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Canceling Gravity

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Abstract:

From General Relativity we know that gravity is the effect of spacetime curvature. To cancel gravity we therefore have to make spacetime 'flat' around a considered object.

The Schwartzchild spacetime interval gives:

$$\frac{\Delta t \text{ (Earth)}}{\Delta t \text{ (empty space)}} \approx 1 - \frac{G M}{\mathrm{R} c^2}$$

where t, G, M, R, c are the same as in the Physics literature. From this equation we see that for gravity cancellation we need to be concerned primarily with time, and time on Earth is less (runs slower) than time in empty space. This relative time difference is the essence of gravity. Space is the relative distance traveled in relative time.

As in Special Relativity relative time is calculated using a universal constant, the speed of light, we similarly must use another constant in nature to cancel gravity. That constant is electron *angular momentum,* or 'spin,' evaluated $h/(4\pi)$ where h is Planck's constant. From this expression we see that electron 'spin' is a universal constant.

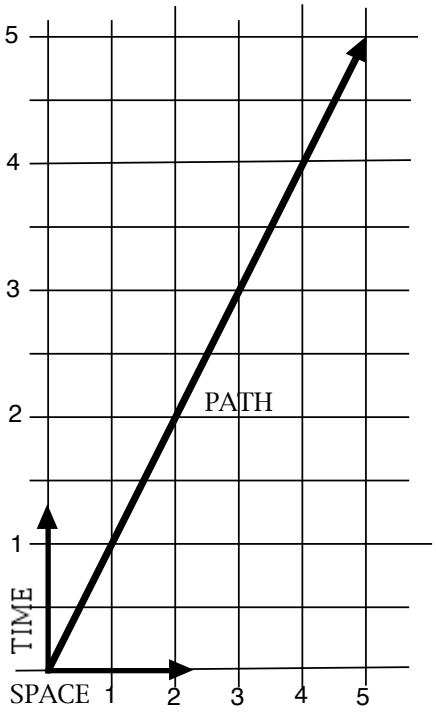
But the electron is a quantum particle with its 'spin' having no physical analogy to our macro world. Nevertheless, atomic particles *do* possess dipole magnetism. They *do behave* as spinning particles with magnetism the same as would an electrically charged, rotating steel ball. Although quantum 'spin' cannot be an actual physical rotation, if the macro property of rotation can analogously explain the magnetism and precession of a quantum particle there is reason to suspect the analogy can explain a possible macro property *as if* quantum 'spin' were a physical rotation. That macro result is *time dilation,* and the means for developing it is a *rotating* magnetic field.

Two 'spins' must therefore be considered: of the magnet and of the magnet electrons. When in opposite directions a relativistic time dilation effect separates the rotating magnet from the time regime of Earth. There is therefore a detachment between the two time regimes and levitation is achieved.

In addition, the device must also lose its energy of weight. This need for energy loss can be understood by analogy with a wheel rolling down an incline that takes longer to reach the bottom than if it slid. Part of the wheel's gravitational energy goes into rotation, leaving less for falling, whereas in sliding the total use of that energy is for falling. In the case of a levitating device *all* its gravitational energy must be lost by means other than falling. Because the energy of gravity is negative a gravity-canceling device is essentially a generator, with its generated energy lost by radiation.

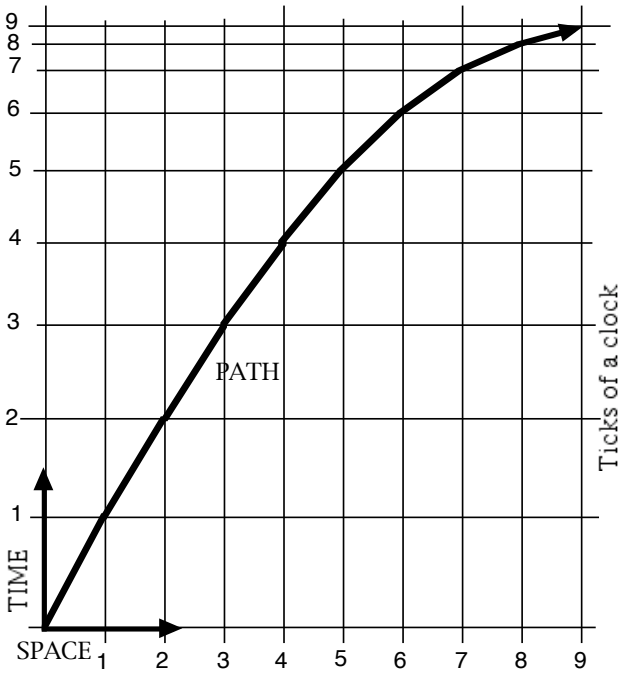
Theory:

General Relativity tells us that gravity is the effect of spacetime curvature. To cancel gravity we therefore have to make spacetime 'flat' around a considered object. The object would then experience the spacetime of empty space although immersed in the spacetime of Earth. How can such an artificial spacetime be created?



