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Implications and evidence of a particle-tied aether: steps towards a deeper foundation for physics and relativity

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1. Introduction

This contribution is primarily about the transmission of transverse electromagnetic (TEM) waves, our principal source of physical information. The Michelson-Morley experimental result ***[1*** of 1887, that the earth's orbital velocity has no effect upon the propagation of light at the earth's surface, led to final abandonment of the notion of an universal reference frame based on an independent, fixed aether. Its replacement, the Relativity Principle of Poincaré-Lorentz ***[2 [3***, embodying the Lorentz transformations with their ingenious reciprocity, sought to permit the interrelation of events in different frames of reference. An essential component of the transformations was the use of light as the messenger, whose velocity ***c*** was seen to be the maximum attainable in any given reference frame.

From there it seemed but a short step for Einstein in 1905 to postulate ***[4*** universal immutability of the value of ***c***, thus securing the one-step interrelation of events in widely separated frames. The price of this simplification was the total exclusion of an aether which might modify the message along the way.

My purpose here is to show that while, in many cases, such simplified relativity is fully justified, there are also many others in which observations betray the action of an aether, particularly of one that is in random motion, a matter that has escaped previous study. Not surprisingly, a majority of these cases are in the astrophysical realm, where the distances allow the build-up of transmission effects.

To encompass these, the relativity principle, that nothing can exceed the *local* velocity of TEM waves, will be firmly retained but regarded as only strictly applicable at the smallest scale of physical nature - that of the local aether.

Another aspect of Relativity is that, as its name implies, it seeks to describe the relationships between entities in various circumstances but it doesn't illuminate the nature of those entities, a gap which quantum electrodynamics and particle physics endeavour to fill.

Further, there is now a considerable body of phenomena, mainly but not exclusively astrophysical in character, that does not fit comfortably within the current framework of physics.

In an effort to help with these matters a continuum (aether) theory (CT) of physical nature will be outlined, in which fundamental particles are special, rather (but finitely) concentrated, rotational forms of disturbance of the continuum. Particle random motions thus imply random motion of the aether (the older spelling is preferred on grounds of priority) and this affects the propagation of TEM waves by it. Under this proposal particles are "made of" aether and the Michelson-Morley result is satisfied.

Although conceived independently, this picture bears some similarity to earlier ones. Maxwell ***[5*** seems to have regarded particles as mere modifications of the aether. Larmor ***[6*** regarded electrons as nuclei of aether rotational (static) strain, but later came to visualize them as perfect-fluid rotational "nuclei of beknottedness in some way" ***[7***, with an external influence indefinitely co-extensive with that of others. Milner ***[8*** regarded aether as a "fundamental substratum of matter from which we can imagine particles are formed".

It will emerge as we proceed that, to a remarkable extent, phenomena widely regarded as specific attributes, and "proof", of the Theory of Relativity, become equally accountable in the new context (CT), even to the extent of involving an indistinguishable parametric formulation.

Following further description of the proposed basis for CT, successive parts of the paper deal with CT/Relativity comparisons for various phenomena, theoretical treatments of various phenomena specific to CT, and the large body of evidence for those phenomena. A final part additionally draws briefly upon aspects of gravitation and inertia to suggest a consistent model for quasars.