Refraction and the Fundamental Forces and Particles

Aran David Stubbs

Abstract

This is a summary of several smaller articles, integrating them. It describes the fundamental particles (leptons, quarks, and photons) as simple structures of proto-matter and gravitons (which are low-energy tachyons). The proto-matter (4 types of proto-leptons, 4 of proto-quarks, and proto-photons) are in turn simple structures of infra-matter (which in turn are assumed to be cosmic strings). The fundamental forces are the result of mutual refraction between these. It eliminates the virtual particles (Higg's boson, gluons, and pions). It gives an explanation of dark matter (the Negrons). It also describes a mechanism for alternating big bangs and crunches as normal matter is converted to dark.

Centripetal Force

In a Newtonian frame of reference, the centripetal force is treated as $F_c=mv^2/r$. As long as velocity is low, this is a good approximation. But in an Einsteinian frame of reference it is not. A better form is $F_c=2E_k/r$. Since the Kinetic Energy (E_k) is $mv^2/2$ in the Newtonian frame, these are equivalent there. In the Einsteinian frame mass and velocity are intertwined, so a form treating them as separable can't be used. As the wavelength λ is hc/E_k and is $2\pi rn$, this equation can be simplified to $F_c=4\pi nE_k^2/hc$ or $F_c=hc/\pi nr^2$. Near the balance point, the imbalance of forces pushes towards the quantum solution (with centripetal effects exceeding attraction when orbit is lower than the balance, and attraction exceeding centripetal when above the balance point). See "A Disagreement with Dirac's Law" for details.

Gravity

Since gravity lacks the propagation delay observed for electromagnetic effects, it is reasonable to assume it involves tachyons. Among the tachyon's more interesting properties is the inverse relationship between effective mass and velocity. Another odd behavior is the addition of momentum causing a drop in velocity, opposite the behavior of tardyons! In this theory, gravitons are trapped in our universe by tardyons. Each tardyon is in orbit just above a pair of gravitons, with the Lorentz contraction stretching it from the gravitons perspective to a solid shell. Similarly, each pair of tardyons not in

contact traps a pair of gravitons between them. Again the tachyons experience the tardyons as stretched over the entire orbit. See "A Quantization of Gravity" for details.

Refraction

The next logical step is the nature of the forces binding tardyons and tachyons together. A good choice is mutual refraction. When a wave moves through another wave it is refracted, slowing it and causing a change in direction. For a tardyon, slowing causes a drop in energy, hence an attraction. For a tachyon, slowing causes an increase in energy, hence repulsion. When a tardyon is orbiting just above a graviton pair, centripetal force pushes it outward just balancing the refractive attraction pulling inward. The centripetal effect on the graviton pushes it outward against the tardyon, while the refractive repulsion pushes it inward, again in balance.

Refraction can also be used to explain the electromagnetic force and the strong force. Each charged structure (either in contact or in pieces) is encapsulated by photon-like structures, whose count of proto-photons matches the net charge on the structure. For instance, an independent down quark has a charge of 1 unit, so there is a single proto-photon orbiting (above the gravitons, at the same level as the proto-quark). An electron has 3 units of charge, hence 3 proto-photons. An alpha has 6 units of charge, so is surrounded by 6 proto-photons. In that case the structure has a pair of gravitons englobing it, just below the proto-photons. In cases where there are 2 structures not in contact with a positive charge on 1 and a negative on the other, a photon-like structure is trapped between them.

When a structure contains multiple pieces in contact, each piece refracts with its neighbors. Specifically, when a monoquark is in contact with a diquark, each refracts strongly with the other. This mutual refraction is interpreted as the strong nuclear force. It only occurs at the points of contact, not extending beyond the nucleus. Since the proto-quarks are moving nearly at the speed of light, a small reduction in velocity exhibits a large drop in energy, hence a strong attraction. See "Refraction as the Mechanism of the Fundamental Forces" for details.

Fundamental Particles

Known sub-atomic particles are divided into several families: the Leptons, the Mesons, the Baryons, the photon, and the graviton. Mesons consist of a quark/anti-quark pair.

Baryons consist of either a trio of quarks or a trio of anti-quarks. In this theory some Baryons are a diquark plus a quark (or an anti-diquark plus an anti-quark), while others have 3 monoquark pieces (such as the Delta).