GRAPH A

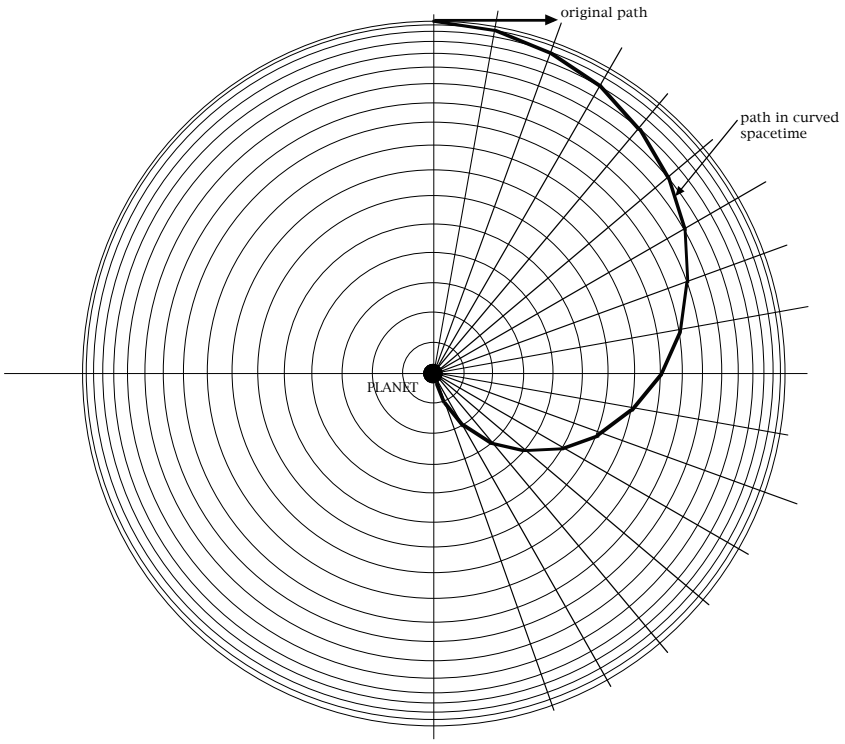
In empty space (flat spacetime) an object can continue on a straight path. At time 1 it is at position 1, at time 2 at poition 2 and so on in a straight line.



GRAPH B

The spacetime near a planet is curved. Increments of time expand near a region of dense mass-energy. An object thrown into the air must follow a curved trajectory.

We know from Special Relativity how relative space and time can be different between observers. We also learn how space and time are inseparable and to change one changes the other. Therefore to change spacetime we need only think about changing relative time. We cannot change relative time without changing relative space. Just as relative time and space are calculated with respect to the speed of light, which is a universal constant, we also must consider a universal constant to cancel gravity. In this case the constant is electron *angular momentum,* or 'spin,' evaluated $h/(4\pi)$ where h is Planck's constant. From the expression we see that electron 'spin' is a universal constant.



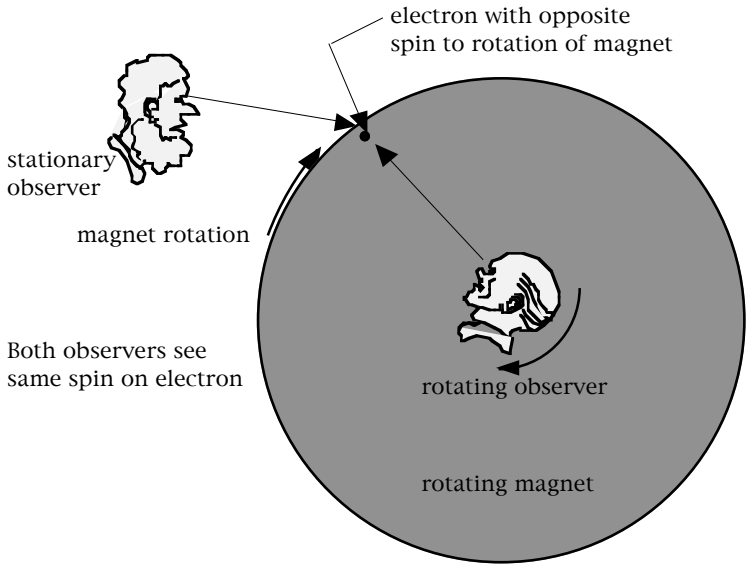
The concentric circles represemt time, the radial lines represemt space. Increments of time expand near the planet. As time slows the increments are delayed.

"A more accurate way of summarizing the lessons of General Relativity is that gravity does not *cause* time to run differently in different places (e.g., faster far from the earth than near it). Gravity *is* the unequable flow of time from place to place. It is not that there are two separate phenomena, namely gravity and time and that the one, gravity, affects the other. Rather the theory states that the phenomenon we usually ascribe to gravity are actually caused by time's flowing unequably from place to place." (Time, Gravity, and Quantum Mechanics, page 4 - Prof. W. G. Unruh, U. B. C.)

Of course, electron 'spin' is not an actual rotation, as the name implies, the electron being a quantum particle with its 'spin' having no physical analogy to our macro world. Nevertheless, atomic particles *do* possess dipole magnetism. They *do behave* as spinning particles with magnetism the same as would an electrically charged, rotating steel ball. The ball would have a magnetic north and south pole, and so do electrons due to their 'spin'. Atomic particles also display the property of *precession,* like a spinning top. It is this property of atomic protons that makes MRI scans possible. The theory presented here is therefore based on *observed behavior*. Although quantum 'spin' cannot be an actual physical rotation, if the macro property of rotation can analogously explain the magnetism and precession of a quantum particle there is reason to suspect the analogy can explain a possible macro property *as if* quantum 'spin' were a physical rotation. That macro result is *time dilation,* and the means for developing it is a *rotating* magnetic field although magnetism itself is *not* a universal constant.

