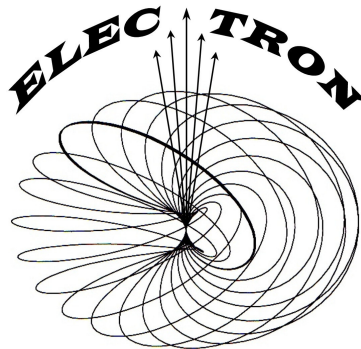# Gravitation as Anisotropic Fluid Flow

Frank M. Meno

Newton stated that gravity could be based on a density gradient in the aether, however, he did not propose a mechanism sustaining such a gradient. Many have subsequently attempted to find a mechanical cause by which the observed force field could be accounted for, but these efforts did not yield a satisfactory solution. In 1916 Albert Einstein introduced the *general theory of relativity* which can account for most observed phenomena, but is based on mathematical concepts without regard for physical justification. He later realized this and, in 1920, in a talk at the University of Leiden stated the following: *According to the general theory of relativity, space without aether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of existence for standards of space and time (measuring rods and clocks), nor therefore any space-time intervals in the physical sense.*

This statement is currently often disregarded, but other alternatives are philosophically untenable, as any postulated space of any dimension cannot possess physical properties without a substance. Thus, the existence of aether is a prerequisite for any physical reality. The Michelson-Morley experiments are misinterpreted; they do not nullify the existence of aether. The reason for the failure to detect a resting reference frame in the aether lies in the fact that the interferometers experience the same Doppler shift as the employed light, canceling the effect of relative motion.

Here is proposed a model based on the existence of an anisotropic gaseous aether. The size of the constituent fundamental particles, termed *gyrons*, is postulated to be the basis for the Planck-length, and motion of these fundamental particles accounts for the *zero-point energy*. Thus, vacuum is not empty, but is actually denser than the observed material manifestations. Consequently, electromagnetic radiation represents waves in the aether, while the material 'particles' with a *rest-mass*, such as electrons and protons, are vortices in the aether, which can drift with speeds below that of light, accounting for the Lorentz transformation and special theory of relativity. Since photons do not mutually gravitate, it is concluded that the material vortices are the essential and unique mechanism generating gravity.

The plot in Figure 1 depicts the streamlines in an aether vortex corresponding to the electron, which is the basic material entity in the universe, accounting for the gravitational, electromagnetic, and weak force fields in terms of different density and velocity gradients sustained by this vortex, but this presentation will be limited to the phenomena associated with gravitation, where density is proportional to the fluid pressure, and its gradient yields the observed force field.

Helmholtz has demonstrated that vortices in an inviscid fluid are permanent, hence, once established, the stability of these vortices is assured, unless they are neutralized by opposite rotating vortices, termed *anti-matter*.

Notice that in the spherical electron vortex the stream-lines pass through the center of the vortex with a twisting motion, which creates a dynamic funnel structure for the gyrons. In the unstructured vacuum the gyron particles, which are not spherical, are randomly oriented and move with an average speed corresponding to the speed of light, while within the vortex they are organized by the flow pattern. Thus, as the gyrons pass through the central rotating funnel structure, they are forced to line up lengthwise, while their speed, which varies reciprocally with the distance from the center of the vortex, increases enormously. Consequently, these lengthwise oriented gyrons with enormous speed can traverse a large distance before their motion is again randomized in the aether.

Since the vortex must maintain equilibrium in its dynamics, the escaped gyrons must be replaced with an inward drift of nearby gyrons. This process is producing the observed gravitational force field which is the result of the aether drift towards the center of the vortex. The vortices are nearly transparent to the escaping gyrons, and therefore, like *neutrinos*, exert only minute reverse force. However, neither gravitation, nor neutrino fluxes have an infinite range. Thus, in contrast to the current view, gravity does not decrease merely geometrically with the inverse square, but is also diminished with a Gaussian function on account of the finite diffusion distance of the escaping gyrons, resulting in an acceleration field of the form

$$g = -\frac{Gm}{r^2}\exp[-(r/R_G)^2/2]. \qquad (1)$$

According to Newton's formula for stable orbits

$$r\frac{dg}{dr}+3g>0, \qquad (2)$$

the above field fails to support orbiting for distances given by $r \geq R_G$, which can account for the fact that galaxies are limited in size to radii of about 50 thousand light years. If gravity were not limited this way, the inverse square law would not prevent an indefinite increase in the size of galaxies.