The quarks consist of a proto-quark orbiting above a graviton pair. The diquarks may consist of 2 proto-quarks above a graviton pair or a proto-diquark above a graviton pair. In the case of the Up quark, the proto-quark is a proto-up in a 2s orbit. The Charm quark has a proto-up in a 3s orbit, while the Top (or Truth) quark has a proto-up in a 4s orbit. Similarly, the Down, Strange, and Bottom (or Beauty) quarks have proto-downs in 2s, 3s, and 4s orbits respectively. The only diquark examined closely has been an up/down diquark, with both proto-quarks or the proto-diquark in 2s orbits. Neither the quarks nor the diquarks have been observed as independent particles.

Like the Baryons, some Mesons are diquarks, while others are 2 monoquarks stuck together. Charged Mesons that consist of 2 monoquarks, and all the charged Baryons, have an encapsulating sphere consisting of a pair of gravitons surrounded by 1 or 2 trios of proto-photons (proportionate to the absolute value of the charge). Charged diquark Mesons have proto-photons as part of their primary structure.

The Leptons are not typically seen in contact with other particles. Therefor they typically have any proto-photons as part of their primary structure. The known leptons consist of 3 negatively charged, 3 positively charged, and 6 neutral particles. The negatively charged are the most studied. The Electron consists of a proto-lepton, 2 gravitons, and 3 proto-photons. The proto-lepton is in a 2s orbit (with a wavelength of 1/2 circumference). Similarly the Muon has the same 6 pieces, but here the proto-lepton is in a 3s orbit (with the wavelength equal to 1/3 circumferences). Likewise the Tauon has 6 pieces, with the proto-lepton is in a 4s orbit (with the wavelength equal to 1/4 circumferences). The Positron, Anti-Muon, and Anti-Tauon have an anti-proto-lepton in 2s, 3s, and 4s orbits respectively. The Neutrinos have a neutral proto-lepton, so they consist of 3 pieces. This neutral proto-lepton has a distinct anti-particle, so there are 3 Anti-Neutrinos. The Electron-Neutrino and the Positron-Neutrino may have their proto-leptons in 1s orbits, while the Muon-Neutrino's are in 2s, and the Tauon-Neutrino's are in 3s. As the neutral proto-lepton has trivial rest mass, it can assume any size orbit, based on the energy content. The neutrinos, having an odd number of constituents, routinely have net angular momentum. This balances the structural portion of the angular momentum of their counterparts among the charged leptons, while the charged proto-lepton has inherent angular momentum relating to the charge carrying tachyons it contains. See Angular Momentum and the Neutrino for details.

The Photon consists of 3 proto-photons and 2 gravitons, each with a fifth the total energy content. While gravitons normally occur only in pairs, they can be viewed as stand-alone particles.

In summary, this theory requires the following particles: a graviton, a proto-photon, a negatively charged proto-lepton, a positively charged anti-proto-lepton, a neutral proto-lepton, a neutral anti-proto-lepton, a proto-up, an anti proto-up, a proto-down, and an anti-proto-down. Each is assumed to be simple structure of infra-matter with all dimensions around $7*10^{-36}$ m diameter (from the balance of force equations). Other particles may occur. See the Particulate Nature of Subatomic Matter for details.

Dark Matter

Having seen monoquarks and diquarks already, it should come as no surprise there can also be triquarks. These would not form structures, since the strong force does not apply. A general name proposed for this category is Negron. When the 3 proto-quarks are 2 proto-downs and a proto-up, each in low orbits, the energy is minimal, and no electromagnetic effects would occur. These have low rest energy (a few hundred MeV?), so have a low escape velocity. The ideal gas equations give a good approximation to the behavior of these particles. Concentration varies reciprocally with temperature, with the highest concentration in inter-galactic space. They are attracted by gravity, so they would tend to form a loose shell around large masses (such as galaxies) and act somewhat like an atmosphere would. As absorption of light depends on the diameter of the photon being similar to the diameter of the structure absorbing it, they would not absorb visible light. Negrons don't typically form except under high pressure conditions. Converting a monoquark/diquark structure to individual Negrons releases considerable energy. This causes local concentration to drop for a time, until gravity again pulls the dense baryonic matter to the center, repeating the process. For more info see "Of Matter: Light and Dark".

Main Website