Deflecting "Propagated Outward Flow"

<u>*INTRODUCTION*</u>

Because gravitation operates by a <u>flow</u> from the attract<u>ing</u> mass acting on the attract<u>ed</u> mass as shown in Section 7, it is possible by deflecting that flow to partially deflect gravitation away from an object so that the gravitational attraction on the object is reduced. That effect makes it possible to extract energy from the gravitational field, which makes the generation of *gravito-electric* power technologically feasible. Such plants would be similar to hydro-electric plants and would have the hydro-electric advantages of not needing fuel and not polluting the environment but, they are much less expensive and can be located anywhere, not needing special sites for dams.

Physically, the action of deflecting gravitational attraction, which of course is directed <u>toward</u> the gravitation source, produces an equal but opposite reaction on the deflecting mechanism directed <u>away</u> from the gravitation source. The result is the combination of reducing the gravitational attractive acceleration of the object toward the gravitation source plus the introducing of a reactive acceleration on the object away from the gravitation source.

For example, a deflector experiencing a natural gravitational acceleration, `A`, reduced by `100%` gravitation deflection to `0.5·A`, plus simultaneously experiencing the reaction to the `100%` deflection in the amount `1.0·A`, experiences a net acceleration acting in the direction <u>away</u> from the gravitation source of `1.0·A – 0.5·A = 0.5·A`. Of course, the `A` is the Newtonian gravitational acceleration `G·M/`$_{d2}$ where `M` and `d` are the mass of and distance to the gravitating source, for example the Sun, the Earth, or Mars.

Such a deflector, engineered with controlled adjustment of the amount and the direction of its action, could provide spacecraft launch levitation and deep space travel acceleration. It could provide both levitation and horizontal motion for a flying vehicle over a planet surface.

Just as the sail-driven ships of past centuries experienced fuel-free travel by means of controlling the energy of the wind, this technology enables fuel-free travel through space by controlled manipulation of the gravitational field that permeates all of space. It uses readily abundantly available materials and techniques and is ready now for research and engineering refinement.

THE PROPAGATED OUTWARD FLOW FROM ALL MATTER

The result of Sections 1 through 7 is that all matter is *Spherical-Centers-of-Oscillation* from which *Propagated Outward Flow* is continually taking place and which through its various interactions produces all of the physical effects that we experience, light and gravitation in particular for the present subject.

As pointed out in Section 2, when the original oscillation came into existence it did so in absolute nothing. The μ_0 and ε_0 of the *Propagated Outward Flow* were then part of that flow the only thing they could have come from and are so now. Each particle's outward *Propagated Outward Flow* contains its own μ_0 and ε_0.

That *Propagated Outward Flow* is an oscillatory wave of `[1 - cosine]` form. It carries and produces the effects of gravitation by its effect on propagation speed determined by the parameters μ and ε. It carries and produces the effects of light as a modulation of its oscillatory waveform. Both are carried by the same one *Propagated Outward Flow* oscillatory wave.

For *Spherical-Centers-of-Oscillation*, which propagate waves of oscillating flow the factors that determine the flow's speed of propagation are [like those of a transmission line] the time required to build up the flow amount for each oscillation cycle through each successive infinitesimal increment of the flow's μ_0 and to build up the flow's potential for each oscillation cycle on each successive infinitesimal increment of the flow's ε_0. The speed, radially outward, of its propagation, is c per equation `8-1`.

$$(8\text{-}1) \qquad \text{Speed} = c = \frac{1}{\sqrt{\mu_0 \cdot \varepsilon_0}}$$

Because the *Propagated Outward Flow* is radially outward its concentration is reduced inversely as the square of the distance from the source *Spherical-Center-of-Oscillation*. That progressively reduces the concentration of μ and ε in the flowing medium but it likewise reduces the magnitude of the flow and therefore the time required to build it up through each infinitesimal increment of the flow's μ and similarly for the flow's ε. As a result the inverse square dispersion does not affect the speed of flow.

