can rotate a quantum bubble and tilt his perspective to instantly experience the slingshot *c* vector value of any object and shift into direct experience of pure light. The time lag is totally under the observer's control. He can also manipulate the whole thing from the Origination center point O without even going anywhere physically OR mentally!!!!

We now have a tool for using phase waves as a means of communicating and transmitting information at any arbitrary speed. There is no limitation. As Harry Palmer announces (**Avatar Journal**, Summer 2002, Volume 16, Issue 3, cover quote), "You are bound only by your decision to have boundaries."

In the case of "parabolic" and hyperbolic trajectories, the manipulations may involve objects separated at the far ends of the universe, way out at the top of the upper nappe. Perhaps these objects are many times the distance light can travel in a reasonable interval of our time as judged by the distance between the parallel planes, which is our gauge for *c*. No problem. The phase waves pass through the center point. Our minds are our minds. All the data is stored in there. We can manipulate the whole scene from the center point.

The observer has his belief system "stored" as various attention automatons in his consciousness in the lower nappe. Continuous recreation of particular belief systems and their projection into world experiences is based on the ability of undefined awareness to generate attention automatons. The subject of creating, de-creating, and general management of such automatons is covered in detail in Palmer's **Avatar Materials** under the subject of "Persistent Masses". But we can understand a great deal of the mechanics of such things by studying the prototype of the proton. An observer's belief system is a complete map of his world. He projects this mental universe through the central point into the upper nappe at a virtually instantaneous speed. It is projected just like an image is projected through a lens onto a screen. It is a total, holistic projection, with parallel processing, not one bit at a time. It is an optical processor, except that it is not limited to the speed of light. It moves at the speed of the will, which is at least $v_P = 10^{42}$ m / s. The physical world interacts as a collection of physical group waves at sub-luminal velocities, or as photons at a maximum velocity of *c*.

Thus ordinary sub-luminal physics is a subset of superluminal Observer Physics. The observer has experiences, because his physical world reflects back to him his beliefs and how they all fit together and interact. At a level far up in the upper nappe, an object may appear to move slowly through a huge orbit. But from the "here and now" perspective at the center pivot point, there is just the tiniest little tilting of a viewpoint angle. With a proper use of lenses he can redirect an orbit from the central point. Just a tiny bias in the central lens will make a great shift in the projected object.

Experiment: You can try this for yourself by setting up a bright light source that shines onto a blank wall. Then place you hands near the source and make tiny movements. They will appear as giant shadows that move rapidly across the wall. Making shadow

images is a popular party game. It demonstrates the value of functioning close to or from the viewpoint of Source and manipulating the world via phase waves. The phase waves you make in this exercise are subject to the limit *c*, but phase waves generated by the **will** are not so limited. They propagate non-locally at the speed of the collapse of the quantum wave function. You may not feel that playing with shadow puppets will really change the world, but you may not be adjusting the appropriate projection for the change you wish to achieve. In ancient Greece Archimedes already understood this principle when he commented that with the right kind of lever and the right place to apply it he could move the world.

FTL and Causality Violations

One of the major issues that is often discussed with regard to the possibility of FTL -- Faster Than Light -- communication is the problem of causality violation. The classic example of such a violation is the paradox of my going into the past and killing my father before he met my mother. What then happens to me? The real issue regarding causality violations is concerned with **responsibility**. Notions of causality are all based on the belief that something "out there" other than "me" is responsible for events that happen in my world. Patricide is probably not a very good example of responsible behavior.

If the observer takes full responsibility for everything that he does (starting with the "me", "not-me" pretense), then the causality problem immediately disappears. Anything becomes possible. Such an assumption of responsibility requires a shift of viewpoint that some people may not be ready to make. If so, they will remain in a world that reflects beliefs about causality. Whatever you see and experience in the upper nappe of your world cone, -- that is your physical world. That is a perfect reflection of the beliefs that you hold in your own awareness. If you believe that you can not change your physical world, guess what? Your reality will be that you can't change your physical world.

Understanding the Quantum Leap

Now we are ready to understand the "quantum leap" or collapse of the wave function and the apparently strange properties of quantum statistics. Any system in the cone is complete. The whole path of the trajectory is there in principle, independent of time. It is just like the quantum wave function. In fact it IS a quantum wave function for a defined automaton system. And it is quantum mechanical because we can interpret it that way if we choose to as long as we consistently take a quantum mechanical view and do not contradict ourselves. Now a funny thing happens as you draw a mental wave function closer and closer to the "here and now" point. The "bubble" of the ellipse -- if that is what the mental trajectory of the attention automaton is -- gets smaller and smaller. It is as if the whole cone is shrinking. When you get it down to the center point, the whole thing explodes. The trajectory disappears into a point. In that point is every other trajectory. It is a point of all possibilities. And it becomes a moment of direct experience for the observer. The bubble pops.

This is the collapse of the wave function. What was once an abstract non-local trajectory

in space/time collapses into a single point. If the attention happens to be directed to a particular point in the trajectory, -- that will be the value it seems to have had. But actually the point value is transcendental. It expands to include the whole cone. Remember that the whole cone shrank into a point. So now, speaking in terms of relativity, that is the same as if the point had suddenly blown up to include the whole cone. The point is both local and non-local. As a point it is local. But as the mapping point for all projections, it is very non-local. It is the whole ball of wax. This brings us to the problem we began discussing back in chapter one. Why it is that quantum particles seem to show up in random locations in the wave function whenever the function collapses? We can never predict where they are going to be. We only know that they will tend to fall somewhere within the shape defined by the wave function -- what we call in our model the "trajectory".

At the "gross" level objects have mass. They have significant mass and are made of many component particles. Therefore they tend to function as automatons. They fall into their statistically most probable macro-state condition, and that is pretty restricted. If you put a cup on the table and come back and look at it again tomorrow, it will still be there unless your wife decided you were messy, washed it, and put it away. If you have a beam of photons or electrons (all of the same type) passing through a tiny aperture you might expect them all to land on a screen behind the aperture at the same location. But they don't do that. They show up all over the place, generally following a pattern that would be suggested by wave interference. If you have two slits, the two waves interfere and make a more interesting pattern. You can show that each individual photon seems to pass through BOTH slits and interfere with itself. You can see this by reducing the beam to single photons and closing one slit and then the other. Closing a slit stops the two-hole interference. But both slits open gives interference even with single photons. Yet you can not predict where a particular photon will go. As a wave it goes through both holes, but as a particle it shows up in a specific but unpredictable location. How can it do this? Nobody ever explains this clearly and logically. Now we can understand it intellectually and experientially.

