SECTION 10

Cubic Crystal Deflector Calculations

A CUBIC CRYSTAL DEFLECTOR

A small portion of a Silicon cubic crystal is depicted below.

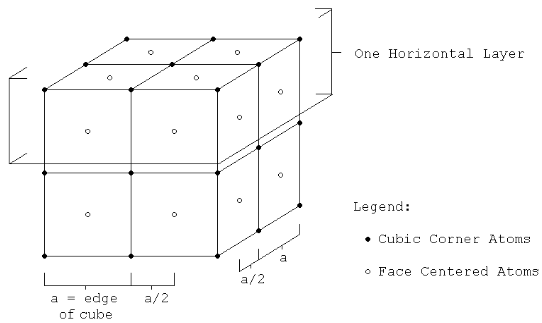

Figure 10-4
A Silicon Cubic Crystal

In the Silicon cubic crystal the edge of the cube, a, is $5.4 \cdot 10^{-10}$ *meters*. The effective horizontal interatomic spacing for vertically upward traveling *Flow* is half the edge, $a/2 = 2.7 \cdot 10^{-10}$ *meters*. From the figure the vertical layer thickness is $a = 5.4 \cdot 10^{-10}$.

The edges of the slit that produces the light diffraction pattern of Figures 9-1 and 9-2 on which the Section 9 analysis of Flow deflection is based consist of atoms spaced along the slit edge at an interatomic spacing that is essentially the same as a cubic crystal's interatomic spacing, about $2.7 \cdot 10^{-10}$ *meter*. The only difference between the light diffraction $5.4 \cdot 10^{-6}$ *meter* wide slit and a cubic crystal's interatomic spacing is that in the cubic crystal the "slit" width is that same interatomic spacing, about $2.7 \cdot 10^{-10}$ *meter*.

The diffraction pattern of Figures 9-1 and 9-2 is determined by the edges of the slit. The edges are the limit of the "slice" of incident light that passes through the slit and the light at those edges is the most deflected because it is the nearest to the deflecting atoms of the slit edge. Similarly, the edges jointly define the mid point of the diffraction pattern which is where the action of the two edges are equally strong so that their deflecting effects cancel each other to no net deflection.

In the cubic crystal those defining points are only apart $2.7 \cdot 10^{-10}$ *meter* as compared to $5.4 \cdot 10^{-6}$ *meter* apart in the case of the slit. The calculations of equations 9-1 through 9-5 must be re-calculated for that $2.7 \cdot 10^{-10}$ *meter* slit. That requires evaluating γ for its Cauchy-Lorentz Distribution. That is the same as in equation 9-2 except that the value of the slit width is changed to $2.7 \cdot 10^{-10}$ *meter*. The result is equation *9-2'*.

$$(9\text{-}2')\quad \gamma' = [74\%\ \text{of}]\big[[\text{slit width}]\cdot \text{Tan}[4.39^\circ]\big]$$

$$= [0.74]\cdot[\,2.7\cdot 10^{-10}\ \text{meter}]\cdot[0.077]$$

$$= 1.5\cdot 10^{-11}\ \text{meter}$$

Calculating the portion, P, of the total amount of the incident *Flow* entering that slit that is deflected through $\Theta = -45^\circ$ to the left of the mid point of the diffraction pattern and its Cauchy-Lorentz Distribution using $\gamma = 1.5\cdot 10^{-11}$ meter per equation *9-2'* is as follows.

1 – Calculate the displacement, d, of Figure 9-3.

$$(9\text{-}4')\quad d = \text{Tan}[\Theta] \times [\text{slit width}]$$

$$= \text{Tan}[-45^\circ] \times [2.7\cdot 10^{-10}]$$

$$= -2.7\cdot 10^{-10}\quad [\text{this example of } \Theta = -45^\circ]$$

2 – Calculate $P = f_{cum}(d;mid,\gamma)$ from equation 9-3.