Let us consider a magnetized disc with large face polarity. Its magnetization means that an abundance of unpaired electrons have their 'spins' all in the same direction. With rotation of the disc we would ordinarily expect an observer rotating with the disc to see a different 'spin' on the electrons than seen by a stationary ground observer, as

would happen with an ordinary object like a rotating steel ball attached to the disc. In that case we would expect the disc observer to see the rotation of the ball being faster or slower than seen by the ground observer, depending on whether the disc's rotation was with or against the ball's rotation. But in the case of electrons their 'spin' is a universal constant, like the speed of light. *Both* observers see the *same* electron 'spin' regardless of disc rotation. Something must be different between the observers and it would be *time,* the same as speeds close to the speed of light give relative time dilation explained in Special Relativity. If both electron and disc 'spins' are in the *same* direction the stationary ground observer sees time running faster relative to the disc observer, and if both 'spins' are in *opposite* directions the ground observer sees time running slower relative to the disc observer (see Appendix **A**), that is, to him the disc observer takes the relative position of empty space without gravity. For a levitating device we therefore want the 'spins' of electrons and disc in opposite directions. If the passage of time of the rotating disc observer is faster as seen by the stationary ground observer, the rotating disc observer would be in the spacetime of empty space although still immersed in the Earth's gravity. That observer would be free of Earth's gravity when in the same energy regime of the disc electrons. This is the hypothesis that must be tested.



A little further discussion will make this argument clear: Both observers are observing electron 'spin' from their respective positions. If they were observing a macro object, such as a rotating *ball* on the rotating disk, the angular momentum seen by each would be $L = I\omega$, where I is the moment of inertia and ω is the rotational speed of the ball, but L is not the same for each. Because the rotation of the disk must be subtracted from the ball rotation (assuming the rotations are opposite) $L_S < L_D$, where 'S' indicates the stationary observer and 'D' indicates the observer rotating with the disk. That is, $I_S\omega_S < I_D\omega_D$. From Physics in the case of a ball, $I = 2/3\ MR^2$, where M is the mass of the ball and R is its radius, each which does not change because of relative rotation. That leaves $\omega_S < \omega_D$. But what if $L_S = L_D$, as analogized in the case of electron angular momentum? That can only mean $\omega_S = \omega_D$. But we know that the angular distance θ seen by the sta-

tionary observer must be less than seen by the rotating observer, that is, $\Delta_S < \Delta_D$, and since $\Delta = \Delta t$:

$$\Delta_S t_S < \Delta_D t_D$$

$$\Delta \quad t_S < t_D$$

meaning that time for the 'stationary' observer is less than seen by the rotating disk observer, and the situation is the same as an observer on Earth compared to one in empty space. If the rotating observer is in the time regime of empty space, where more time passes than on Earth, he would be in the spacetime regime of empty space where gravity is zero.

If that were all there is to it, we would have discovered how to cancel gravity years ago. But it is not. With more time now experienced by the disc electrons they would now have the energy they would have in empty space, which is less than they had before disc rotation. To see this, let us put some hypothetical numbers to it. Let us suppose that for every 5 seconds that pass on Earth, 6 seconds pass in empty space. This means that *before* rotation the disc experiences 5 seconds, the same as everything else on Earth. Power equals energy per time (P = E/t), so if the energy E generated by the electrons on Earth is 100 Joules, the power P = 100/5 = 20 Watts. But with rotation the time experienced by the magnetic disc, due to the experiment's configuration, becomes 6 seconds, the same as in empty space. The power generated is now P = 100/6 = 16.7 Watts. This is 3.3 Watts less than it had when stationary, and that difference has to be burned off to make the magnetic disc equal to the energy regime of empty space. If that is done, then the rotating disc should shield everything immediately above it from the gravity of Earth.

We might think it strange that the simple act of shedding energy would shed weight, but this is well known in mechanics. If a wheel is placed on an incline and alternatively allowed to roll and then slide down the incline, in which case would it reach the bottom quicker? Would it make any difference if the wheel rolled or slid? Yes, it does. When rolling it takes longer than if it slid. The reason is that it is its energy of weight in rolling down the incline that makes it rotate. Rotation takes energy too, so the wheel has less for falling. In sliding all its energy of weight goes into reaching the bottom of the incline, and it arrives there faster. The difference in gravitational energy loss of the wheel between rolling and sliding exactly equals the energy it takes to rotate.

In the following equations the energy of weight is considered the difference in energy between the gravity of Earth and empty space: $\Delta E = -GMm/R - 0 = -GMm/R$ [where *G:* gravitational constant (Newton m^2/k_g^2); *M:* mass of Earth (k_g); *m:* mass of object to be levitated (k_g); R: radius of Earth (m). To be noted is that the kilogram (k_g), meter (m), second (sec) system is used for calculations. Some measurements are in inches (").] A levitating device must lose all this energy, but because gravitational energy is negative, $E_e - (-\Delta E) = E_e + \Delta E = E_o$ (where E_e: energy seen in empty space, or alternatively the rotating frame of reference, E_o: energy seen in a gravitational field, or in this experiment by the stationary observer), a levitation device seen from the ground is a *generator*. Because gravitational energy is negative its subtraction from the time regime of empty space means its addition as seen from the gravitational field in which the device

is immersed. It is that *generated* energy (from the time regime of the rotating electrons) that is *excess* energy over what the device would have in empty space, and must be *lost*. By losing that excess energy the device is left with the gravitational energy it would have in empty space, which is zero, although still in a gravity field. In effect the device would lose its energy of weight, and an object with no energy of weight has no weight.

An objection to any gravity canceling theory has always been that such a theory would unavoidably introduce perpetual motion, which is impossible. But this theory presents the intrinsic *need* for energy loss, with no force implied just as no force is implied in General Relativity. Energy loss is integral to this gravity canceling theory and therefore it cannot be said to contradict laws of established Physics for that reason. It may also be thought that no physically rotating system could have sufficient rotational speed to give the relative time difference sought, forgetting the accumulative effect of trillions of electrons. In the same way, to produce magnetism in a wire electrons only have to move at the pace of a walking man, not move at relativistic speeds, due to the vast number of electrons in the wire.