Upon encountering another particle's flow the **a**rriving flow's μ_a and ε_a combine with the μ_e and ε_e in the **e**ncountered flow the $[\mu_a + \mu_e]$ and $[\varepsilon_a + \varepsilon_e]$ sums being larger values for the overall μ and ε. The result is that the encountered flow is slowed relative to its natural speed, equation `8-1`, and likewise the arriving flow.

That process changes the speed of flow because the amount of μ and ε is a scalar quantity so that the arriving and encountered quantities combine when co-located. But, the flow through each infinitesimal increment of the μ and the potential on each infinitesimal increment of the ε are vector quantities. Their time for vector build up through each infinitesimal increment of the combined flow's μ and ε are for the arriving and the encountered flows separate independent processes of each even though the scalar μ's and ε's combine and each flow must address that combination.

Unless an external event deflects it, each vector flow increment along its *Propagated Outward Flow* wave front periphery pursues its own radial outward propagation direction hedged-in by its flow increments next immediately on each side

while taking longer to build up flow and potential increments in the common greater μ and ε as $[\mu_a + \mu_e]$ and $[\varepsilon_a + \varepsilon_e]$.

Therefore *Propagated Outward Flow* from a *Spherical-Center-of-Oscillation* encountering another *Spherical-Center-of-Oscillation* and its *Propagated Outward Flow* operates to slow the propagation speed of both the flows. One body's gravitational flow can affect another body's gravitational flow. One body can change another body's gravitational affect on other body's.

DEFLECTION OF PROPAGATED FLOW

Light normally travels in a straight direction. But, when some effect slows a portion of the light wave front the direction of the light is deflected. In Figure 8-1 below, the shaded area propagates the arriving light at a slower velocity, v', than the original velocity, v, so that the direction of the wave front is deflected from its original direction.
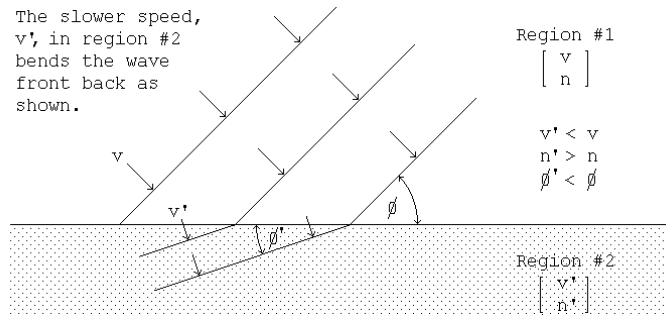

Figure 8-1
Deflection of Light's Direction by Slowing of Part of Its Wave Front

"Gravitational Lensing", Figure 8-2, is another example of slowing of part of a wave front resulting in curving or deflecting the direction of flow.
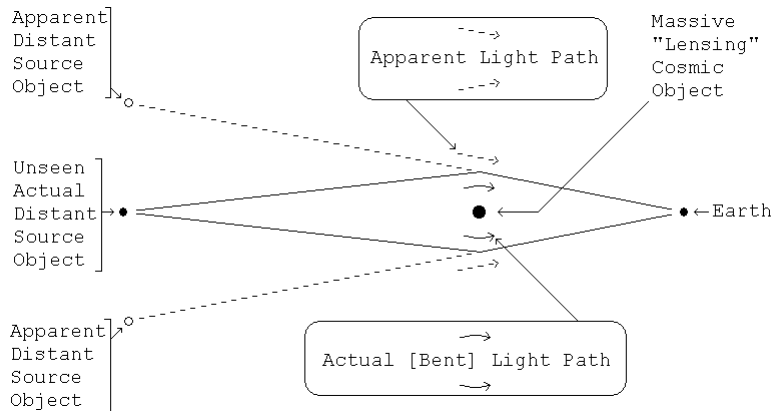

Figure 8-2
Gravitational Lensing Bending of Light Rays

"Gravitational lensing" is an astronomically observed effect in which light from a cosmic object too far distant to be directly observed from Earth becomes observable because a large cosmic mass [the "lens"], located between the Earth observers and that

173

distant object, deflects the light from the distant object as if focusing it, somewhat concentrating its light toward Earth enough for it to be observed from Earth.

