

The Sun under the microscope, from core to corona, illuminated by new insight on the physics of gravitation

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The Sun is much used as a testing ground but an understanding of the physical mechanism of gravitation, the driver of all its machinery, has been lacking. Evasively, Relativity treats the mass property of particles as 'intrinsic'. But progress is possible. We pursue the proposal [1] that particles are vortical constructs of aether motion and suck themselves together to provide gravitation. Thus constructed, particle motions and aether motions are coupled, not dynamically independent, as confirmed by [2]. To characterize such vortices we implement the Maxwell's equations aether as a continuum of high-density electric charge, using guidance from LEP observations at CERN. We conclude that the Newtonian field around and throughout a gravitationally retained assemblage is inescapably accompanied by a corresponding positive-body-repelling radial electric field, the Gravity-Electric (G-E) field [3].

In the Sun, we consider significant implications at six levels from core to corona. (1) The G-E field provides additional overburden support, lowering the rate of burning required in the core. (2) At the core boundary the temperature-related intensity of random aether movement causes intense random electromagnetic excitation of nuclei, offering a non-relativistic mechanism for the 'quantum tunnelling' that makes nuclear fusion possible. (3) Just below the tachocline the scattering associated with aether random motion offers increased opacity needed for a SSM/helioseismology match. (On a cosmic scale this source of opacity, superimposed on ordinary distance fading, may resolve Olbers' paradox) (4) The extra electrons for the abundant negative H ions responsible for the high opacity of the photosphere [4] are likely separated from the proto solar wind ions by G-E field action. (5) Those ions, by spiralling up the legs of a magnetic arch under G-E field action, will often load, stretch and rupture the arch, releasing the ions as a CME. (A critical observation is that CME releases accelerate away from the Sun, implying energy gained from the G-E field.) (6) The problematic chromosphere-corona transition. Ion energies gained by G-E field acceleration through the chromosphere become enough on reaching the transition region for their mutual impact to increase their ionization level, further increasing G-E field enhancement of their impact energies. This positive feedback yields the sudden rise in apparent ionization temperature to the several MK of the corona, but which is not LTE. The electrons released here become entrained in the solar wind.

Quantitatively, for the Earth, observations of the ionosphere and thunderclouds confirm presence there of the G-E field at 1 V/m [3], but a recent estimate is higher.

[1] Thomson W./Kelvin (1867) On Vortex Atoms. *ProcRSEdinb*, **VI**, 94-105, Reprinted 1867 in *Phil. Mag.* **XXXIV**, 15-24. **[2] Michelson AA & Morley EW** (1887) *Am. J. Sci.* **34**, 333-345. **[3] Osmaston MF** (2013) Implementing Maxwell's aether illuminates the physics of gravitation: the gravity-electric (G-E) field, evident at every scale..... In *The Physics of Reality: Space, Time, Matter, Cosmos*. (ed. RL Amoroso et al), 388-410. Singapore, WSPC, ISBN: 978-981-4504-77-5. **[4] Wildt R** (1939) *Ap. J.* **90**, 611-620.

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