Canceling gravity is not easy because that energy is considerable. For example, substituting values from Physics, the gravitational energy of one kilogram of any mass is:

$$\frac{G\,M\,m}{R} = \frac{(6.67 \times 10^{-11})(5.98 \times 10^{24})(1)}{6.38 \times 10^{6}} = 6.25 \times 10^{7}\ \textit{Joules}$$

which is nearly twice the chemical energy in one kilogram of gasoline:

$$\frac{1.3 \times 10^{8}\ \textit{Joules}/\text{US gal}}{3.782\ \text{kg}/\text{US gal}} = 3.4 \times 10^{7}\ \textit{Joules}$$

Experiment:
Of interest, then, would be a proof-of-concept experiment to see if the energy loss requirement for gravity cancelation in fact gives that cancelation. Two cases are presented, the fist, Case **I**, is meant for experimental purposes only, whereas the second, Case **II**, describes the device that would be used commercially but involves an oscillator/inverter and radiation plates that are not needed for a simplified experiment. Due to the controversy gravity cancelation evokes, a proof-of-concept experiment will be the preferred first choice, but still involves a considerable cost because of the large number of light emitters required. But if successful there would be a much increased incentive to follow with the more practical Case **II**.

Case **I**: The magnetism of an experiment would not be from a single magnetized disc (page 4) but from discrete magnets available on the market. These can be visualized in a circular arrangement on a steel plate, free to rotate on each side of a horizontal copper plate armature, with their collective magnetic fields cut by the copper 'spokes' between slots in the armature. Important is that the magnets do the rotating, not the armature. With magnetic field B and magnetic field area A_B, in the time t by Faraday's Law the voltage V generated is:

$$V = -n\frac{\Delta B A_B}{\Delta t} \qquad \mathbf{1}$$

The negative sign is from Lenz's Law and plays no part in this theory. 'n' is the number of copper 'spokes' x number of magnet locations. Since all calculations begin from $t = 0$ the 'Δ' can be ignored[1] for simplicity of notation. Since power P = energy/time, the energy E generated is:

$$E = P\, t_C$$

where t_C = time per revolution of magnet plate rotation. Equating with the energy of weight (page 5):

$$\frac{G\, M\, m}{R} = P\, t_C$$

$$m = \left(\frac{R}{GM}\right) P\, t_C$$

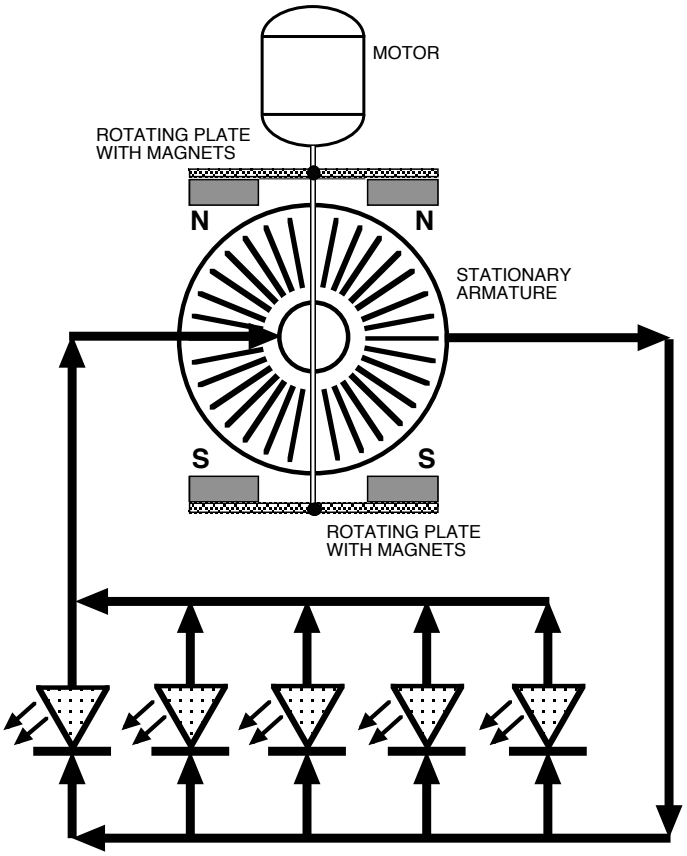
Substituting values (page 6);

$$m = \left(\frac{6.38 \times 10^{6}\ \text{m}}{(6.67 \times 10^{-11}\ \frac{\text{Newton m}^2}{\text{k}_g^2})(5.98 \times 10^{24}\ \text{k}_g)}\right) P\ \frac{\text{Newton m}}{\text{sec}} (t_C\ \text{sec})$$

$$m = \left(1.60 \times 10^{-8}\right) P\, t_C \quad \text{k}_g \qquad \mathbf{2}$$

[1] That is: $\Delta t = t_2 - t_1 = t_2$ since $t_1 = 0$.

With these few equations we can begin to develop a proof-of-concept experiment. In the Electrical Schematic below a copper armature is sandwiched between two rotating steel plates containing magnets. Important is that the lower face of each top magnet above the armature be N, the upper face of each bottom magnet below the armature be S, and the magnet bearing plates rotate in a *clockwise* direction seen from the top. This is a requirement due to the important relationship of rotation to electron 'spin'. Electron 'spin' is therefore opposite plate rotation as required. Current (shown here to be electron flow, not conventional positive current) in the armature, considering *magnet* movement (not armature movement), will be generated from its inner rim to its outer rim. This direction is desirable because of the smaller circumference of the inner rim that would build charge to impede current if flow were opposite. DC current is conducted to light emitting diodes (LEDs) to immediately radiate off the energy generated. Levitation is made possible by the source of energy in the alternate time of the rotating electrons being expended to equal the gravitational energy of that alternate time regime. Since an object has no energy of weight in empty space, its energy of weight while in a gravitational field must be lost. Since the LEDs are the interface between the two time regimes, they should be placed at the bottom-most part of the device to gravitationally isolate anything directly above them.



