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# A fresh look at the Sun, from core to corona, illuminated by new insight on the physics of gravitation

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## Abstract

The Sun is a testing ground for many kinds of physical understanding but an understanding of the physical mechanism of gravitation, the driver of all its machinery, has been lacking.

Newton's work on gravitation astride the end of the 17th century concentrated on the behaviour of the force, not upon its origin. But he already endorsed the idea of an ubiquitously intervening aether to convey the force and, as Huygens had already reasoned, also to transmit light waves. Then, in the 1860s, Maxwell [1] and Thompson (Kelvin) [2] started to think of fundamental particles as being aether in a vortex-like motion which would, by mutual attraction, provide their mass property and gravitation. In such a set-up, not only will particles and the aether around them not be dynamically independent, as the Michelson-Morley experiment actually demonstrated 20 years later, but the aether will be in a related degree of random motion. Importantly, that motion will cause the scattering of transmitted radiation.

But, in setting up Relativity (1905-1916), Einstein made further enquiry impossible. General Relativity treats particles as infinitesimal entities, and supposes, evasively, that the mass is 'intrinsic' to that specific infinitesimal point in space. This denies them any volume in which to develop their individual external mass property and has discouraged any attempt at physical understanding of its development.

Nevertheless, there is now firm evidence that electrons, positrons and protons do have finite size. So, building on the original thinking of Maxwell and Thompson, supported later by [3], my inquiry as to the nature of the physical mechanism by which gravitational force is developed has led me to the surprising finding that the Newtonian potential is inevitably always accompanied by a corresponding positive-body-repelling radial electric field. I have called this the Gravity-Electric (G-E) field and have adduced evidence for its action at many astronomical scales [4 - 7].

So I will set out the reasoning, summarized below, that has led to this result. I will then address briefly the various listed solar features potentially illuminated by these findings**.**

**Origin of the mass property and of the G-E field.** We start by implementing, apparently as never before, Maxwell's aether as a massless, compressible, continuum of negative electric charge. And we follow [1 - 3] in regarding fundamental particles as constructs of vortical aether motion. Particles of opposite relative charge, e.g. electron-positron pairs, are then dynamically similar but one incorporates more aether than the mean, and the other less. From this we use observations of size to show that the aether's mean charge density is extremely high (> $10^{30}$ C/cm$^3$). The statistically prevalent tendency of such vortices will be to suck themselves together, not to scatter, thus providing the origin of gravitation. In any resulting gravitational assemblage, that sucking action is continually seeking to maintain a lower aether charge density in the interior. That charge density gradient is an electric field; the Gravity-Electric (G-E) field. Gravitational interaction with the rest of the Universe means that the G-E field extends indefinitely outside the body, as does its Newtonian one. In the case of the Earth, the ~250kV potential difference evidently present between ionosphere F-layer and ground yields a G-E field of ~1 V/m [7]. Linear extrapolation on gravity would suggest ~30 V/m at the solar photosphere.

**Nucleosynthesis and overburden support.** The G-E field, acting on the solar interior ions, provides an overburden support force additional to the pressure generated by nucleosynthesis in the core. So solar stability will be achieved with a lower rate of nucleosynthesis than inferred in the Standard Solar Model (SSM). Implications for:- *electron neutrino deficit, helioseismology, solar age, planets age, and Universe age (see [6])*

**Opacity deficit of SSM w.r.t. helio-seismology in the tachocline region.** Allowance for the random aether motion scattering action may remove this deficit. On a cosmic scale this source of opacity, superimposed on ordinary distance fading, may resolve Olbers' Paradox [6].

**CMEs.** G-E-driven ions spiral up the legs of a magnetic arch. At the top of the arch the radial G-E field force on those ions loads and stretches the arch until it breaks, 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.

**Granulation.** Sunspots are dark because they expose lower temperature at depth, so granulation cannot be thermal convection. A smaller version of the foregoing CME mechanism is suggested.

**Solar wind.** These ions, whose FIPs show they were formed in the lower chromosphere, are accelerated away by the G-E field, which provides charge separation; so the detached electrons are returned to the photosphere, whose the opacity is due to the resulting abundance of the negative H ion [8]. Similar behaviour is caused by the Earth's G-E field, in that 90% of vertical lightning discharges bring negative charge to ground [7].

**Coronal energy support.** Energy acquired by the G-E field acceleration of ions through the chromosphere becomes enough by reaching the transition region at the top of it for mutual impact of those ions. This increases their ionization level, further increasing G-E field enhancement of their impact energies. This positive feedback yields the sudden apparent rise in ionization temperature to the several MK of the corona, but which is not LTE. The electrons released here do not return to the photosphere but become entrained in the solar wind.

In conclusion, these actions of the G-E field in the solar atmosphere suggest that large electric current flows, both of ions and of electrons, must be present. Are these perhaps the underlying cause of the magnetic features and motions to which so much analytical study has been devoted?

# References


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