

Essay 85: The Photon Mass

Recent work in UFT244 and UFT245 has revealed a great deal about the theory of the photon mass, so the work is summarized briefly in this essay. In UFT244 the usual approach to the Compton effect was reversed, so that the photon mass was assumed to exist and to be finite. The basic assumption in photon mass theory is that the photon is a particle, but in standard physics it is assumed to have no mass. Compton's experiment earned him a Nobel Prize in physics but it was based on a massless photon. UFT244 shows that this assumption is the only one that leads to a constant electron mass in relativistic particle scattering theory. This turns out to be one of those illusions, and in the words of Oscar Wilde, "Illusion is the first of all pleasures." As soon as two particles, each with mass, are considered in the classical relativistic theory of colliding particles, the entire edifice collapses. The reasons are given in preceding essays and UFT158 to UFT170.

In the standard literature in physics the mass of the photon is always recorded as being too small to measure, but UFT244 showed initially that it could be of the order of the electron mass. However, further work in UFT244 revealed a basic flaw in the classical relativistic theory of particle scattering, a violation of the law of conservation of energy. Standard physics may prefer the pleasure of illusion to nature, but a real scientist must accept that there is something profoundly amiss with the very basics of standard physics. By now that comes as no surprise, it is obvious that a sieve made of lead will not float on water unless it has theological overtones. In the words of Gerard Manley Hopkins there is a golden echo of the truth about nature, and the leaden echo of dogma.

In UFT245 the usual doctrine concerning photon mass was subjected for the first time in its long history to due intellectual scrutiny. The long road to measurement of the photon mass was apparently walked at outset by Louis de Broglie, the Nobel Laureate and pioneer of wave particle dualism. He devised the first experiment to measure the photon mass. Since then many of these experiments have assumed the validity of an off the cuff solution to the Proca equation known as the Yukawa potential. This solution means that the photon mass affects for example the Coulomb law and the Ampere law of respectively electrostatics and magnetostatics. So, many experiments have just been variations on a theme: they look for deviations from these laws, but always assume the validity of the Yukawa potential. No deviations from the Coulomb and Ampere laws have ever been found in over two hundred years of investigation. So the standard physics jumps to the conclusion that the photon mass is too small to measure. This is a pleasurable illusion, the standard physics needs it zero photon mass, otherwise it is nearly meaningless. UFT245 shows that a photon mass of any value is compatible with the usual Lienard Wiechert solution of the Proca equation, one that predates the Yukawa solution by about thirty five years.

So the standard massless photon rests on a circular argument, it asserts that photon mass is zero, never mind the consequences, and assumes the Yukawa solution to prove that the photon mass is zero. None of its experiments prove that the photon mass is zero. If the well known Lienard Wiechert solution is used, as in any other part of classical electrodynamics, any photon mass becomes compatible with the Coulomb and Ampere laws, or any laws of classical electrodynamics.

The truth is always less pleasurable than the illusion, but the truth is that very little is known about the photon mass. Different experiments and different theories give different answers, and the worst thing is that the entire theory of classical relativistic particle scattering collapses if it is restricted to special relativity and the old quantum theory (meaning the original quantum theory). In UFT158 to UFT170 the disastrous collapse of particle theory was remedied by ECE theory to a certain extent. However the new challenge is to remedy the violation of conservation of energy found in UFT244, and to apply the new methods of

UFT245 to other experiments designed to measure photon mass. It is clear already that the tables of the standard physics are an illusion. There is no reason to think that the photon mass is zero. In that case the entire edifice of the particle theory of standard physics collapses, and with it the currently fashionable Higgs boson.