The light rays are so bent because the inverse square reduction in the lensing object's *Propagated Outward Flow* slows more the portion of the incoming light's *Propagated Outward Flow* wave front that is nearer to the lens than it slows the farther away portion of the light wave front.

The same effect occurs on a much smaller scale in the diffraction of light at the two edges of a slit cut in a flat thin piece of opaque material as shown in Figure 8-3 below. The bending is greater near the edges of the slit because the slowing is greater there. The effect of the denser material in which the slit is cut slows the portion of the wave front that is nearer to it more than the portion of the wave front in the middle of the slit where there is only air.
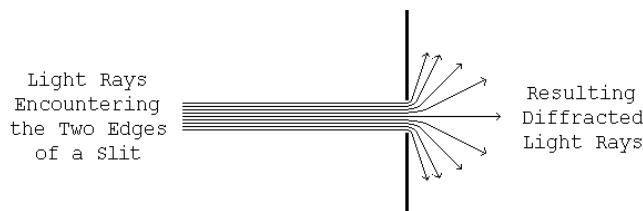

Figure 8-3
Diffraction at a Slit Causing Bending of Light Rays

In both of these cases, gravitational lensing and slit diffraction, the direction of the incoming *Propagated Outward Flow* wave front is changed because part of the wave front is slowed relative to the rest of it. In the case of gravitational lensing the part of the wave front nearer to the "massive lensing cosmic object" is slowed more. In the case of diffraction at a slit the part of the wave front nearer to the solid, opaque material in which the slit is cut is slowed more. Both effects are because each body's slowing-causing *Propagated Outward Flow* is reduced as the square of the distance from its source.

In the slit diffraction effect the role of the "massive lensing cosmic object" is performed by the individual atoms making up the opaque thin material in which the slit is cut. That shows that the gravitational lensing process, involving immense cosmic masses, can be implemented on Earth on a much smaller scale practical for human use.

Therefore, a properly configured material structure can deflect gravitation away from its natural action by deflecting the gravitation's *Propagated Outward Flow,* reducing the natural gravitation effect on objects that the gravitation would otherwise encounter and attract.

THE ENERGY ASPECT AND THE SOURCE OF THE FLOW

But, changing the "natural gravitation effect" means changing the gravitational potential energy of objects in the changed gravitational field. If the energy is changed where does the difference come from or go to ?

The potential energy for an object of mass, m, at a height, h, in a gravitational field is truly potential. It is the kinetic energy that the mass would acquire from being accelerated in the gravitational field if it were to fall.

While at rest at height h [as on a shelf] the total mass of the object is the same as its rest mass. The object has no actual "potential energy". It is merely in a situation

where it could acquire energy by falling in the gravitational field. Falling, the mass of the object increases as its velocity increases, reflecting its gradually acquired kinetic energy.

Since, <u>until it falls, the object does not have the energy that it will acquire when it falls</u> in the gravitational field <u>the energy that it acquires must come from the gravitational field during the fall</u>.

The energy of gravitational field is in its *Propagated Outward Flow* radially outward from all gravitational masses. The *Propagated Outward Flow* is a flow of the potential for energy, realized at any encounter with another mass

- That *Flow* creates potential energy, <u>creates the situation where kinetic energy could be acquired</u>, at any mass that it encounters.
- It does so continuously, replenished and replenishing by the on going continuous *Propagated Outward Flow*.
- It does so continuously, regardless of the number of masses or amount of mass that the *Propagated Outward Flow* encounters and regardless of their distance from the source of the *Flow*.

But, for there to be a continuous *Flow* outward from each mass particle, each must be a supply, a reservoir, of that medium which is flowing. That reservoir supplying the on-going continuous *Propagated Outward Flow* is presented in Book I, Section 2. The original supply of the *Flow* medium, of gravitational potential energy, came into existence at the beginning of the universe.

If that immense reservoir of energy could be tapped by tapping some of its appearance in its outward *Flow*, which is the gravitational field, it could be a vast supply of energy cheaply, cleanly, and permanently without [for practical human / Earth purposes] being used up.