When the attention moves to subtler, more refined levels of awareness, it becomes less localized, and less subject to bias. It becomes more like a wave function than a particle. We showed this when we analyzed how smaller quantum particles actually spread out more as they have smaller and lighter inertial mass. A wave has a spread and exists in several places at once. When bias disappears, being here and being there does not make much difference so long as one adheres to the general game plan -- that is, the overall shape of the wave. You find more and more uncertainty in space and time as you relax your bias regarding the "here's" and "there's" of things. When you get to the transcendental field, the wave function collapses into the point of all points. There is no bias at all. Thus awareness becomes omnipresent.

In describing the process of Transcendental Meditation (TM), Maharishi was fond of using an analogy to bubbles rising in a pond. The bubbles start at the bottom (in the quantum foam) and rise to the surface. As they rise, they become more expanded. When they reach the surface, they have their largest size and greatest level of excitation. The

process of TM is like turning the attention around. Instead of looking at the largest, most excited bubbles as they pop on the surface and disturb the whole pond with ripples, we begin to notice the path by which the bubbles arise in the mind. We retrace that path backward to subtler and subtler, finer and finer levels of thought impulses until the bubble collapses into a point. It then loses its structure and the mind expands to become totally non-local. This is called Transcendental Awareness. In Transcendental Awareness the mind is not biased. Everything is OK this way or that, however it wants to be. It just is. An interesting side effect is that practice with attention at a very subtle level develops the ability to use attention very efficiently and with fine focus in activity while also maintaining the unbounded expanse of its underlying wave nature.

At the subtler levels near to the Source of Awareness, the trajectory is so small that the object can easily "tunnel" from one location to another in the trajectory. Or it can even tunnel to another trajectory. Ordinarily it seems unlikely we can walk through a macro-state object such as a concrete wall. But an electron can tunnel through an apparently impenetrable barrier (called an electron well) given the right conditions. Tunneling is also possible at the level of concrete walls, but that would take a bit more finesse. We understand how an electron can tunnel once we know that the electron is nothing but an energy vortex. By modulating its wave function, we can cause the vortex to dissolve at one point and re-form at another. Barriers are irrelevant. What counts is the fluid dynamics. You can do the same thing with vortexes in a stream of water by manipulating the current with some rocks.

Gravity and Thermodynamics

Finally we should say a few words about thermodynamics. This is a big field, but it has some simple principles. These principles are related to the study of quantum gravity, because the essence of gravity is relaxation and the conjugate form of gravity is kinetic excitation. Generally speaking, kinetic excitation is the same thing as thermal excitation. There are many good treatments of thermal physics, so there is no point in going into all the details. We have listed some good sources in the bibliography and much material is available online. We only wish to make a few key points that are relevant to our introduction to Observer Physics. Let's begin with some preliminaries.

Energy is recognized and measured in terms of motion or the ability to generate motion. The dimension of energy reflects this concept of energy -- a mass times a velocity times a velocity, or a force projecting through a distance. Kinetic energy ranges from highly specific and organized motion to random motion. We call “organized” motion "work", and we call “disorganized” or “wasted” motion "heat" -- unless we feel cold. Heat is an expression of random motion. It is possible to do work with heat by organizing its flow on a macroscopic level. In that case you are treating the organized flow of kinetic motion as a mechanical energy. But it is not possible to convert heat completely into work because of the **definition** of work as organized motion. Some of the heat is always too disorganized to do work. That means that the kinetic motions of the system tend to cancel out. The cancellation of kinetic motions in a system is called equilibrium. A state of equilibrium can not do work, because everything is balanced, and all the forces cancel out. Hence, there is less or even no organized displacement. Equilibrium states can only BE.

They can not DO. To **do** you must disturb equilibrium. The range of energy goes from nucleonic energy, which is highly localized in a nucleus, to electromagnetic energy, which is expressed through the linear motions of photons, to chemical and mechanical energy, which are just gross forms of electromagnetic energy, on to the random kinetic energy of heat. Heat is often considered the "lowest" form of energy, because, when a system reaches a thermal equilibrium, you can not get any more work out of it. It gets permanently lazy. Or at least that's the way it looks, and that is how it usually is treated in the study of thermodynamics.

Heat is a form of energy, and energy ultimately is heat. Hotness is a relative term indicating a comparison of relative amounts of random kinetic energy and therefore is concerned with systems made of **multiplicities of components**. In studying thermodynamics it is useful to start by playing with an ideal gas. This is a relatively dilute collection of identical (usually, but not always, monatomic or diatomic) particles with random velocities moving about in a volume of space. The gas has very little internal structure. The particles of the ideal gas are dilute enough so there are no significant EM or gravitational interactions and the average particle separation is greater than a particle diameter. Particles can have many types of energy relationships, including translational motion, vibrations and rotations, electron orbiting energy, electrical potential, intermolecular forces, magnetic field effects, center of mass, and perhaps others. Usually heat is concerned primarily with translational kinetic energy, but the other interactions may also become significant under special conditions of temperature and/or pressure. Generally we measure the relative hotness of composite objects by establishing a gauge called temperature. Temperature is a gauge for measuring the relative "hotness" of composite objects -- that is, their relative willingness to transfer energy of some form to another object. Thermal energy generally transfers via convection, conduction, or radiation. All of these transfer methods are ultimately EM interactions.

In general energy (E) can transfer to or from a system via heat (thermal transfer) or via work. In the latter case the system does work on its surroundings, and one (or more) of its external parameters changes. The ideal gas law had been derived experimentally by the nineteenth century:

* $PV = n\,R\,T$.
* P = pressure
* V = volume
* n = number of molecules or atoms in moles times Avogadro's constant: $\boldsymbol{N}\mathbf{A}= (6.02214129(27)\times10^{23}\ \mathrm{mol}^{-1})$
* k = Boltzmann's constant $\mathrm{k} = 1.38\times10^{-23}\ \mathrm{J}\cdot\mathrm{K}^{-1}$
* T = the temperature on the Kelvin scale (K).

Boltzmann's constant is independent of the particular gas. It gives the number of joules per kelvin and is thus just a conversion constant between joules and degrees kelvin. Avogadro's constant tells you how many particles there are per mole. The pressure is related to the density and refers to the number of collisions the gas particles make on a surface in a given time interval, given we can figure out their average momentum.