ELECTRICAL SCHEMATIC

In this experiment is assumed:

48 magnets, each 4" x 1" x 1", surface field: 4871 *Gauss,* which at distance 1/8" gives 0.148 *Tesla*. Since there are two magnets per magnet location, $B \approx 2 \times 0.148 = 0.296$ *Tesla*. These magnets have large face polarities, so that A_B = 4" x 1" = (0.1016)(0.0254) = 0.0026 m^2.

Slots in the armature are at 4° radial separation, giving 360°/ 4° = 90 slots and 90 copper 'spokes' cut in the armature for carrying current. Since there are 24 magnet locations, n = 24 x 90 = 2160.

Voltage to be generated is V = 24 *Volts*.

Therefore the RPM needed, from equation **1** is:

$$24 = 2160 \frac{(0.296)(0.0026)}{t_C}$$

$$= \frac{(1.662)}{t_C}$$

$$t_C = \frac{(1.662)}{24}$$

$$= 0.069 \text{ sec/rev or } 870 \text{ RPM}$$

The total resistance in the circuit is designed low $\approx 5.00 \times 10^{-6}$ *Ohms*. This would still give an insufficiently clear weight loss (1/4 lb.), but if the apparatus were given the temperature of liquid nitrogen, the electrical resistance of the copper would be lowered to $\rho_N = 7.89 \times 10^{-7}$ *Ohms*. Continuing with voltage V = 24 *Volts*, the power generated using the new resistance is, from Physics:

$$P = \frac{V^2}{\rho_N}$$

$$= \frac{24^2}{7.89 \times 10^{-7}}$$

$$= 7.30 \times 10^8 \text{ } Watts$$

Substituting into equation **2**:

$$m = -(1.60 \times 10^{-8})(7.30 \times 10^8)(0.069) = -0.81 \text{ } k_g \text{ or 1-3/4 lb.}$$

which is sufficient for a proof-of-concept result. For commercial devices much improved levitation is possible, described in Case **II**.

Assumed for the above proof-of-concept experiment was a voltage V = 24 *Volts* generated to accommodate market light emitters needed to burn off the generated energy. LEDs of 300 *Watts*, 24 *Volts* are available on the market, but required for the 7.30×10^8 *Watt* result are:

$$\frac{P}{300} = \frac{7.30 \times 10^8}{300} = 2.43 \times 10^6 \text{ LEDs}$$

that is: two and one half *million* LEDs! This is a minimum, which does not take efficiency into account. Assuming 60% efficiency, the total number of LEDs is 4.05×10^6 or well over four *million*. Here is another reason for experimenters never having discovered the relation between gravity and rotating magnetic fields, and also presents a limitation on this experiment.

Case **II**: Regardless of LED efficiency the enormous energy generated and the consequent exorbitant number of these devices required make them an impractical means of energy dissipation. Instead, radiation plates are required and of such size to handle the frequency that is dependent on the amount of power dissipated. The following example demonstrates the improved result over Case **I** of using liquid nitrogen cooled superconductors and the required radiation plates.

Case **I** restricted power generation to hold LEDs to a limited number for the experiment. With radiation plates the amount of radiation is unlimited and power generation need only be confined by design requirements. Its disadvantage is an oscillator/inverter needed for the large DC current converted to AC at high frequency.

The general outline of a *commercial* gravity-canceling device follows the same mentioned for the proof-of-concept experiment. The difference from Case **I** is that DC current is changed to AC by an inverter/oscillator and conducted to plates that serve as electromagnetic radiators, the same as a dipole antenna. Levitation is made possible by the source of energy in the alternate time of the rotating electrons being expended to equal the gravitational energy of empty space, which is zero. The radiation plates are the interface between the two time regions – between the rotating magnetic fields and gravity. They should therefore be placed at the lowest position of the device to gravitationally isolate anything immediately above them. In reaction to the rotation of the magnets these plates and the entire housing will rotate in the opposite direction from conservation of angular momentum.

In recent years other means than using metal conductors has become available with the discovery of 'high' temperature superconductivity, although at the present time multi-component commercial wire and tape are not perfect in this regard. Firms can now produce these commercially with the ability to conduct electricity with much reduced resistance at the temperature of liquid nitrogen, even in the presence of magnetic fields that normally destroy superconductivity.

For calculation, superconductor conductivity is taken to be 100 times the conductivity of gold: 100 $(4.10 \times 10^7) = 4.10 \times 10^9$ *Amp/Volt* m. Therefore, the superconductor current (i) is:

$$i = 4.10 \times 10^9 \text{ (}Amp/Volt\text{ m) V(}Volts\text{) } \square\text{(m)} \qquad \mathbf{3}$$

where ℓ is the length of superconductor tapes. These must span the length of a magnet, which is 4", so ℓ = 0.102 m. The same parameters: B = 0.296 *Tesla*, A_B = 0.0026 m^2, t_C = 0.069 sec/rev are the same as for the proof-of-concept experiment. With a width of approximately 1/8" each, n = 120 of these tapes at 3º radial separation can occupy the area of induction of what was the armature in the proof-of-concept experiment. Since there are 24 magnet locations and 120 strips, n = 2880. These strips substitute for the armature 'spokes' cut radially in the armature. From equation **1** the voltage generated is therefore:

$$V = 2880 \frac{(0.296)(0.0026)}{0.069}$$

$$= 32.1 \textit{ Volts}$$

From equation **3** the current generated is:

$$i = (4.10 \times 10^9) \textit{ Amps/Volt} \text{ m } (32.1) \textit{ Volts } (0.102) \text{ m}$$

$$= 1.34 \times 10^{10} \textit{ Amps}$$

From Physics the power generated is:

$$P = V i$$

$$= (32.1)\ (1.34 \times 10^{10})$$

$$= 4.30 \times 10^{11} \textit{ Watts}$$

Substituting into equation **2**:

$$m = (1.60 \times 10^{-8})(4.30 \times 10^{11})\ (0.069)$$

$$= 475 \text{ k}_g \quad (\approx 1050 \text{ lb})$$

This is for one superconductor tier. To levitate 2,800 k_g, for example, 2,800/475 = 5.9 or 6 tiers in electrical parallel are needed.