[Since the "Big Bang" the *Propagated Outward Flow* has been gradually depleting the original supply. That process is an exponential decay. The time constant is about $\tau = 3.57532 \cdot 10^{17} \ sec \ (\approx 11.3373 \cdot 10^9 \ years)$].

TAPPING THE ENERGY OF THE GRAVITATIONAL FIELD

The general vertically upward *Propagated Outward Flow* of gravitational energy can be tapped by deflecting part of a local region's gravitational *Flow* away from its normal vertical direction. Figure 8-4 below (the slit diffraction of Figure 8-3 now rotated 90°) illustrates such deflection using a single slit.

Resulting Deflected Rays of
Flow of Gravitation

Slit →   ← Slit
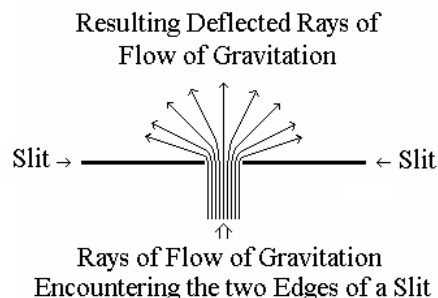
Rays of Flow of Gravitation
Encountering the two Edges of a Slit
Figure 8-4
Slit Diffraction, the Basic Element of a Gravitation Deflector

175

Multiple such slits parallel to each other would spread the deflection left and right in the figure. Additional multiple such slits at right angles to the first ones would spread the deflection over a significant area.

GRAVITATION DEFLECTOR DESIGN CONCEPT

The edges of the slit in the above Figure 8-4 are actually rows of atoms. A cubic crystal, such as of Silicon, consists of such rows of atoms, multiple straight line rows and rows at right angles, all equally spaced – a naturally occurring configuration of the set of slits required for deflection of gravitation. (The atoms are at the corners of the cubes; the lines, not natural, indicate the cubic structure.)
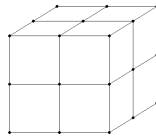

Figure 8-5
A Small Piece of a Cubic Crystal

The *Flow* from each of the cubic crystal's atoms is radially outward. Therefore its concentration falls off as the square of distance from the atom. The amount of slowing of an incoming gravitational *Flow,* and therefore the amount of its resulting deflection, depends on the relative concentrations of the atoms' *Flow* and the overall gravitational *Flow*.

In the case of diffraction of the *Flow* of light at a slit the concentration of the *Flow* from the atoms of the slit material is comparable to the concentration in the horizontal *Flow* of the light, because it originates from a local source, not from the Earth's immense gravitation.

But for the *Flow* from the atoms of the slit to deflect the much more concentrated vertically upward *Flow* of Earth's gravitation the *Flow* from the atoms of the slit must also be much more concentrated. The only way to achieve that more concentrated *Flow* is a configuration in which the *Flow* of Earth's gravitation is forced to pass much closer to the atoms of the slit so that, per the inverse square variation in the atoms' *Propagated Outward Flow*, the *Flow* of Earth's gravitation will pass through a concentration of the slit atom's *Flow* comparable to the concentration in the Earth's gravitational *Flow*.

The spacing between the edges of the diffracting slit [Figure 8-4] is about $5 \cdot 10^{-6}$ `meters`. The spacing of the atoms at the corners of the "cubes" in a Silicon cubic crystal is $5.4 \cdot 10^{-10}$ `meters`. An inter-atomic spacing of less than $3 \cdot 10^{-19}$ `meters`, much closer than the natural spacing in the Silicon cubic crystal, is required to obtain deflection of a major portion of the incoming Earth's gravitational *Flow,* per Appendix E, Relative *Propagated Outward Flow* Concentrations.

Such a close atomic spacing cannot be obtained by directly arranging for, or finding a material that has, such a close atomic spacing. However, that close an atomic spacing can be effectively produced relative to just the vertical *Flow* of gravitation by slightly tilting the Silicon cubic crystal's cubic structure relative to the vertical.

Figure 8-6 on the following page illustrates the tilting, schematically not to scale, and shows how it increases the number of crystal atoms closely encountered by the upward gravitational *Flow*.