The usual way of looking at heat in a dilute ideal gas from the molecular level is as the average random translational kinetic energy of its particles. We may take n as the number of particles, m_x as the average mass of a molecule in the gas, $\langle v \rangle$ as the average velocity, V as the volume, and k as Boltzmann's constant. The pressure P on a wall of the gas container is:

* $P = (1/3)\, n\, m_x \langle v \rangle^2 / V$.
  (The value 1/3 indicates one of three equal spatial dimensions.)
* $PV / n = k\, T$.
* $PV / n = (1/3)\, m_x \langle v \rangle^2$.
* $(1/3)\, m_x \langle v \rangle^2 = k\, T$
* $(1/2)\, m_x \langle v \rangle^2 = (3/2)\, k\, T$.

Since energy is quantized, as Planck discovered, heat is also quantized. Planck discovered the constant $\hbar$ that started quantum mechanics while studying the thermal radiation from a black body.

Heat means nothing in terms of a single quantum particle. We must consider ensembles of many particles, each with a certain amount of kinetic excitation in order to detect heat. We see the relevance of thermal energy to gravity when we consider a large cloud of gas in space. It can either remain a cloud, or it can collapse and form a star or other celestial object. However, an ideal gas in open space is not the same as an ideal gas enclosed in a container where the gas generates pressure by the particles banging against the container walls. In open space it is gravitational attraction that moves the gas in the direction of coming together to form a denser object. The kinetic excitation of the individual gas particles acts to keep the gas in the gaseous state, or even to diffuse the gas more widely in space. Thus **density** is a key consideration in the discussion of thermal physics, and we will have to revise our kinetic equation to deal with a dilute ideal gas in space.

There are three "laws" of thermodynamics, and we may as well structure our discussion of "gravitational" thermodynamics around them. **The first law of thermodynamics is the law of conservation of energy**. This general law of physics applies also to thermodynamics because heat is a form of energy. The total kinetic motions of the constituent particles of a system will be conserved as long as the system is closed, and has no energy flowing in or out, or as long as the inflows and outflows are equal. The conservation law stated in terms of thermodynamics thus says that the energy input caused by the heating of a system equals the change in energy plus any work that the system does.

* $\Delta U = Q - W$.

Here ΔU is the difference in energy, Q is the energy that can be transferred by heat flow, and W is the work done by the system. Work, as we mentioned, requires the energy to move as a "block" in a particular direction. A whole bunch of particles must move as an organized ensemble within the system. Thus work is an indication of "orderliness" or

"organization" and is defined as a force through a distance. And, of course, work has the dimension of energy. A system in thermal equilibrium can do no work because the random kinetic motion thoroughly interferes with itself destructively, canceling out any organized displacement. Thermal equilibrium is thus totally unaligned kinetic energy.

The first law of thermodynamics, the heat form of the energy conservation law, tells us that the total energy of a system is changed by the work done on it and the heat flow into it. At face value this is a circular definition. To say that the energy of a system is conserved if the inflows and outflows are equal to the change in energy is about the same as saying that if the energy is conserved, the inflows and outflows will be equal. It's just a definition of energy conservation.

It is possible to suddenly expand a gas into a larger volume by removing a barrier. This is called sudden adiabatic expansion. No heat is added in the process. Such an expansion shows no change in the kinetic energy of the gas. Only the volume of the space has changed. You can also allow a gas to expand slowly and adiabatically, but allowing the gas to do some work on a piston along the way. This will remove heat from the gas. But you can add some heat at the end and reach a final condition that is identical to the sudden expansion. This shows that the "heat" of this system is only in the thermal kinetic energy of the gas and nothing else. Heat -- random kinetic excitation -- is therefore the exact opposite of gravity.

* $P\,V = n\,k\,T$.
* $F_g = G\,m_1\,m_2 / r^2$.
* $F_g\,r = G\,m_1\,m_2 / r$.

Believe it or not, the ideal gas equation and Newton's gravity equation say the same thing! (Check the units.) The only difference between these expressions is that the former deals with the average behavior of a gas cloud of many particles and the latter deals with only two massive solid particles. Also, the gas law expresses itself in a volume of space, whereas the gravity law, being limited to only two bodies, involves a one-dimensional interaction between the two centers of mass. Masses m_1 and m_2 are considered spherical and thus taken to be equivalent to point particles. Otherwise these two laws are the same. The units J·K/K cancel the temperature unit into a proportion.

If we have an isolated cloud in free space, and allow its temperature -- that is, the average kinetic energy level of the gas particles -- to drop, "gravity" causes the volume to contract. If we add kinetic energy -- that is, add heat and generate a higher T value -- that causes the cloud to expand. There is thus **no difference between allowing a gas to cool and allowing it to contract gravitationally**. This is the proper **"equivalence principle"** that Einstein should have used when he developed his theory of General Relativity.

Einstein's elevator example is misleading, because it appeals to our habit of looking at gravity in terms of large individual objects. The elevator example should be analyzed in terms of thermodynamics and then would reveal that it is the opposite of gravity rather than the same as gravity. In reality gravitational systems mainly involve macro-states

that contain microstates on the order of thermodynamic systems. How do we remove the kinetic energy of a gas? Imagine that a certain percentage of the gas's kinetic energy converts to thermal radiation and escapes by radiating away into space. The gas cools. As it cools, it shrinks. It might as well be contracting gravitationally. If it shrinks faster than it loses kinetic energy, then the temperature rises. The gas has grown denser, and the kinetic motion is now in a more confined space. Beyond a certain threshold of density, molecules begin to interact, and the ideal gas law no longer governs the cloud. Other agencies come into play.

Our main principle here is that gravity and heat (kinetic energy) are conjugate partners. They are both somewhat complicated by the occurrence of various **phase states for materials**. Nevertheless, gravity is random. It propagates evenly in every direction as an "attractive force". Heat is also a random force. It also propagates evenly in every direction as random kinetic motion. Gravitational equilibrium and thermal equilibrium are the same thing. However, we know that **heat is quantum mechanical**. **The heat in a particular gas is always a function of how many particles are in the gas.** The number of particles per volume of space is the density. The number of collisions per unit area with a certain average momentum determines the pressure. Our molecular translation equation gives us the average kinetic energy times the density. **A single isolated particle therefore has NO heat. A single isolated particle also has NO gravity.** It takes two -- or more -- to tango. **Thus gravity is also a quantum phenomenon. The two smallest fermion masses interacting as a pair define the quantum unit of gravity.** The exchange of gravitational energy can occur through thermal radiation at the speed of light. However, this is a converted form of gravitational/thermal energy. The usual boson for exchange of gravitational "energy" on the universal level is the graviton, which moves at a superluminal velocity and is the conjugate of the will. The conduction and convection transfers of heat occur primarily through fermion interactions, which are ultimately electromagnetic in nature. Gravitational energy exchanges are usually most observable as changes in the relative kinetic motions of fermion particles or particle ensembles, the "group wave" aspect of gravitational interaction.