As mentioned, a major difficulty of Case **II** is the need for an oscillator/inverter to change DC to Ac using such high current. In electronics oscillators/inverters and antennae are common, but using minuscule current compared to what is needed for gravitational loss.

To be noted is that the same equipment and dimensions are used in the Case **II** development for superconductors as in the proof-of-concept experiment wherever possible, for comparison. These can change for a superior result, meaning the diameter of the device with a larger number of magnets, magnetic strength and speed of rotation. If and when commercial superconductors improve to allow even higher current than used here, there is virtually no limit on the gravitational mass (weight) loss to be achieved.

The following radiation formula:

$$f_P = (3.68 \times 10^5) \frac{i_P}{\sqrt{A_P}} \left[2 - \frac{1}{m^2} \right]^{1/4} \qquad \textbf{3}$$

gives frequency f_P delivered to the radiation plates, i_P is current delivered, A_P is the area of the plates and m is the mass to be levitated. To be noted is that equation **3** is valid only for $m > 0.707$ due to m in equation **2** having a negative value. See graph below.

We can find what frequency the 475 k_g loss would require using radiation plates. Assuming two semi-circular radiation plates of radius r_P = 10 m, their combined area is:

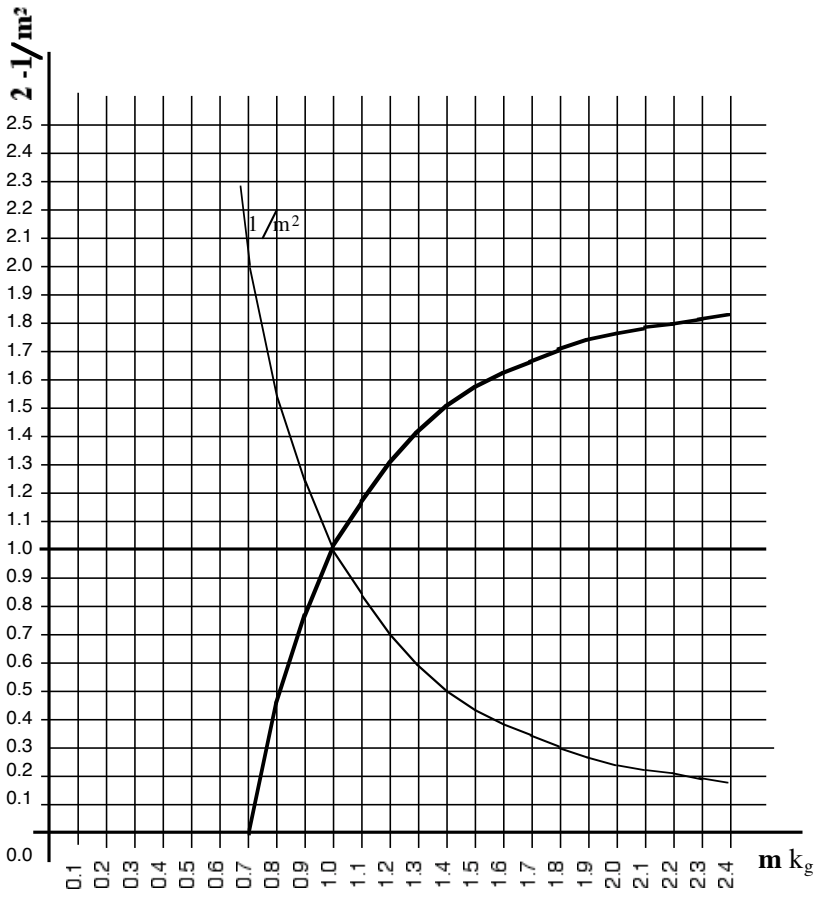
$A_P = \pi r_P^2 = \pi (10)^2 = 314.16$ m^2. The frequency required is therefore, using equation **3**:

$$f_P = (3.68 \times 10^5) \frac{1.34 \times 10^{10}}{\sqrt{314.16}} \left[2 - \frac{1}{475^2}\right]^{1/4}$$

$$= (2.78 \times 10^{14})\ (1.19)$$

$$= 3.31 \times 10^{14} \text{ cycles/sec}$$

This frequency is in the visible light range of the electromagnetic spectrum.



RADIATION PLATE FREQUENCY CHART FOR LOW *m*

Appendix A: DIRECTION OF MAGNET ROTATION

Let us imagine a wheel spinning on an arm, like a child's propeller toy, but with the arm also rotating. The planes of both rotations are parallel, that is, their mathematical normals are parallel but in opposite directions since the arm rotates in a direction opposite to the spin of the wheel. We consider the rate of spinning of the wheel from the point-of-view of two observers, one observer is stationary on the ground, the other observer is rotating with the arm. Obviously the two observers will not see the same rate of rotation on the wheel. Because the arm is rotating opposite the rotation of the wheel, its rotation must be subtracted from the wheel rotation as seen by the stationary ground observer. This is not true of the observer rotating with the arm, who will see the rotation of the wheel as if there were no arm rotation.

