Collapse of SRT 2: Earth Carries Along Electric and Magnetic Fields

Sankar Hajra
Calcutta Philosophical Forum, Salt Lake, AC -54, Sector-1, Calcutta - 700 064, INDIA
e-mail: sankarhajra@yahoo.com

This paper argues that the results of electro-dynamic experiments performed on the surface of the moving Earth demand that the surface of the moving Earth is exactly similar to free space for our description of electromagnetic phenomena on it. In our opinion, this clearly implies that in the vicinity of its surface, Earth carries electric and magnetic fields along with it, just like it carries all other physical objects with it. We show in this part of our paper that this simple consideration naturally explains electro-dynamic phenomena as observed on the surface of the moving Earth and leaves no room for special relativity theory in electro-dynamics.

Key Words: auxiliary equations, real equations, real physical entities.

1. Introduction

Part 1 [1] of this overall development presented derivations of electro-dynamic equations, including auxiliary Lorentz transformation equations. Electro-dynamic phenomena as observed on the surface of the moving Earth are conventionally explained from the consideration of special relativity theory (SRT). This Part 2 exposes the weak experimental foundation of SRT and its resultant absurdity. The paper offers an alternative approach to understand these phenomena from a Newtonian viewpoint. We present this viewpoint in the following Sections.

Rational Expectations

Equations of electro-dynamics describe interactions of charges with electric and magnetic fields, as well as propagation of electromagnetic disturbances in free space. Electromagnetic fields possess momentum and energy that could be experienced by our sense organs. It follows from these facts that electric and magnetic fields are real physical entities to the same extent as charged bodies are real physical entities (Kompaneyts 1961 [2]).

There are many experiments to prove that the speed of light is independent of the velocities of the small field-creating bodies (Alvager 1964 [3], Brecher 1977 [4]). This fact indicates that **small bodies that create the electromagnetic fields cannot carry those fields with them**. By analogy, the electromagnetic fields should not rotate with the rotation of the small body that creates these fields. This conclusion is, however, contradicted by many authors, and counter-contradicted by some other authors. In the present state of knowledge, we may conclude only that electromagnetic fields are embedded in free space, and small field-creating bodies cannot carry these fields with them while translating.

Maxwell's equations of electromagnetic fields are applicable only in free space and inside systems stationary in free space. Therefore, all real equations originating from Maxwell's should apply only in free space and inside systems stationary in free space. One would then expect the real equations for a situation on the fast moving Earth surface (30 Km/Sec) would require some correction or modification, such as an additional term, involving the velocity of Earth's surface. But that does not happen.

Surprising Experiments

i) All the real equations in [1], *e.g.* (34), (36-41), (47), (50), (54), (59), (61), (65) (68) and (69), are unaffected by the motion of Earth when experiments are performed on Earth to verify them,

ii) In the (1904) Trouton-Noble experiment, a fine wire suspends an electric condenser with its plates vertical. The condenser is charged by this wire and by another wire coming from beneath and dipping into mercury. Now, the condenser is moving with Earth with a very high velocity in free space. Therefore, the electric field between the plates should produce a magnetic field that varies as $\sin\theta$, where, θ being the angle between the direction of Earth's motion and direction of electric field between the plates of the condenser. As magnetic field energy is proportional to the square of the field strength, the magnetic energy must vary as $\sin^2\theta$. The condenser should, therefore, experience a torsional force and tend to turn so as to make the magnetic field energy a maximum and this happens when $\theta = 0$. Trouton and Noble (1904) charged the condenser and looked for the turning effect. But no such effect was observed [5]. The experiment was only sensitive to the translation of Earth, which should give a large value but not to its spinning which should give a negligible small value to detect.

Note: If a condenser on the surface of Earth moves and spins about Earth's axis with Earth, then at a point P on Earth, distance r away from the condenser, the electric field changes, and thereby at the point P, a magnetic field should arise. But if the condenser stationary on the surface of Earth moves and spins about Earth's axis with its electric field with Earth, there should be no change of electric field at P and thereby there should be no magnetic field at P (near Earth's surface), which is the result of the Trouton - Noble Experiment (1904).

iii) When a point charge moves steadily on the surface of the moving Earth, the electric field and magnetic field at any point on Earth due to the moving point charge depend on the velocity of the charge with respect to Earth's surface, but do not seem to depend on the velocities of translation and spinning (about the axis) of Earth.