Have you ever ridden in a hot air balloon? I have a hot air balloonist's license. If we are correct that heat is "antigravity", then the conservation law also applies to gravity. In fact, this law is considered to apply to all forms of energy and is a fundamental invariance in physics. **The law of conservation of energy in quantum mechanics corresponds to the invariance with regard to time. The reversibility of any quantum mechanical process implies the reversibility of time. Reversibility of gravity means antigravity. Quantum thermodynamics is therefore the theory of quantum antigravity.**

This brings us to **the second law of thermodynamics, which is known as the law of entropy.** This law creates a lot of confusion, because it seems to create a contradiction between the macroscopic classical scale and the microscopic quantum scale. Also it seems to contradict the notion that time in quantum mechanics and in classical mechanics is reversible. Yet it fits our "experience" that time does not seem to be reversible. What goes on here?

The second law says that if we have a system containing a large number of particles, and we let it do whatever it wants without disturbing it, it will end up in the macro-state of greatest probability and stay there. This macro-state of greatest probability is also called equilibrium. Another way of stating the second law is to say that heat does not by itself go from lower to higher temperatures. This is another way of stating the reasonable principle that particles with a certain average kinetic energy will not by themselves start moving faster. To get them to move faster, you have to add some more energy from outside the system of particles. You can see how this law of thermodynamics is related to Newton's first law of mechanics that an object at rest or in motion will tend to maintain its status unless acted upon by some external influence. When we get into the study of wave packets in quantum mechanics, we realize that **this principle does not hold up on the quantum scale. But it seems to work fine for macroscopic systems.**

The second definition of the second law is pretty clear. The first definition takes a little more attention to understand. When a system has many different microstates, and many different component particles, the possible number of states of the system is usually very, very large compared to the rate of transition from one microstate to the next. The macro-states of a system are the general categories of the system considered without looking at the details of the microstates. For example, if we shake a box of coins and then look at the coins, we will find them scattered all about in the box. However, if we look at the distribution of heads and tails, we will find that generally half will be heads and half will be tails. The relative amounts of heads and tails, disregarding which specific coins are heads and which are tails, is an example of a macro-state. It is a big brush stroke picture of things. A hundred coins will show quite a bit of statistical fluctuation from shake to shake. But a bottle of gas that contains billions of molecules will not show much fluctuation once it reaches its equilibrium macro-state even though the microstates are transitioning quite rapidly. The phase space is just too large to show much macro-state variation once equilibrium is reached. However, this brings up the relationship between energy -- which is what a thermodynamic system is all about -- and time. We assume when we speak of randomness that the components of the system will periodically change state, and at each change of state they will have equal opportunity to change into any of the possible microstates of the system. If the process is left to itself and continues in a random manner as we have defined above, sooner or later -- probably later if there are a very large number of microstates -- there will be significant random fluctuations in the macro-state. We have discussed briefly in an earlier chapter such fluctuations and referred to them as Poincaré Peaks. The problem here is **that the time frame for a system with a phase space containing a very large multiplicity of microstates to experience significant Poincaré fluctuations is way out of our human consciousness league. It gets very "non-local" in time, beyond the age of the earth, and beyond the age of the universe even in many ordinary cases such as the molecules of air in a room. Cosmic time has no restrictions against Poincaré Peaks in vast phase spaces.**

Therefore, the second law of thermodynamics gives us a wonderful paradox. At the microstate level, time is reversible, and every transition can go either way. We see this as the common way of life among the subatomic particles. They switch directions in time quite easily when they bump sharply into a vector boson. Yet at the macro-state level,

time marches on inexorably bringing systems to increasingly larger states of equilibrium. The randomness of such states is also sometimes compared to "disorder." The world seems to be headed inexorably toward more and more disorder, a rather dismal prospect.

However, before we get depressed, we should realize that the concept of entropy is a **mental mathematical device**, born of the large numbers of component particles in many systems. **It only expresses a viewpoint, a certain way of looking at physical systems, not necessarily the only "inevitable" way things are.** To manage such large numbers of microstates, mathematicians use the logarithm to keep track of them. Given a number of microstates (*Ns*) that a system can assume, the entropy (*S*) is:

* $S = \log (N_s)$.

For example, if there are 8 (i.e., 2^3) possible states in a binary system, the entropy is 3. If there are n^{20} possible states in a system, the entropy is 20.

Thus entropy is a function of the number of particles, the energy, and the volume of the system, at a minimum. These parameters determine the number of states possible. But **anything** that distinguishes possible states can be used. The second law is a very general principle. The law of entropy tells us that **the entropy of a system stays the same or increases as a result of any process that occurs with the system**.

The universe, when looked at as a mechanical, physical phenomenon, does indeed appear to be subject to an inexorable law of entropy. However, appearances can be deceiving. Entropy is a result of the natural tendency of physical systems to find thermal equilibrium -- assuming that they are "abandoned", mindless systems. **Entropy applies ONLY to dumb automatons that someone has created and then abandoned to wander around in their mental and physical space.** This means that the kinetic motions of the various component dumb particles are going this way and that randomly instead of in some particular direction of flow that seems to go somewhere or is directed by a deliberate conscious will. We think of work as getting something done. **Randomly putzing around is not considered work.** These are just different viewpoints. **A "negative feeling" about entropy and a desire to minimize it may be just a symptom of addiction to a "work" ethic belief system or a "neatness" fetish.**

Exercise: What do you believe about work? What do you believe about putzing around? What do you believe about mindlessness? What do you believe about abandonment? Do Exercise #16, "Self-Deception Signals" in **ReSurfacing**. Consider carefully the questions asked after each section.

From the viewpoint of Observer Physics I suggest that thermal energy is not necessarily just random particles putzing around. It may indicate the degree to which a system has put itself into the ideal condition for the operation of its conjugate form, gravity. If a system is all moving in one organized direction, such as a rocket that is headed off on a journey, then the system will be very resistive to earth's "gravitational attraction". However, the rocket's exhaust gas will be just putzing around in the upper atmosphere. It

will get drawn into the rest of the atmosphere and join the gang of loose air particles and just float around. Eventually some of the heavier elements may even settle down as dust and get back to earth.

So we have here a fundamental principle of observer physics that thermal equilibrium, far from being an energy "dead-end", is **the ideal starting point** for gravitational "work" to begin creating new things. Gravity does "work", because it creates a directionality that organizes particles with respect to an arbitrary singularity point, and starts them moving in that direction. Entropy does work, because it is the conjugate of gravity, and therefore performs "conjugate work". Entropy and Gravity form a team.

