## **Refraction as the Mechanism of Fundamental Forces**

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While the consensus of opinion is that the fundamental forces result from the exchange of virtual particles, other options exist. Among these is treating the forces as the result of refraction between wavicles. In this view, the refraction slows and bends the surface of a wavicle. This requires the wavicle to be a structure, with a proto-wavicle at the surface orbiting some central attraction.

In the case of electromagnetism, the photon still acts as intermediary, while the graviton fills that role for gravity. But treating the attraction as the result of refraction gives a more explicit view of the matter. In the case of electromagnetism, the photon is trapped around 2 similar wavicles, or between 2 wavicles of opposite natures. Slowing the proto-wavicle at the surface lowers the energy at that point, raising the orbit of the proto-wavicle. When this is on the side away from the other wavicle, the pair is pulled apart. When the minimum energy point is between the 2 wavicles, they are pulled together. This same effect acts in turn to trap the photon either around or between the other wavicles, requiring the photon in turn to be comprised of proto-wavicles in orbits.

Since the effects of gravity lack the delay experienced with electromagnetism, it is reasonable to assume the graviton is a tachyon. Since tachyons are repulsed by refraction (slowing a tachyon raises its energy), the graviton can not be bound to the outside of a pair of wavicles as the photon can. The only places a graviton can be trapped are between 2 wavicles or within a single wavicle, providing the attraction of the proto-wavicle to the center. The rapid motion of the graviton barely slows the proto-wavicles it is moving past, so the effects are miniscule. It should be noted that unlike the other wavicles, the graviton is not a structure with orbiting pieces, but a single tiny bit (on the order of  $10^{-35}$  m in diameter). Within other structures, the graviton is orbiting just below the proto-wavicle, with the repulsion from above just balancing the centripetal effect pushing it outward.

When 2 wavicles are in contact, their surfaces can refract each other. As the effect of refraction varies inversely with the velocity of the other proto-wavicle, this effect swamps gravity and electro-magnetism when quarks are in contact. When they are not in contact, there is no effect at all. This "strong force" is balanced by the forces maintaining the structure of the wavicle. Compressing a quark produces expansive forces that counter the strong force (from the centripetal effect of the gravitons within each). In this context, either a monoquark or a diquark (with 2 orbiting proto-wavicles) is subject to this attractive refraction. From chromo-dynamics, attraction only occurs when there is a difference in "color" between the pairs.

2 leptons forced into contact would exhibit a weaker attraction, as would a lepton / baryon pair. As with the 2 baryon situation, this effect only occurs when the pair is touching. Strength of the attraction depends on the velocity of each, with 2 electrons whose proto-leptons are coasting along around .7c, the attraction is much less than a pair of quarks with their proto-quarks in the .95-.999 c range (depending on flavor). Drop in energy depends on degree of slowing, and where on the Lorentz slope the velocity started. Dropping from .999c to .998 causes a sharp drop in energy (29%), while dropping from .7c to .6 has much less effect (8%). In the case of a lepton / baryon pair, it would be .999 to .95 and .7 to .699, so the electron is weakly attracted to the quark, but the quark is strongly attracted to the electron. An electron brushing against the nucleus would be readily absorbed.

If this view is correct, the attraction between particles is a surface phenomenon, so at very small distances repulsion and attraction would not be equal for equivalent cases. That is, 2 electrons would repulse slightly less than an electron and a positron would attract, when the distance between their centers is less than a dozen of their diameters.

A general formula for the effect of refraction has not yet been generated, but it appears to be a function of both velocities, and the product of the probabilities of their overlap. Thus a graviton in a large orbit would not only have a large velocity, but it would be adjacent a miniscule fraction of the time. This works out to a function of  $v^2$  or equivalently  $d^2$ , since wavelength is proportionate to velocity and is equal to pi times the diameter.

Each pair of fundamental particles in the universe would be joined by pairs of gravitons, orbiting between them. Since the particles also have a pair of gravitons within, the number of total gravitons in the universe would be roughly twice the square of the number of non-gravitons.

For photons, brushing past the orbits of electrons around atoms, the violet is most refracted, while red is least. That is proportionate to the inverse of their wavelengths. Since all photons are moving at the speed of light in vacuum, refraction is based on the velocity of the electrons, the electrons wavelength and the wavelength of the photon.