$$(9\text{-}5')\quad P = f_{cum}(d;mid,\gamma) = \frac{1}{\pi}\cdot \arctan\left[\frac{d - mid}{\gamma}\right] + \frac{1}{2}$$

$$= \frac{1}{\pi}\cdot \arctan\left[\frac{(-2.7\cdot 10^{-10}) - (0)}{1.5\cdot 10^{-11}}\right] + \frac{1}{2}$$

$$= 0.018$$

Again the portion of the total Flow flux that is deflected by $\Theta = 45^\circ$ or more is $P_{45} = 1.8\% + 1.8\% = 3.6\%$. The result is unchanged from that in the case of the $5.4\cdot 10^{-6}$ *meter* slit. The reason for that is that the parameters of the Cauchy-Lorentz Distribution describing the deflected Flow amounts in the various directions of deflection are determined by the two opposed slit edges. Contracting their spacing correspondingly contracts the distribution.

Now for the 1.8% on each side of the Cauchy-Lorentz Distribution to pass its deflecting atom within a distance equal to 1.8% of the slit width, the new value of that distance is the value for the cubic crystal slit, $[0.018 \times (2.7\cdot 10^{-10}) = 4.9\cdot 10^{-12}$ *meter*]. If it could be arranged that all of the vertically upward Flow gravitational flux were to pass within that close a distance of an atom of the cubic crystal lattice, then 100% of the gravitational flux should be deflected by 45° or more.

EARTH'S GRAVITATION VS. A SURFACE LIGHT SOURCE

However the light-and-slit analysis deflections and calculations in Section 3 were for light traveling in the Flow flux density generated by the Earth surface light source not the much more concentrated Earth overall gravitational Flow outward flux. The deflections and calculations for diffraction of light as developed in Section 3 must be adjusted to compete at the level of Earth gravitational Flow flux rather than at that of an Earth surface light source if there is to be a noticeable deflecting affect on Earth gravitation.

Appendix A is a detailed calculation of the relative gravitational strengths of natural objects at the Earth's surface and the Earth's surface overall planetary gravitation. The ratio of the Earth's surface gravitational acceleration, $9.8\ ^m/_{sec^2}$, to, from Table A-8 of Appendix A, the gravitational acceleration of air, $4.81 \times 10^{-17}\ ^m/_{sec^2}$, is about $2 \cdot 10^{17}$. From that table, the gravitational acceleration of metals is on the order of $10^{-14}\ ^m/_{sec^2}$ as compared to the Earth's overall gravitational acceleration of about $9.8\ ^m/_{sec^2}$ for a ratio of about 10^{15}. Consequently, the flux actually carrying the light [generated by a metallic light source] and entering the slit is the dominant factor not ambient air.

The Flow fluxes are proportional to the acceleration that they produce. The ratio of the accelerations, which is the ratio of the Flow fluxes, is as given in equation 10-1, below.

$$(10\text{-}1) \quad \text{Ratio} = \frac{\text{Acceleration of Earth Gravity}}{\text{Acceleration of Diffracted Light Flows}} = \frac{\text{Earth Gravity Flows Flux}}{\text{Slit Diffracted Light Flows Flux}} \approx 10^{15}$$

Therefore the Flow concentration which all vertical rays of gravitational Flow flux must be forced to encounter by being forced to pass close to the cubic crystal's atoms must for this purpose be made 10^{15} times greater. The gravitational Flow flux must be forced to pass accordingly even closer to the cubic crystal's atoms.

However, the Flow concentration from the atoms is inverse-square reduced with distance from the atom and accordingly so increases with nearness to the atom. Consequently, to increase the concentration by a factor of 10^{15} requires reducing the separation distance by a factor of only the square root of that, about $3.2 \cdot 10^{7}$.

The earlier above found effective interatomic spacing to be forced by tilting the cubic crystal, $2 \times [4.9 \cdot 10^{-12}] = 9.8 \cdot 10^{-12}$ *meter*, must now be that divided by $3.2 \cdot 10^{7}$ the result for which is $3 \cdot 10^{-19}$ *meter*. That arrangement, arranging that all of the Flow gravitational flux must, at some layer, pass within $3 \cdot 10^{-19}$ *meter* of an atom of the cubic crystal will result in essentially 100% of the gravitational Flow flux passing so close to some atom that it should be deflected by 45° or more..