A system in thermal equilibrium has all its kinetic energy randomized. It has no kinetic bias. The only thing that keeps it in gaseous form is the relative amount of kinetic energy with respect to its mass density. Thus thermal entropy is anti-gravity, and gravity is thermal anti-entropy. The two are a conjugate pair. Cooling has the same effect as gravity. It draws particles closer together.

As a dilute ideal gas in space contracts under the "attraction" of gravity (which is really a relaxation, or loss of kinetic energy), it begins to grow hot. Actually it is not really heating up. It is like a planet moving from apogee to perigee. As long as the density is not too high, this is an adiabatic contraction. The appearance of heating is just that the gas is compacted into a much smaller space with the same number of particles and the same kinetic energy. The particles begin to bang into each other more and more. This appears to "heat" the system up. It really only heats up more when more particles are sucked into the contracting mass -- thus adding more mass and kinetic energy -- or more energy of other type(s) is put into the system. We notice a fundamental difference between an "open" system that is not sealed, and a "closed" system that is sealed off. A closed system experiences "pressure" from containment and particles bang on the container walls. An open system has no such containment, and so the only pressure results from the adiabatic compaction of the particles. In a dilute gas collisions between the particles are pretty rare. Therefore the ideal gas equation does not hold in the same way for a gas in free space. Our previous derivation of the pressure in terms of particles colliding with walls must be abandoned. We imagine the gas cloud is in open space and is undisturbed by external influences. If it is not rotating, it takes a spherical shape. As Newton discovered, the center of gravity will emanate from the center of the sphere, and, in spite of the various random motions of the individual particles, the gravity well m_1 will appear to be located at a point in the center of the cloud. We assume that the particles are all of the same type, say molecules of hydrogen. Then each individual particle, regardless of where it is in the cloud, will be effectively orbiting the center of gravity of the well in some roughly elliptical orbit with occasional collisions here and there that we will ignore. The gravitational effects of individual particles on individual particles also will NOT be negligible and will average in all directions, effectively modifying the role of G in the system. **A particle at the very center of the cloud will experience zero *G*-force, because the gravitational influences of all the particles on it reach equilibrium.**

However, the particle will have a certain kinetic energy that will cause it to move through

the center, in which case it will have a degenerate elliptical orbit like the ball bouncing (or jiggling) through the center of the earth that we described earlier. Since there may be other particles at other angles in such orbits, these particles will tend to collide from time to time and then remove themselves from the center, allowing other particles to slide into central orbits.

We begin to realize that the study of gravity has a great deal to do with density as well as "temperature", and we will pursue the question of how unbound clouds behave in space more deeply in chapter 15.

Negative Entropy

Our discussion of the thermodynamics of gravity also brings up the possibility of deliberate manipulation of gravity and entropy. Our model shows that the lower nappe of the gravity cone is the mind of the observer. Erwin Schrödinger coined the term "negative entropy" to refer to biological systems and the growth of consciousness. The physical world in the upper nappe is a reflection of the mental belief system in the lower nappe. The lower nappe is below the vacuum zero point state, so positive entropy dominates in the upper nappe and negative entropy dominates in the lower nappe.

Thus the observer/participant can set up a resonant cavity to resonate any way he pleases. If the physical world appears subject to entropy and a tendency toward increasing random disorder, the conjugate mental world can be directed by gravity -- the reflection of will -- and deliberate organization of beliefs. We recall the exercise we did in which we practiced "connecting the dots". The ability of the observer's awareness to direct his attention to deliberately connect a random collection of particles into an organized structure is an example of negative entropy. It is the conjugate opposite of the collapse of the wave function in which a continuous function suddenly transforms into a series of dots in space/time. Projections into the World space, once abandoned, become mindless automatons that can only follow the patterns of the beliefs that created them. Projections in either Mind space or World space, unless abandoned, are subject to the deliberate intelligent direction of the will in its defining of beliefs. The will can decide the level of excitation and the level of organization of the Mind space. The World space is an exact reflection of the Mind space -- a replica.

Exercise: Have someone take you through the "Expansion Exercise" #26 in **ReSurfacing**. Practice this exercise until you can easily expand your awareness to contain your entire World space and Mental space. What happens to scale? What does this imply with regard to the second law of thermodynamics?

The Third Law of Thermodynamics

Finally, let us consider the third law. **The third law of thermodynamics tells us that as temperature is reduced, the various parameters of a thermodynamic system, including the entropy, tend toward zero. Theoretically, at absolute zero kelvin, all parameters are at zero.**

However, just as we saw with entropy, the actual situation is not quite that simple. For

example, systems have various phase states, such as gas, liquid, and solid states. They go through transitions in various patterns depending on the components of the system. Also, density increases as temperature drops. If density increases and kinetic motion also drops off, other components of the system come to the fore. This includes molecular structure, spin, magnetic moment, and so forth. Therefore, especially when we get to extremely low temperatures, it becomes somewhat misleading to think of temperature only in terms of average kinetic energy. It is possible to have negative temperatures, but not negative kinetic energy. It is possible to cool materials by manipulation of magnetic moments. Many interesting phenomena occur in super-cooled materials. These include superfluidity, superconductivity, and the ability of fermions to behave as if they were bosons.

Let us get a general statement of the third law. This law is also known as Nernst's Law, although Planck and others contributed a lot to its understanding.

* No process can take a system to zero kelvin in a finite number of steps.
* The entropy goes to zero as the temperature approaches zero, and the entropy may reach zero before the temperature reaches zero kelvin.
* As temperature drops toward zero kelvin, the entropy change in an isothermal process goes to zero.

One thing we notice in these statements is a complementary relation between the second law and the third law. The second law tells us that entropy increases as the heat content of a system increases. The third law tells us that entropy decreases as the temperature decreases. Temperature is a measure of heat content. So rising temperature means more entropy. Lowering temperature means less entropy. Entropy is also associated with disorder, so the notion arises that higher temperature leads to more disorder, and lower temperature leads to more order. We definitely see that crystals are much more orderly than liquids, and liquids are more orderly than gases (in the sense of flexibility).

The second law tells us that any system with a multiplicity of mindless components left to alone will go to its macro-state of greatest entropy and stay there. Systems interacting tend to expand the entropy of the totality of the interacting systems. It seems that, in the case of mindless systems of particles, entropy always tends to stay still or increase, never to decrease. (And Poincaré Peaks seem out of practical time frames.)

On the other hand, the third law tells us we can lower the entropy by lowering the temperature. However, this apparently involves work done on the system, even if it just means thermal radiation dissipating into the void. And so even if a process decreases the entropy inside the system, it increases entropy outside the system. The whole system of systems experiences increasing entropy. On the other hand, a space with no particles, or only one particle, has no entropy and no heat. Let's apply observer physics.

