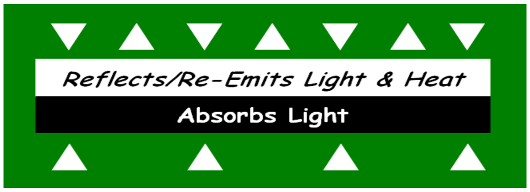
Light Pressure Device!!!

Incredibly, many researchers *still* insist that the Casimir Force is nothing more than Van der Waals Attraction Forces between the two surfaces; this is despite the fact that the now-experimentally-verified values were *originally* **predicted** from calculating a Lorentz-Invariant Electromagnetic Frequency Distribution for the Quantum Flux!!! Therefore, I am proposing a new method of directly measuring the Energy Density of the Quantum Flux *without* using the two parallel surfaces of conventional Casimir-Effect Experiments. One side of a plate will *reflect* the 5-15nm wavelengths of the Quantum Flux at grazing angles of incidence between 0 and 15-degrees.) The opposite side will absorb these wavelengths with minimal reflection or transmission. As with Nichols Radiometer, a perfect reflection would impart twice as much momentum as perfect absorption--not that anything about this experiment is going to be perfect!

At first glance it appears impossible to utilize the vast energy of the Zero-Point Energy Field. Why? One highly descriptive name for the Quantum Flux is *light-pressure.* The photons of the Quantum Flux exert many tons of light-pressure on us all the time; indeed, they *constantly* move objects back and forth and here and there, one photon-collision at a time; however, since this pressure is equal in all directions, all of these forces ***seem*** to add up to zero ***net*** force; fortunately, things are not always as they *seem ! ! !*

In principle, the quantum-pressure of the photons of the Zero-Point Energy Field (ZPE) can impart up to twice as much ***momentum*** to one side of a solitary *macroscopic* object as to its opposite side---despite the fact that the quantum pressure is the *same* on *both* sides! This is possible because the material on one side of an isolated object can be engineered so that it primarily *reflects* the photons of the Quantum Flux while the material on its other side primarily *absorbs* them. In other words, one side experiences *elastic* collisions with these photons while its opposite side experiences *inelastic* collisions with these photons. This results in a net Quantum Light-Pressure Force that acts on a single *isolated* **macroscopic** object! Nichols Radiometer is a well-known example of a light-pressure device. It demonstrates light-pressure using visible light. (Not to be confused with Crookes Radiometer which actually works on a weird kind of convection that only takes place in a partial vacuum!)



nm	PSI	nm	PSI	nm	PSI	nm	PSI
1	191,676	14	4.989	27	0.5777	40	0.1023
2	11,980	15	3.786	28	0.4907	41	0.09192
3	2366.37	16	2.925	29	0.4194	42	0.08285
4	748.73	17	4.989	30	0.3607	43	0.07487
5	306.68	18	3.786	31	0.3118	44	0.06783
6	147.9	19	2.925	32	0.2710	45	0.06160
7	79.83	20	2.295	33	0.2366	46	0.05607
8	46.80	21	1.826	34	0.2075	47	0.03928
9	29.21	22	1.471	35	0.1828	48	0.03611
10	19.17	23	1.198	36	0.1616	49	0.03325
11	13.09	24	0.9856	37	0.1434	50	0.03067
12	9.24	25	0.8182	38	0.1277	51	0.02833
13	6.71	26	0.6849	39	0.1141	52	0.02622

“d” in meters, P in Pa

P = 1.30 X 10^(-27) / 2*d^(-4)

The Light-Pressure phenomenon has been independently repeated and published in peer-reviewed journals and even in most standard Physics textbooks. Astronomers have found that it changes the course of Asteroids and NASA has found that it even wreaks havoc with geostationary satellites that refuse to remain so!!!

We may potentially produce very large forces from macroscopic arrays with nanoscopic features that exploit wavelengths close to 10 nm or less! The table on the left, shows these pressures in ***pounds per square inch.*** For example, at 6 nm we see a value of 148 psi. This is the total quantum pressure that is attributable to all wavelengths that are greater than or equal to 6 nm

To determine the light pressure that is attributable to just those wavelengths that include some range of wavelengths —say 9 nm and ten nm and every wavelength in between: We simply subtract the pressure value for 10 nm and above, from the (larger) pressure value for 9 nm and above:

29 – 19 = 10 psi

Material constraints *probably* limit us to utilizing wavelengths that are 5 nm and larger. At these small wavelengths, electromagnetic radiation only reflects at very shallow angles! Therefore in practice, it may be unrealistic to achieve net pressures that are better than ten percent of ***these*** values in the chart.

I need help selecting appropriate materials. For example, I have located good reflection data for Al, Ni, Au, U and Th; but even there, I am uncertain how far the EUV penetrates into these materials before reflecting, absorbing or transmitting through the material. I need to select a material that does not transmit the EUV or (hopefully!) does not allow those wavelengths of the Quantum Flux to arise inside the material, especially in the absorptive half of the Radiometer.

For example, one might form a small *solid* sample of some kind of Raney Ni-Al type alloy. However, rather than grinding the alloy into powder, it will be molded into a solid, flat, thin plate and soak on *one* side in 5-Molar Sodium Hydroxide. This will leach the aluminum out of the surface of that one side, leaving a nano-porous spongy surface. Hopefully, most EUV and Soft X-ray electromagnetic radiation gets lost in the maze and is ultimately absorbed into the material. The spongy, absorptive side will be given a protective coating whereas the opposite side will be ground and polished until it is optically flat and then sealed to prevent oxidation.

Raney Nickel is metallic gray (instead of being black) because the pores are so very small that they reflect *visible* light as though it were a smooth surface. After all, the pores are the spaces that have been vacated by very tiny groups of aluminum atoms, so they are usually characterized as being between a few angstrom on up, with few being larger than perhaps 20 nm.

These pores are likely to effectively absorb the less-than 20 nm wavelengths that are being targeted! I suspect that I may require a lower aluminum content in the pre-leach alloy so that smaller holes with thicker walls will be more common than larger holes, and the average wall thicknesses will be greater. One would want to experiment with a few different alloys. I am leaning heavily toward starting with a fifty/fifty ***molar*** ratio of Ni & Al. The metal must be relatively thin and it must be heated to remove all crystals, then suddenly quenched in liquid nitrogen so that the reflective side will cool in a vitreous—noncrystalline surface with fewer imperfections. If this is done with a very thin foil than the flimsy surface can be sealed, one side treated with Sodium Hydroxide and glued against a stiffer surface for support. Many layers can be stacked together if they are separated even a very small amount by a material that is optically neutral at the target wavelengths.

The outcome will be a solid piece of alloy that will have an optically flat, non-crystalline vitreous metal surface mirror surface on the reflective side and a dull metallic gray surface on the absorptive side, since visible light will not be well-absorbed by the much smaller pores.

I have used the familiar example of Ni- Al alloy and Sodium Hydroxide; however, papers by Dr. Allred at BYU on EUV lenses and mirrors indicate that a fifty percent reflection only occurs at angles of five degrees or less, between five and twelve nm for elements such as Ni & Al, but they indicate that some heavier elements such as Thorium and Uranium and some meta-materials reflect EUV at a rate of fifty-percent at angles of incidence as large as fifteen degrees, between five and 12 nm wavelengths.

Eventually, many alternating layers can be electroplated, one set after another. A computer will switch between different donor electrodes to build up materials with multiple constituents at any desired proportion from one solution.

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