That would be the normal expectation. But suppose both observers see the *same* rate of rotation on the wheel. Something would have to be different between the two observers and that would be *time*. Using designations:

t_G : time seen by the ground observer
t_A : time seen by the arm observer
ω_A : arm rotational velocity
ω_W : wheel rotational velocity
θ_A : angular distance traveled by arm
θ_W : angular distance traveled by wheel

The time ratio between the ground and arm observers is as follows. Since $\theta = \omega t$:

$$t_G = \frac{\omega_W - \omega_A}{\omega_W}$$

$$= \frac{\omega_W t_A - \omega_A t_A}{\omega_W}$$

$$= t_A \left(\frac{\omega_A}{\omega_W} \right) t_A$$

$$= t_A \left[1 - \frac{\omega_A}{\omega_W} \right]$$

$$\frac{t_G}{t_A} = 1 - \frac{\omega_A}{\omega_W} \qquad \textbf{4}$$

To be noted in equation **4** is that time for the ground observer is less than time for the arm observer when wheel rotation is opposite arm rotation. This is the natural time relation between a gravity field and empty space. If both rotations were in the same direction it would be more.

Appendix B: $E_e = -MC^2$

Due to $1/c^2 \to 0$ the Schwarzchild spacetime interval can be abbreviated to:

$$(\Delta\tau)^2 = \left(1 - \frac{2GM}{Rc^2}\right)(\Delta t)^2$$

where *G:* gravitational constant, *M:* mass of a large object like Earth, *c:* speed of light, R*:* distance from the gravitational center of Earth, τ: time near Earth and *t:* time at a distance in space with little mass-energy. Although General Relativity describes gravity as a spacetime phenomenon the usefulness of time flow difference as its major component is apparent. This equation expressed:

$$\frac{\Delta\tau}{\Delta t} = \sqrt{1 - \frac{2GM}{Rc^2}}$$

with its square root binomially expanded becomes:

$$\left(1 - \frac{2GM}{Rc^2}\right)^{1/2} = 1 - \frac{GM}{Rc^2} - \frac{1}{2}\left(\frac{GM}{Rc^2}\right)^2 + \ldots$$

$$\frac{\Delta\tau}{\Delta t} \approx 1 - \frac{GM}{Rc^2}$$

That is, for Earth:

$$\frac{\Delta t\,(\text{Earth})}{\Delta t\,(\text{empty space})} \approx 1 - \frac{GM}{Rc^2} \qquad \mathbf{5}$$

To be noted from equation **5** is that time runs slower on Earth than in empty space.

Let us now consider Appendix **A** and make an analogy of the wheel and arm to electrons and plate. The electrons take the place of the wheel and the rotating plate containing the electrons takes the place of the rotating arm. In addition there is a magnetic field applied to the plate in such manner that it orients the 'spin' of its electrons in the opposite direction to plate rotation. Using designations:

t_0 : time seen by a stationary observer (sec)
t_e: time seen by an observer in a rotating frame of reference (sec)
ω_r: rotational velocity of the rotating frame of reference (rad/sec)
ω_e: electron property corresponding to rotational velocity (rad/sec)
m: mass, the weight of which is to be neutralized (kg)
E_o: gravitational energy seen by a stationary observer (joule)
E_e: gravitational energy seen by an observer in the rotating frame of reference (joule)

To be noted is that t_0 is analogous to t_G in the wheel example and t_e is analogous to t_A :

$$\frac{t_o}{t_e} \equiv \frac{t_G}{t_A}$$

For an object to achieve weightlessness, the ratio of time seen by a ground observer to time seen by an observer in the rotating frame must be the same as the ratio of time seen on Earth to that seen in empty space. That is, using equation **5**:

$$\frac{t_o}{t_e} = 1 - \frac{GM}{\mathrm{R}c^2} \qquad \textbf{6}$$

To be noted also is that ω_r is analogous to ω_A in the wheel example and ω_e is analogous to ω_W :

$$\frac{\omega_r}{\omega_e} \equiv \frac{\omega_A}{\omega_W}$$

Therefore, analogous to equation **4**:

$$\frac{t_o}{t_e} = 1 - \frac{\omega_r}{\omega_e} \qquad \textbf{7}$$

$$\therefore \quad 1 - \frac{\omega_r}{\omega_e} = 1 - \frac{GM}{\mathrm{R}c^2}$$

$$\frac{\omega_r}{\omega_e} = \frac{GM}{\mathrm{R}c^2} \qquad \textbf{8}$$

Time and energy are reciprocal, as in KE = 1/2 $L\omega$ = 1/2 $L(\theta/t)$. Therefore, equating the ratios of time and gravitational energy using equation **7**:

$$\frac{t_o}{t_e} = \frac{E_e}{E_o} = 1 - \frac{\omega_r}{\omega_e}$$

$$\therefore \quad \frac{E_o}{E_e} = \frac{1}{1 - \frac{\omega_r}{\omega_e}} \cong 1 + \frac{\omega_r}{\omega_e}$$

$$E_o = \left(1 + \frac{\omega_r}{\omega_e}\right) E_e$$

$$\therefore \quad \Delta E = E_o - E_e = \left(1 + \frac{\omega_r}{\omega_e}\right) E_e - E_e = \left(\frac{\omega_r}{\omega_e}\right) E_e \qquad \textbf{9}$$

For weightlessness an object in a gravity field must shed its energy of weight – *GMm*/R, and since this is the relative energy difference:

$$\Delta E = \left(\frac{\rho_r}{\rho_e}\right) E_e = -\frac{G M m}{\mathrm{R}}$$

Substituting equation **8**:

$$\left(\frac{G M}{\mathrm{R} c^2}\right) E_e = -\frac{G M m}{\mathrm{R}}$$

$$E_e = -mc^2 \qquad \textbf{10}$$

In other words, gravitational energy intrinsically (considering only mass and electromagnetism) is negative mass energy. This leads us to speculate that negative mass, which must have been created at the origin of the universe in equal amount to positive mass, does not exist in the universe today because it became the energy of gravity.