Exercise: Redo the expansion exercise and imagine a space in which the universe effectively becomes a single infinitesimally small particle in a huge empty space. If we treat the whole universe as a single tiny particle in a vast space, entropy disappears, and so does temperature. All random kinetic motion effectively disappears -- reduced to an

imperceptible level, relatively below the Planck scale compared to our expanded observer viewpoint. Thus expansion of awareness lowers the mental temperature.

Undefined awareness has no temperature. If we really establish undefined awareness as the core belief in Mental Space, it will automatically reflect in World Space and -- from that viewpoint -- entropy will be erased from the universe. The third law tells us that if we have a way to lower temperature, that will lower the random kinetic motion and other contributions to the heat of the system. The entropy of a system can be removed. Furthermore, cooling of a system has the effect of time dilation. It slows the clock just like fast relative kinetic motion also slows the clock.

Zero entropy stops the clock. Anyone using a refrigerator or freezer understands this principle -- that cooling slows aging processes in materials. At zero kelvin, if we could hold the system there, the clock stops, just as the clock stops at the velocity *c*. This is odd. You can slow or even stop the clock by going fast, and you can slow or even stop the clock by slowing down!! The difference is that the clock that slows when going fast is an orderly periodic oscillation of a coherent structure involved in work, whereas the clock that slows when "going slow" is an entropy clock that slows by reducing its random thermal kinetic fluctuations. Also, slowing the clock by fast motion is only apparent to an external observer, but slowing the clock by lowering the temperature slows the colder clock for all observers.

The question then arises: if we can slow a clock, one way or another, can we reverse a clock? The view of Observer Physics is that this is a meaningless question. What we call time is really an awareness of change. Change proceeds in various ways. Change is a sign of energy transformations. Generally it either is cyclical, developmental (non-cyclical), or random (non-developmental). Equilibrium is a very stable cyclical state. Systems tend toward cyclical states, and only behave non-cyclically as they move turbulently through phase transitions. Yet a sequence of phases separated by transitions amounts to another kind of cycle.

Rather than speaking of running the clock backwards, we really should speak of **achieving a preferred state of equilibrium in which the system cycles within a specific desired range.** Or we can think of reversing one or more sequences of phase transitions back to a previous equilibrium. Just running the clock "backwards" does not make much sense.

One Monday morning I went to my high school and found that a student had broken into the classrooms over the weekend and adjusted all the clocks so they ran backwards. The student was expelled, but I always admired his sense of humor. Our clocks go around and around. We just choose to tell time in a particular direction by convention. A system for telling time is a "type two" conventional belief system according to Palmer's typology of beliefs.

Given a high multiplicity of microstates, the recurrence of a specific unique configuration of microstates is also probably meaningless, since we do not experience life with that

degree of resolution. Therefore, a good working definition of time reversal might be – "**Time Reversal is shifting the macro-state phase of a system into a condition that matches the macroscopic parameters of a prior phase state to a desired degree of resolution."**

This is obviously quite doable, since we only desire a reasonable match and not exact duplication. Exact duplication may be possible too, but seems rather overly perfectionist, since the total detail of a prior **microstate** multiplicity is not likely to be known, and the microstate transition rate is pretty swift and ongoing. At any rate, the procedure is simply to identify the primary components of the desired prior macro-state and then to insert those components into the belief system of the Mental Space. Then adjust the Lens Modulator to project those beliefs into experiences in the World Space so as to achieve the proper sensory feeling. The detailed technology of Lens Modulation procedures are included in sections II and III of the **Avatar Materials** as the Creation Handling Procedure for anyone who is really interested in exploring such procedures. Since that becomes a laboratory experience rather than theory, I leave that project for the reader to follow up on as an exercise.

A state of maximum equilibrium with maximum entropy is an ideal unbiased starting point, and gravity provides a good example of a recipe for effortlessly turning states of maximum entropy such as clouds of dust and gas into shiny new stars and planets ready to evolve. The will as the prime mover can turn undefined awareness effortlessly into a fascinating set of beliefs to explore and experience.

Is it possible to lower temperature and remove entropy without doing work? The problem with using work is that work tends to generate more entropy and heat.

Experiment: Put your hand inside a refrigerator. It feels cold. Now put your hand behind a refrigerator while its pump is running. The heat you feel is the heat pumped out of the refrigerator plus the extra heat generated by the pump.

So the key here is NOT to **pump** the system like we do with a refrigerator or a laser, but to **relax** the system. Slack can be useful under the right conditions. For example, we can relax a system physically by isolating it in free space, exposing it to the vacuum state. It will definitely cool. Expose it to a reservoir of cold. The ambient temperature in free space (not exposed to sunlight) is about 3 degrees kelvin. Space is a good refrigerator. But, from our conical gravity model we also get some other ideas.

The lower nappe of the cone represents Mind Space. It is a field of negative physical energy, located below the vacuum state. It precisely reflects the contents of the upper nappe, the World Space. However, both nappes can be manipulated from the O-point in the middle. In fact they can be completely controlled from the quantum foam at the Planck level.

Phase waves are superluminal, lack mass, and can carry information, as marquees, movies, and slide shows demonstrate. Photons travel at *c* and lack mass. The World

Space phenomena project onto the quantum foam via photons that arrive at the speed of *c*. Luminal attention photons and superluminal graviton particles can be manipulated deliberately by the will.

There is a process known as flash freezing that allows material to be frozen almost instantly. Recently some physicists announced they had succeeded in "flash freezing" photons. They did not elaborate in the news release, because the public does not yet understand what is going on in such processes, but this experiment was accomplished using four-wave mixing phase conjugation techniques. A nonlinear gas medium at low temperature was pumped with conjugate lasers until highly energized. Then a third light source was introduced as a flash of light. This was the third beam added to the system. As the flash entered the coherently resonating gas, it achieved quantum correlation with the gas particles. Its quantum mechanical "signature" became holographically "entangled" in the quantum bubble of the coherent gas. The pump lasers were then damped, and the quantum information of the flash of light was left recorded in the gas. After some time, the lasers were turned up again. The flash reformed and continued on its way as the fourth beam of the phase conjugation system. As you can see, this is just a delayed reaction four-wave mixing system. A photographic hologram is another way of "freezing" an entire 3-dimensional light field on film. It can later be unfrozen and restored as a light field by scattering a laser off the hologram film's interference pattern recording.