With the cubic crystal's natural interatomic spacing being $2.7 \cdot 10^{-10}$ *meter* and the effective spacing to be forced is $3 \cdot 10^{-19}$ *meter* then each natural interatomic space must be sub-divided into $9 \cdot 10^{8}$ "pieces". If the crystal is tilted such that each of the layers of the crystal lattice is located offset from the layer below it by $[^1/_{9 \cdot 10^8}] \cdot [2.7 \cdot 10^{-10}] = 3 \cdot 10^{-19}$ *meter* in each of the two horizontal directions of the orientation of the lattice then the objective is met.

The direct implementation of that would require a tilt at an angle whose tangent is the offset divided by the interatomic [layer-to-layer] spacing, $[3 \cdot 10^{-19}] \div [5.4 \cdot 10^{-10}] = 5.6 \cdot 10^{-10}$, an angle of about $6.4 \cdot 10^{-8\,\circ}$. That means that the tilt causes each successive layer to offer its atoms a further $3 \cdot 10^{-19}$ *meter* offset so that enough layers will produce offering the atoms at every $3 \cdot 10^{-19}$ *meter* increment in each $2.7 \cdot 10^{-10}$ *meter* horizontal interatomic space. See Figure 10-5, next page.

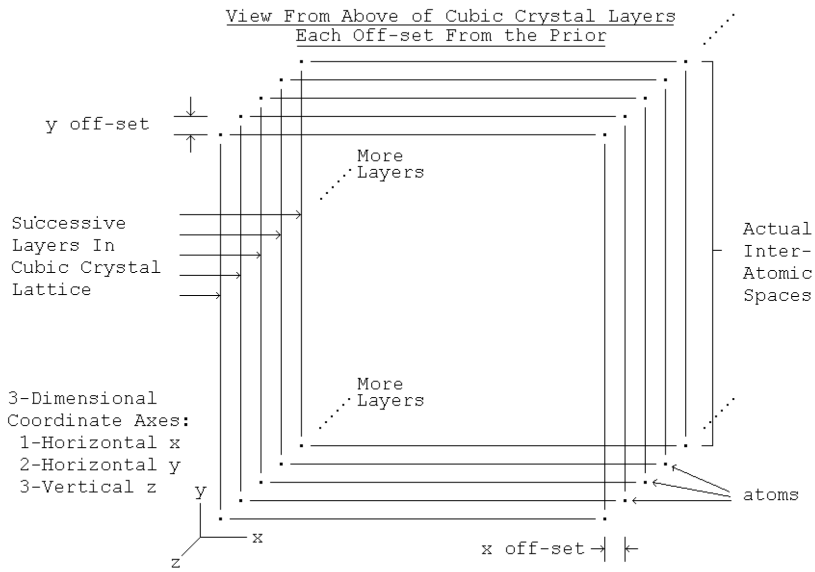

Figure 10-5
Crystal Layers, Offset Slightly, Achieving Effective Close Interatomic Spacing
[The z-axis is vertical. The x- and y-axes are in layers.]
[Not to Scale.]

The required number of layers is one layer for each of the $9 \cdot 10^8$ "pieces" into which each $2.7 \cdot 10^{-10}$ meter horizontal interatomic space is divided: $9 \cdot 10^8$ layers.

Such a fine tilt angle and its precision are unlikely if not impossible to set up. The solution to that is that the successive layers need not each supply the minute offset relative to their adjacent layers. If the layers as depicted in Figure 10-5, above, were shuffled into any order whatsoever, they would still have the same effect that no vertical ray could avoid passing within $3 \cdot 10^{-19}$ meter of an atom, some atom, not necessarily one in the immediately next layer.

Of course, the layers in the cubic crystal cannot be shuffled or re-arranged, but that is not necessary. All that is necessary to operate using a larger tilt angle is that the same sufficient number of layers overall be employed and that the tilt be such ["workable tilt"] that the actual *x-axis offset* and the actual *y-axis offset* be such that, after that "same sufficient number of layers overall", each required effective atomic position appears somewhere, in some layer, even though not necessarily in "sequential order".