Appendix C: ENERGY OF MAGNETIC FIELD ≡ ENERGY OF GRAVITY

Of interest is to know whether the energy E_e generated by a rotating magnetic field is the same as the energy of gravity. Since electric current $i = V/r$, where V: voltage (*Volt*) and r: resistance (*Ohm*), from Physics the power generated is:

$$P = \frac{V^2}{r}$$

Substituting equation **1**:

$$P = \frac{\left(\frac{B\,A_B}{t}\right)^2}{r} = \frac{(B\,A_B)^2}{t^2\,r}$$

Since power = energy/time, the energy generated is:

$$E = \frac{(B\,A_B)^2}{t\,r}$$

In the reference frame of a ground observer this is:

$$E_o = \frac{(B\,A_B)^2}{t_o\,r} \qquad \textbf{11}$$

Remembering that $t_o \equiv \Delta t$ (Earth) and $t_e \equiv \Delta t$ (empty space), from equation **6**:

$$t_e = \frac{t_o}{1 - \frac{GM}{Rc^2}}$$

The energy seen from the rotating magnets considering equation **11** and relativistic symmetry is:

$$E_e = \frac{(B\,A_B)^2}{t_e\,r}$$

Substituting for t_e:

$$E_e = \frac{(B\,A_B)^2}{\left(\frac{t_o}{1 - \frac{GM}{Rc^2}}\right) r}$$

$$= \frac{(\mathrm{B}\,A_{\mathrm{B}})^2 \left(1 - \frac{GM}{Rc^2}\right)}{t_o\, r}$$

$$= \frac{(\mathrm{B}\,A_{\mathrm{B}})^2 - (\mathrm{B}\,A_{\mathrm{B}})^2 \left(\frac{GM}{Rc^2}\right)}{t_o\, r}$$

$$= \frac{(\mathrm{B}\,A_{\mathrm{B}})^2}{t_o\, r} - \frac{(\mathrm{B}\,A_{\mathrm{B}})^2}{t_o\, r}\left(\frac{GM}{Rc^2}\right)$$

or, using equations **8** and **11**: $$E_e = E_o - E_o \frac{\lambda_r}{\lambda_e}$$

We want to know the relative energy difference $\Delta E = E_o - E_e$, that is:

$$\Delta E = E_o - \left(E_o - E_o \frac{\lambda_r}{\lambda_e}\right)$$

$$= E_o \frac{\lambda_r}{\lambda_e}$$

or in the reference frame of the rotating magnets, considering relativistic symmetry once again, it is:

$$\Delta E = E_e \frac{\lambda_r}{\lambda_e}$$

which is the same evaluation as equation **9**. Since equation **9** was derived purely from the time ratio of equation **5** and the basic premise of this theory, the implication is that the energy generated by a rotating magnetic field is intrinsically the energy of gravity.

Personal Reflections:

Given the importance of canceling gravity during our space age we have to wonder why we hear so little about research into it, although billions are spent on rockets that can never make space access possible without enormous expense. The subject seems taboo, although the association of gravity with atomic particle 'spin' was discovered over forty years ago by experimenter Henry Wallace, described in his U.S. Patent #3626605 – "Method and Apparatus for Generating a Secondary Gravitational Force Field," awarded on Dec 14, 1971. In his experiments Wallace produced and measured a gravity field in materials with an odd number of nucleons when given high rotation. The effect is similar to the Barnett Effect in which a body of any substance given high rotation becomes magnetized. The effect is explainable from this gravity canceling-theory as it would be due to precession of the nucleons to give *positive* alignment with rotation of the material. What he found is the relationship of *all* atomic particle 'spin' to gravity, since the atomic 'spin' of all particles, whether protons, neutrons or electrons, is universally invariant and therefore capable of producing a gravitational time difference. In more recent years experimenters have discovered unexplained gravitational effects associated with rotating magnetic fields, disclosed in reports such as "Experimental Research of the Magnetic-Gravity Effects," by V. V. Roschin and S. M. Godin, Institute for High Temperatures, Russian Academy of Science. Other experimenters also have suspected a connection between rotating magnetic fields and gravity, with no theory to explain their findings because all theoretical effort has concentrated on the magnetic fields, which have only an indirect relationship to gravitation. The direct connection is in the time dilatation property of electron spin. That a civilization like ours, that can contemplate quantum computers, does not have the technology to neutralize gravity seems anomalous, although we have had a theory of gravity since 1916 in Einstein's General Theory of Relativity.

No doubt that anomaly can be partly explained by the cost of innovation and the natural conservatism of people reluctant to go beyond the next mountain. The Wright Brothers had the airplane invented in 1903 yet it did not become accepted until 1908, with unbelief and derision, including from the most scientifically educated of their time, filling those five years. It was not until World War I that the potential of the airplane was recognized. Frank Whittle is regarded as the father of the jet engine, receiving his first patent in January 1930, England, but could not get official support for its study and work due to the obstructionism of British scientists. That soon changed during WWII when it was found that Germany had invented the same. Marconi was told by the scientists of his day that radio waves could not be heard across the Atlantic at sea level. If anything, conventional scientists have been an *impediment* to technological progress.

A sad fact of human history is that *war* has given major impetus to invention, and the same could be true of a gravity-canceling device. The ability to cancel gravity on an object would provide the ultimate military "high ground" for surveillance and more. We would think that space companies would have the most reasonable incentive for developing gravity-canceling technology, but unfortunately they seem to have been afflicted with the same pessimism as 'experts' in the subject, so once again this advancement will probably follow the usual historical pattern.