The principle here is that **anything** can be frozen instantly -- even the whole universe. The freezing of a material involves finding an appropriate method of sucking out the kinetic energy (and any other expressions of entropy) in the system. Perhaps the simplest way to do that is to shift attention. All of thermodynamics is based on multiplicities of microstates. If we eliminate all the microstates of the system, then we automatically eliminate all entropy and all temperature. Rather than trying to invent a giant vacuum cleaner to suck the microstates out of a phase space, why not just shift to a viewpoint from which the microstates are no longer viewed as microstates?

Microstates are ensembles of particles. Remember how we created particles by curling photons up into little tops? Run that process backwards. We simply relax the energy of attention that goes into juicing up the photons and curling them into particles. Matter is made from photon energy. Photon energy is in frequency. Photon velocity is the same for all observers, so the (wavelength / frequency) ratio must be dependent on observer viewpoint.

* $c = \lambda_o f.$

Shift to a viewpoint where the wavelength stretches out and the frequency drops down. This relaxes the system, and the particles stretch and yawn and return to their modality as potential energy.

Basically we have to dissolve the observer viewpoint bias that hardens the energy into matter. That takes a little exploration to find the hidden assumptions and transparent

beliefs that generate the bias. Then the matter simply dissolves back into energy with no mass or resistance. From the state of Source, established in a field of All Possibilities with no resistances, we can decide what we would like to do next and effortlessly accomplish it.

Maharishi Mahesh Yogi has compared this process to "lowering the Mental Temperature." I believe he was the first person to bring up the notion that one could deliberately reduce entropy in the world by lowering mental temperature. For him this means relaxing the awareness through meditation. But the principle is general. The state of Absolute zero temperature and zero entropy says nothing about zero energy. You can have as much energy as you like at Absolute zero. It is like the common misconception that a black hole must be very dense and crunch you out of existence. Actually large black holes could have the density of dilute gases. And the universe as a whole has a density of about one or two protons per cubic meter or even less and yet it almost certainly qualifies as a black hole. Take another look at the ideal gas law.

* $PV = n\,k\,T.$

If the pressure goes to zero, the temperature goes to zero, and the entropy goes to zero. If the volume goes to zero, the temperature goes to zero, and the entropy goes to zero, regardless of how much mass is hanging around. If the number of particles goes to zero, the temperature goes to zero, and the entropy goes to zero, regardless of the space the system occupies. The observer can achieve all of these without work simply by shifting his viewpoint.

Exercise: Have someone take you through the "Expansion Exercise" (**ReSurfacing**, Exercise # 26). When you have done it a few times with a coach's guidance, you can do it yourself. Alternatively or additionally, explore the ideal gas equation in the light of the laws of thermodynamics using the advanced Avatar tools. (I come back to this exercise numerous times because it is extremely easy, useful, and illuminating.)

Having discussed some of the fundamental principles regarding thermodynamics and gravity in the light of observer physics, we have one other topic to consider in this chapter -- density.

Archimedes was asked by his king to find out whether a certain craftsman had properly made a crown from pure gold. One day while Archimedes was relaxing down into a warm bath, the answer came to him in a flash. According to the legend Archimedes was so surprised and excited that he jumped out of the tub and ran around naked shouting "Eureka"!! "I got it." He had discovered that the volume of water displaced equals the volume of the object immersed. This led him to Archimedes' Principle, the law of density. **The force that buoys an object in a fluid equals the weight of the material that it displaces.** Archimedes realized he could weigh the crown in air and then put it into a tub of water, and then weigh the water that it displaced. Then he could weigh out the same amount of gold as the crown weighed in air and then place the gold in the tub. If the weight of the water displaced by the crown were the same as that displaced by the

known sample of pure gold, then the crown would be made of pure gold. If it were not, then the density of the crown would be different and some alloy would have been added.

Archimedes' law of density is one of the great insights in the history of science. And it is so simple, elegant, profound, and general. If the weight of the material an object displaces in a medium is greater than the object's weight, then the object will tend to "float". This is where the principle of gravity comes into play with regard to density.

The general principle of gravitational environments is that the denser material usually (on average) tends to locate near the center of mass (CM), and the least dense material locates the farthest from the CM. If the particles have equal density, then the ones closer to the CM singularity will be more closely crowded together. Thus each gravity-well is actually a mass-energy density gradient.

Why is this so? From observer physics we understand that a CM singularity indicates a focus of attention. The greater the focus of attention, the more mass-energy density will manifest. Hence, when attention is fixated at a certain point with a great deal of focus, matter particles form and collect there. The gravitational attraction is the conjugate reflection of the focused attention. Will controls focus. If we expand this to the universe, we find that the original attention that created an external focus of attention was the idea to pretend that something was "not me". The idea of an expanding universe is an installed belief that there is more and more that is "not me" or that the "not me" fills a larger space. Gravity is simply the reassertion of the fundamental truth of universal unity that quietly intrudes when attention to create "not me" is divided in order to focus attention on “external” local points of interest.

The loss of universal resistance leads to the collapse of the pretense of diversity and the tendency of all matter to reunify as a single particle of pure energy. Every inhabitant of planet earth is in an "orbit" determined by the relative density of the person or object. There are some variations due to phase state, but generally this is how it works. For example, water in its liquid phase resides in the oceans and lakes, but in its vapor phase, it resides in the atmosphere. As we move about the planet we generally follow orbital trajectories. Periodically we rebound off objects or ideas and change direction, but we generally stay within the average density orbit trajectory "shell" for particles made mostly from water, but slightly less dense than water -- at the earth's or water's surface.

Most people think of transportation in terms of the use of kinetic translational devices such as cars, or airplanes, or other vehicles. Actually there is another efficient form of transportation that involves the use of Density Modulators. Primitive examples of vehicles that operate using density modulation are submarines and helium or hot-air balloons.

The major bottleneck to the development of our space program is the lack of an efficient density modulator to shift men and material from Earth Surface Orbit to Earth Near Space Orbit. From Earth’s Near Space Orbit to outer space and beyond is easy given our current technical development. The second great bottleneck to exploring the World Space

universe "first hand" is the speed of light. Even the nearest star systems are light years away. Travel to other galaxies is no more than a fantasy without the development of a superluminal density modulator. Such a device is akin to the "Beam me up, Scotty" device used in Star Trek, but works on an interstellar and intergalactic scale. The sci-fi technology called the "warp drive" is an example of a superluminal density modulator suitable for mass transport.

