

Essay 107 : A New Theory of Reflection and Refraction and the Evans Morris Frequency Shifts.

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Reflection and refraction are every day phenomena that may first have been explained in ancient times. The dogmatic teaching of physics attributes the first explanation to Willebrord Snellius in 1621. However explanations of reflection and refraction had been given by Ptolemy of Alexandria, Ibn Sahl in 984 and by Thomas Harriot in 1602, who communicated his results to Johannes Kepler. Following upon the inference by James Clerk Maxwell of his famous equations, later developed by my Civil List predecessor Oliver Heaviside, the phenomena were thought to have been fully understood. As always this is an illusion, an optical mirage.

In the dogma of a thousand textbooks, the incoming, reflected and refracted frequencies are all the same. This idea had its origins in continuity at the interface where reflection and refraction took place. The phases at the interface must be the same so it was accepted uncritically that the frequencies must be the same. The reason why is very hard to find, the reason for the lack of reason why is that there is no reason, just dogma. In UFT278 it is shown very simply that the equal frequency dogma violates conservation of total energy for a single photon. The Planck energy of an incoming photon must be equal to the sum of the Planck energies of the reflected and refracted photons. It follows by cancellation of h , the reduced Planck constant, that the incoming frequency must be equal to the sum of the reflected and refracted frequencies. The three frequencies cannot be the same.

Similarly, there is conservation of linear momentum described by the wave particle dualism of Louis de Broglie. After h is cancelled out, the incoming wave vector must be equal to the vector sum of the reflected and refracted wave vectors. These ideas are exactly the same as used in the development of the Compton effect in UFT158 and following papers. The conservation of total energy and total linear momentum are fundamental to any kind of physics, including reflection and refraction. When they are applied correctly an entirely new understanding of refraction and reflection springs out of the dogma of a thousand years. The correct and logical theory means that the frequency of the refracted and reflected electromagnetic radiation must be different from that of the incoming electromagnetic radiation. The frequency changes accompanying refraction depend on the dielectric dispersion and refractive index of the medium in which refraction takes place. More generally they depend on the complex permeability and complex permittivity.

The alley of a thousand dogmatic dustbins took a thousand years to ossify, until Gareth Evans and Trevor Morris observed many types of frequency shifts in visible frequency refraction and reflection. These data took several years to gather, and were meticulously checked for reproducibility and repeatability. They were quickly verified by Dennis Davies in the United States and all details are recorded in the diary or blog of www.aias.us. In order to explain these effects UFT278 uses a very simple theory based on conservation of total photon energy and total photon momentum. This theory immediately demonstrates that the equal frequency dogma is wildly wrong. This is becoming a familiar feature of advances in ECE theory.

How can all those dogmatist be wrong? This is the usual answer of the dogmatists, but the reason is well known - groupthink or the pathological science of Irvine Langmuir, the uncritical acceptance of ideas long ago turned to bone, and the adherence to the familiar. In schools and at undergraduate level it is almost impossible to think originally without failing the examinations, so the pupil or student quickly develops a defence mechanism and regurgitates to survive. At graduate, post doctoral and faculty level the anonymous referees

would soon deal with originality by censoring it in a dark, smoke filled room, no more grants no tenure. Only when there is freedom to think does the truth shine through - reflected or refracted - with a lot of new information about a lot of materials - the Evans Morris frequency shifts.