"Unworkable tilts" are those that duplicate needed atomic positions or that fail to produce all needed atomic positions, or both. The problem of what successfully workable tilts are and how they relate to unworkable tilts is developed in Appendix B, Factors Affecting Crystal Tilt.

The number of layers required, $9 \cdot 10^8$, requires a cubic crystal thickness of that number of layers multiplied by the individual layer thickness, which is $9 \cdot 10^8 \times 5.4 \cdot 10^{-10} = 0.50$ meters or 50 cm.

Each "slit" in the cubic crystal is a pair of atoms spaced apart horizontally by the crystal lattice interatomic spacing of $2.7 \cdot 10^{-10}$ meter; or, more precisely, each "slit" is a linear "string" of such atom pairs, in any single layer of the crystal, and running from one side to the other of the crystal just as the slit edges in the case of light diffraction by a slit is a linear "string" of the atoms of which the slit edge consists.

For each such $2.7 \cdot 10^{-10}$ meter wide "slit" the above tilt procedure implements arranging that out of all of that portion of the total gravitational Flow flux that passes through it, the $1/9 \cdot 10^8$ or $1.1 \cdot 10^{-7}\%$ on either side, a total of $2.2 \cdot 10^{-7}\%$, passes within $3 \cdot 10^{-19}$ meter of an atom of the cubic crystal lattice and will be deflected by $45°$ or more away from its pre-deflection vertically upward direction. That leaves the issue of what happens to the balance of the gravitational Flow flux entering each such "slit".

The Flow propagation of each such atom falls off in concentration inversely as the square of the distance from it. The $3 \cdot 10^{-19}$ meter closeness is required to obtain the $45°$ deflection. Of the total gravitational Flow flux entering that slit, at ten times farther away from an atom, $3 \cdot 10^{-18}$ meter, the concentration is reduced by a factor of $[1/10]^2 = 1/100$. There the angle of deflection is reduced by approximately that factor to about $0.45°$. That deflection is experienced by about $1.1 \cdot 10^{-6}\%$ on either side out of the total gravitational Flow flux that passes through the "slit", a total of $2.2 \cdot 10^{-6}\%$.

Still farther away, at $3 \cdot 10^{-17}$ meter from an atom, the concentration is reduced by a factor of $[1/100]^2 = 1/10{,}000$. There the angle of deflection is reduced by approximately that factor to about $0.0045°$ and applies to about $2.2 \cdot 10^{-5}\%$.

Thus far more than 99% of the total Flow flux entering the "slit" experiences negligible deflection. That is, until layer-by-layer in the crystal lattice further portions having earlier experienced that negligible deflection then experience the "$3 \cdot 10^{-19}$ meter" condition until, eventually, all of the Flow flux experiences the "$3 \cdot 10^{-19}$ meter" condition and is deflected by $45°$ or more.

Returning to the mean free path analysis at equation 1-2 it is now found to be the case that the target interatomic spacing to be achieved by the tilt of the cubic crystal is $3 \cdot 10^{-19}$ meters instead of 10^{-18} meters. The mean free path in the Earth for that same $3 \cdot 10^{-19}$ meters target size then is calculated as follows.

$$(10\text{-}2) \quad MFP = 1/C \cdot A = \frac{1}{[C, \text{Atoms Per Unit Volume}] \times [A, \text{Atom Cross Section Area}]}$$

For the Earth the concentration of atoms is on the order of $C = 5 \cdot 10^{28}$ per cubic meter. In the cubic crystal deflector the target spacing achieved by the tilt is $3 \cdot 10^{-19}$ meters. Each target has cross sectional area space available to it equal to a circle of that diameter so that

$$(10\text{-}3) \quad A = \pi/4 \cdot [3 \cdot 10^{-19}]^2 = 7.1 \cdot 10^{-38} \text{ meter}^2$$

and, for such targets the mean free path per equation *1-2* in the Earth's outer layers is

(10-4) $MFP = 2.8 \cdot 10^8$ meters.

That is to be compared to the mean free path in the cubic crystal deflector being one-half the cubic crystal thickness of *0.50 meters* or *0.25 meters*.

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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