How could we conceive of such a device on a practical level? The first step is to develop the Ansible, Ursula LeGuin's sci fi idea of an FTL communicator device. Our cone model allows us to envision the principles for the development of an Ansible Technology. The gravity cone is like a star map of the universe that connects the dots precisely into a Mental Map inside our consciousness. The principles are simple, although the development of applications may involve some research and development -- if you believe it will:

* We formulate the "message" we want to "send" as a set of beliefs, and project them into our Mental Space.
* The "message" includes a space-time "to" and "from" address.
* Then we use our Lens Modulator to transform the Mental "message structure" into a physical form in the World Space.
* This happens instantly and faster than light. The message appears at the intended Space-time destination in World Space as soon as it is properly established in Mental Space.

The physical apparatus involved with this is not of great consequence, as there could be a number of feasible approaches. One possibility includes the use of quasar signal beacons as carrier frequencies for time-reversed phase wave modulators. The main priority before we can make progress as a civilization in this area is the development of skills in the management of belief systems in Mental Space.

If you do not believe that what I am talking about in this book or in the above proposal makes sense or is possible, you are welcome to your opinion, and I stand corrected wherever I have erred. But I stand by my own experiences. On the other hand, diversity of opinion is a basic principle of observer physics. I suggest that you take ten days and experience the **Avatar Materials**. Why not? The materials give you all the basic tools you need to understand this body of ideas, or anything else you like, and then to actually transform your ideas into an experiential reality. Go online to AvatarEPC.com and check it out. For a start, get a copy of **ReSurfacing** (if you haven't already) and do the exercises with careful attention. That little book is the "laboratory" text for this introduction to observer physics. Not enough “time” or “money”? What are your limiting beliefs about time and money?

The Density Modulator Transport Device follows the same basic principles as the Ansible Communicator Device but transports objects and individuals as well as information. How do I know the Ansible technology works? Well, this discourse was written by the use of a prototype version of the Ansible Technology. The material of Observer Physics

came from the future and was projected down through my "working model" of a quantum foam Lens Modulator (as well as the Internet and lots of wonderful books and articles). Aside from my own personal errors of transcription, for which I apologize, take full responsibility, and will make every effort to correct, this material on the subject of Observer Physics is entirely accurate and verifiable. Observer Physics must match with the World of experience or change. It is not difficult or obscure. You need to read the materials with some attention, but both the mathematics and the theory are easy enough for any alert student to follow.

The Mental Space we have modeled may contain anything you can imagine. It contains the complete set of your beliefs, and is nothing but your beliefs. Your World Space is a perfect reflection of your Mental Space. Whatever you experience is a verification of what you really believe. If you do not like what you see, then you may want to change your beliefs. There are tools for doing that. If you imagine a World that does not match your experience, your attention is fixated on a localized behavior loop. But that still is your World -- a World in which the underlying belief structure is that "Certain things that I imagine, are not true in the World Space I inhabit."

Observer Physics embraces the current state of modern physics with just a few modifications and greatly expands the vision of physics into the future. It also provides models for the experimental physicists to verify the theoretical principles and models provided in the discourse, with the caveat that experimental verification is nothing more than evidence that a particular belief or set of beliefs is true. Assertion of a particular belief does nothing to invalidate any other belief, except from the viewpoint of the belief in "invalidation". It is always possible to assert a belief and then marshal evidence that that belief is true, so long as you truly believe what you assert. In any case, if you truly believe something, not much is going to convince you otherwise.

With this material we have found a precisely defined direction for the string weavers and other supersymmetry theorists to apply their skills, and we can peer directly into the original Cosmic Boson particle of creation by probing deeply into the proton itself. This suggests not only experiments that can be done with high-energy proton colliders, but also subtler probing into the nuclear resonances. It also suggests an urgent need to study the detailed behavior of neutrinos and their oscillations. All the key oscillations should be carefully studied. The internal mapping of the proton-neutron structure will reveal the perfect balance of matter and antimatter in the universe. It will also reveal the secrets of high-energy dynamics and unlock the door to controlled use of mini black holes to resolve our energy needs and open up many new technologies.

We began by proposing that Observer Physics orients us in the direction of a new paradigm in physics. This is a belief. This belief is true in the Mental Space. And it is true in the World Space whenever and wherever the World accepts it as a paradigm. If someone believes it is science fiction, then in that person's World it will be science fiction or some other version of physics that the person believes in with certainty.

The paradigm of Observer Physics can lead to the development of new sources of

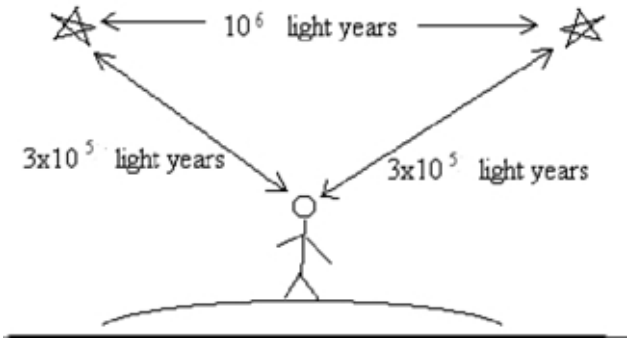
virtually unlimited "clean" energy and many other new technologies. Eventually it may give way to a new and broader paradigm. Study of the quantum energy windows for neutrino oscillations, the electron-positron system and for the proton-neutron oscillation system will lead us to the ability to deliberately shift particles back and forth between their mass phase state and their energy phase state. It will also lead to a clear understanding of the relationship of awareness and consciousness to all physical systems and to a full appreciation of the vital role of the Observer in the play and display of our wonderful physical universe.

Above all, Observer Physics will contribute to the evolution of a more enlightened planetary civilization.

Enjoy!!

Exercise: On a clear night go outside to a place where you have an unobstructed view of the sky. Select a faint star in some quadrant of the sky and put your attention on it. This star may be thousands of light years away. As you look at it, the retarded photons that strike your eye left that star thousands of years ago, or even millions of years ago, and traveled forward in time and across space to reach your eye. As you look at the star, your advanced attention particles travel backward in time and across space to reach the star where it was thousands of years ago. The huge space/time qwiff bubble thousands of light years in diameter pops when you observe each photon. Shift your attention to a different star located in a very different quadrant of the sky. Now you are popping qwiffs from a different star that is also many thousands of light years distant from you and much farther than that from the previous star you observed.

Your advanced attention particles travel at light speed backward in time to this new star you selected. In free space attention travels at c^*, and light travels at c. But your will is a phase wave that travels at the vastly superluminal Planck Velocity -- up to roughly 10^{42} m / s. In a moment you can decide to send attention particles to one star or another over vast ranges of space/time and into opposite ends of the universe. This is the phase wave quality of the will. You can make non-local quantum mechanical modifications to your universe on any scale of space or time by the exercise of your will.



An Observer Pops Very Large Qwiffs and Wills His Attention
To Range across the Universe at the Planck Velocity