

A continuum theory (CT) of physical nature: towards a new ‘ground floor’ for physics and astronomy, including gravitation and cosmogony, with major tangible support

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Abstract

The theory of Relativity was, in effect, based upon throwing out one of the elements of the then-existing physical theory ‘basement’, namely the existence of an elastic aether, the need for which had been uniquely secured by Maxwell’s equations for the transmission of transverse electromagnetic waves (TEM-waves). By so doing, transmission effects were axiomatically excluded, which was seen as desirable. We explore the implementation of Maxwell’s aether in the form of a massless superfluid continuum of (negative) electric charge and adduce four kinds of evidence that it is in random motion, with corresponding, widely observed transmission effects upon TEM-waves, one of which is a redshift proportional to path length. To characterize and quantify that random motion it is proposed that fundamental particles are ‘made of aether’ in the form of rotational configurations within it. This yields a continuum theory (CT) of physical nature in which the Universe is devoid of singularities, in stark contrast to the current wholly particulate physical paradigm. The resulting ‘particle-tied’ character of the aether motion gives it, and the resulting TEM-wave effects, a dependence upon the temperature and density of the propagating medium. The particle-tied character is hugely reinforced when the particle bears a charge.

A systematic examination of the various kinds of observation forming the supposedly unique support for Relativity suggests that they are undeserving of that distinction in the new context. In particular, the ‘relativistic mass increase’ thought to be observed in particle accelerators appears to have been an over-eager assignment to the Relativity prediction, overlooking that the pushing mechanism employed - the communication of two electromagnetic fields - has a c-limited terminal velocity and pushing efficiency.

This recognition enables the mass property of any particle to be regarded as a stable quantity upon which to design the provision of that property, with an outcome that offers exciting new insight into the nature of the process of gravitational interaction. In respect of the charge property, to make electrons and positrons (for example) ‘out of aether’, one of them incorporates more, and the other less, aether, so such pairs are easy to make, as observed, and the mean aether density must exceed 3×10^{29} coulombs/cm³, this being the (excess or defect) density in their cores, based on their LEP-determined ‘sizes’. To equip particles with the mass property their rotational aether motion is deemed to have a vortical aether-pumping property which makes them ‘suck’ themselves towards one another. On the smallest scale, partial closure of the aether-pumping circuit (e.g. 3 quarks) may be the source of the strong nuclear force and of the reduction of mass (less external aether flow) when particles fuse. On a macro scale the result is a reduction of aether charge density within the body; this is a (positive inwards) radial electric field, here called the gravity-electric (G-E) field, which consequently is predicted to co-exist with all gravitational fields, thereby rendering Newtonian gravitation an incomplete description of gravitational action, another difference being that the communication, now seen as electromagnetic in character, is retarded.

Evidence of such electric fields is ubiquitous, both as a repulsion upon ionic plasma - Earth’s ionosphere, solar wind, stellar winds and perhaps even galactic winds - as a substitute or supplement for radiation pressure and also for the acceleration of cosmic rays, attaining 5 GeV from the Sun and their $\sim 10^{20}$ eV maximum from the G-E fields of neutron stars. In a new scenario for forming the solar planetary system the G-E field played a major dynamical role in several respects. This scenario sees the protoplanetary disc material and an outer layer for the Sun as a secondary acquisition by quasi-polar infall, some time after the protoSun had been formed in a previous dust cloud, the new disc flow being driven outwards by the solar G-E field, assisted by magnetic coupling. Protoplanetary nucleations near the Sun (where this coupling ensured the prograde vorticity preserved in their rotations) were pushed outward successively by the field-driven plasma. This process increased the angular momentum of the planetary material without drawing any a.m. from the Sun, offering a quantitative solution of the well-known problem that its mean specific a.m. is $\sim 137,500$ -fold greater than that in the Sun. In the new scenario, the temporary dust-jacket around the Sun would have shielded the forming protoplanetary nuclei from solar radiation, explaining how some gas-giant exoplanets occur very close to their star.

In stellar evolution the G-E field is a major additional overburden-support mechanism, enabling fusional evolution to proceed more slowly and perhaps explaining the solar neutrino deficiency. In CT, TEM-waves cannot exhibit the mass property but the gravitational deflection of light, or microlensing, is qualitatively attributable to refraction by the radial aether charge density gradient that is the G-E field which, in turn, is proportional to the gravitational potential. The solar redshift, with its steep dependence upon path length in the solar atmosphere, even for near-vertical paths, is not a gravitational effect but a transmission one, as originally suggested by Freundlich.

Overall, the CT model for the Universe which emerges has an inherent cosmogonical/creative property and originated as an infinite, mass-devoid randomly moving aether an undefinable time ago. The energy of that motion was the resource from which all mass has progressively been formed, zero-point energy and the CMB being probable manifestations but tenuous measures of its current level. There was no Big-Bang and the Universe is not expanding. The various demands for CDM are removed or much diminished. Quasi-axial infall of cosmogonically young material is a major factor in the build-up and morphological evolution of galaxies, especially that of barred galaxies which constitute an import step on the route to the triaxial elliptical end-product. A new quasar model based on velocity-dependent inertia has superluminal circulations able to generate intrinsic redshifts up to at least $z = 5$ and cause the Lyman α forest of absorption lines. Its intense accretionary and squashing power may offer light element nucleosynthesis and, at high masses, mass annihilation, with a possible GRB outcome, black holes being inconsistent with the finite size of mass-bearing particles in CT.

In brief, the recognition of Maxwell’s aether in the form of a high-charge-density continuum that is in particle-related random motion has wide observational support at all scales. The velocity c of TEM-wave propagation by it is not immutable but depends on its physical parameters. These two results render Relativity Theory inappropriate. Development of the centuries-old speculation that material particles are ‘made out of aether’ offers insight into the internal dynamics of mass-bearing particles and thence to a major break-through in studying the gravitational process, which has very tangible support in the dynamics that formed our planetary system.