The speed of the aether drift that causes gravity, termed *escape velocity,* can be computed from the observed gravitational acceleration

$$g = \frac{dv}{dt} = \frac{dv}{dr}\frac{dr}{dt} = \frac{dv}{dr}v = \frac{1}{2}\frac{dv^2}{dr} = -\frac{Gm}{r^2}, \qquad (3)$$

which, upon integration results in

$$v_G = \sqrt{2Gm/r} \, . \qquad (4)$$

Note that the far-field effect due to the Gaussian function has been neglected for the sake of simplicity and clarity, but this does not substantially alter the result.

Thus, aether flows into every mass with this speed, carrying with it, or exerting force on any other mass and waves located in this stream. The term 'escape velocity' is suitable in the sense that in order to resist the flow, an object has to move faster in the opposite direction than the speed of the stream in which it is located. This speed can only increase to the speed of light which represents the rms speed of the gyrons. Therefore, by equating the gravity drift speed with the speed of light, one obtains the Schwarzshild radius
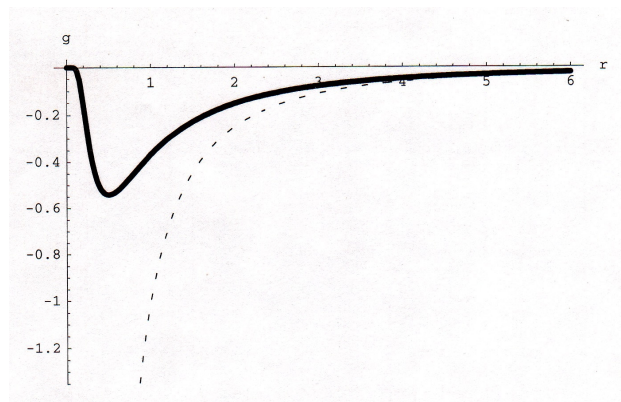
$$r_S = 2Gm/c^2 \, . \qquad (5)$$

The bending of light in gravitational fields is accounted for by the fact that the medium in which light propagates is deflecting it from a straight line in the direction of the vector sum formed by the wave propagation and aether drift, which also explains the blue and red Doppler shift in color, depending whether the light is moving along the drift velocity, or in the opposite direction.

The proposed model also takes care of the objection to general relativity for postulating field propagation with the speed of light, which was already shown by Laplace to be untenable in view of the stability of the solar system. Laplace determined that for the required planetary orbiting stability, the gravitational field must propagate in excess of 200 million times faster than the speed of light. The fast ejected gyrons do meet this criterion.

Newton's formula as well as the above diffusion-corrected version, still manifest a singularity at the origin, but this can be removed by introducing another exponential factor, resulting in a singularity free gravitational field of the form

$$g = -\frac{Gm}{r^2} \exp[-(R_E/r) - (r/R_G)^2/2], \qquad (6)$$

where R_E stands for the electron radius. This makes also physically sense because the gyrons are leaving the center of the vortex on account of the centrifugal force. Clearly, on this scale, this removes the singularity, but physically it does not substantially alter the inverse square law beyond the size of the electron, as shown in the following plot.

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In summary, it appears that gravitation can be accounted for on the basis of aether dynamics, provided that the aether fluid has suitable anisotropic properties which enable the existence of specific vortex structures. The electron vortex might be adequate to serve as the fundamental material entity from which other vortex systems are assembled. Electrical charge is accounted for on the basis of the two possible mirrored vortex structures, and mass is a parameter derived from the number of gyrons participating in the vortex assemblies. This concept leads to the view espoused by Descartes that physical reality is merely an interplay of extension and motion.