By appropriate tilting of the cubic structure each of its $5.4 \cdot 10^{-10}$ `meters` inter-atomic spacing is effectively sub-divided into 10^{10} "sub-spaces" each of them $5.4 \cdot 10^{-20}$ `meters` long and with an atom in each. A 4.5 `mm` shim on a 30 `cm` diameter Silicon cubic crystal ingot produces such an effect, producing a tilt `tangent = 0.015` for a `tilt angle = 0.86°` that produces the objective effective sub-division of the crystals' natural inter-atomic spacing, a sub-division that acts only on vertical *Flow*, as of gravitation.
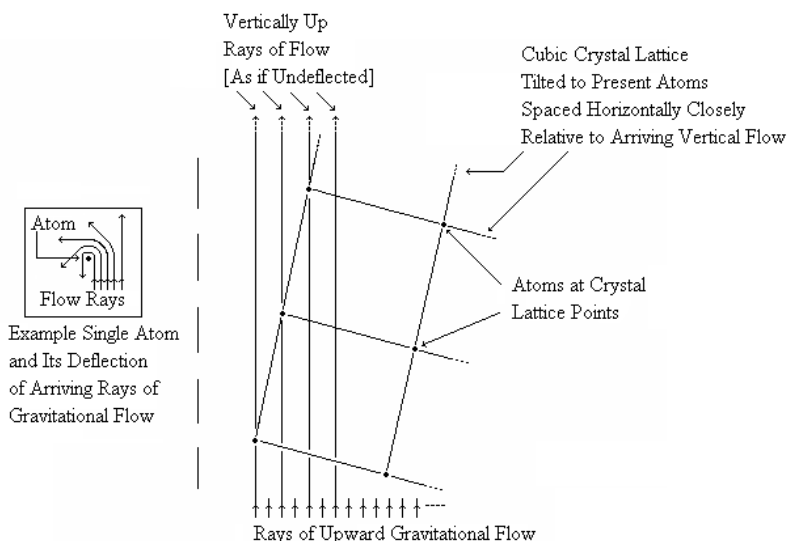

Figure 8-6
Cubic Crystal Lattice Tilted for Effective Gravitational Flow Deflection

Pure, monolithic, Silicon cubic crystals up to 30 `cm` in diameter are grown for making the "chips" used in many electronic devices. The gravitation deflector requires a large, thick piece of Silicon cubic crystal rather than the thin wafers sawed from the "mother" crystal for "chip" making.

Mean free path [`MFP`] is the average straight line distance a moving particle travels between encounters with another particle. For atoms in solid matter the mean free path is

(8-2) $$\text{MFP} = \frac{1}{[\text{Atoms Per Unit Volume}] \cdot [\text{Atom Cross Section Area}]}$$

For the Earth the atoms per unit volume is on the order of

`Atoms per Unit Volume = 5·10`^{28} ` per cubic meter.`

In the cubic crystal deflector the atomic spacing produced by the tilt is about 10^{-20} `meters`. Each therefore has cross sectional space available to it of that of a circle of that diameter so that for this purpose the atom's cross section area is

`Atom Cross Section Area = `$^{\pi}/_4 \cdot [10^{-20}]^2$
$$= 8 \cdot 10^{-39} \text{ meter}^2$$

For targets as fine as those in the cubic crystal deflector, the mean free path in the Earth's outer layers is, therefore

`MFP = 2.5·10`^{9} ` meters`

177

The mean free path in the thick minutely tilted Silicon cubic crystal ingot for intercepting Earth's natural <u>vertical</u>ly outward gravitation is ½ the thickness of the ingot. For a `50 cm = 0.5` m thick ingot the gravitation deflector is about 10^{10} times more effective than the natural Earth at intercepting Earth's natural gravitation. However, that effectiveness is only for vertical rays of *Flow*. The Silicon crystal's mean free path for non-vertical *Flow* – *Flow* already once deflected within the crystal – is that of Earth, $2.5 \cdot 10^9$ `meters,` which takes the once-deflected *Flow* out of the crystal.

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