When a radiating dipole translates transversely with respect to an observer stationary on Earth's surface, transverse Doppler's

effects as measured are dependent on the velocity of translation of the dipole with respect to Earth's surface. These do not seem depend on the velocities of translation and spinning of Earth in the free space.

Similarly, life spans of steadily moving radioactive particles depend on the velocity of radioactive particles with respect to Earth's surface, but not on the velocities of translation and spinning of Earth.

Note: When a charge moves on the surface of Earth, the electric field and magnetic field originating from the moving charge should depend on the velocities of translation and spinning of Earth in free space as well as on the velocity of charge with respect to Earth's surface. But if Earth translates and spins with the charge and its electric and magnetic fields, the electric and magnetic fields originating from the charge should depend on the velocity of charge with respect to Earth's surface, which is the result of the experiment. The same explanation could be extended to the experiments of transverse Doppler effect and life spans of moving radioactive particles.

iv) Light propagates with a velocity c in free space where Earth is moving with a very high velocity. Therefore, the velocity of light should change if measured on Earth depending on the direction of movement of Earth and the light beam. But it is well confirmed with repeated experiments that the velocity of light is the same c in all direction if measured on Earth. All Michelson-Morley type experiments performed in air stationary on the moving Earth, with light rays (Kennedy-Thorndike, 1932), with microwaves (Cederholm *et al*, 1958) with laser beams (Jajeva *et al*., 1964), and with laser frequency locking techniques (Brillet-Hall, 1979 [6], Hils-Hall, 1990 [7]) register the null results for two-way speed of light. For one-way speed of light (Will, 1992 [8], contra Bay and White 1989 [9]), Riis *et al* (two-photon absorption, 1989 [10]) and Krisher *et al* (NASA Jet Propulsion laboratory, 1990 [11]) have confirmed isotropy of space near the surface of the moving Earth.

The principle of the Michelson–Morley type experiments lies in noting the shift in fringes in the Michelson interferometer due to differences in time taken by light to travel along and opposite direction of motion of Earth; for, the time taken by a beam of light to travel along the direction of motion of Earth should be greater than that to travel distance opposite to the direction of motion of Earth.

The Michelson–Morley experiment is sensitive to the translation of Earth but not to its spinning (about its axis). Kennedy and Thorndike (1932), using an interferometer with unequal arms, carried out the appropriate experiment and found that the result is independent of the spinning of Earth about its axis, or the rotation of this planet in its orbit. Note: This is only possible if Earth while translates, spins about its axis and rotates in its orbit, the electric and magnetic fields translate, spin and rotate with it.

[However, there are a few exceptions to those observations from the days of D.C. Miller 1 (Astro. Phys. J., **28**, 352-368, 1928). Selleri has suggested an anisotropy of space near the surface of Earth from the analysis of unusual effect in Miller's experiment (1925), Kennedy-Thorndike (1932), Jaseva-Javan–Murray– Townes (1963) (F. Selleri: "On the anisotropy observed by Miller and Kennedy & Thorndike") and some authors are drawing attention to the anisotropy of space near the surface of Earth from the analyses of the experimental results from Couvoisier (1953), Silvertooth–Jacobs (1983), Marinov (1987), Marinov-Wesley, as cited by Wilczyn'ski (Ind. J. of Theo. Phy. **43**, 269-77, 1995), none of which seem to have any strong foundation at the present moment. Some electric and magnetic experiments in the form of the Trouton-Noble experiment of 1904 are required to confirm them. Anisotropy in the upper atmosphere of Earth has also been observed by Hefele-Keating (1972) and Smoot *et al* (1977), which should be studied carefully. However, upper atmospheric anisotropy is likely to be observed from the consideration of the study presented in this paper. Some anisotropy of $c+\omega R$, $c-\omega R$ type of the space near the surface of Earth (ω is the angular velocity of Earth and R is the radius of Earth) has been suggested from the Michelson-Gale experiment (1925), experiments of Saburi *et al.* (1976), Brillet-Hall (1979), as analysed by Aspden (1981), the experiment of Bilger *et al* (1995), GPS time synchronisation cited by Kelly (1996) and Marmet (PIRT-2000, edited by Dr. M.C. Duffy), which require serious attention though those seem to be highly improbable from electromagnetic viewpoint.

Any electromagnetic fields are carried along with the moving Earth at the near vicinity of the surface of Earth**.** This indicates that the velocity of light is subject to the influence of the gravitational field of Earth and this has been confirmed by many experiments. Therefore, it is likely that the centrifugal force and especially the Coriolis force originating from the spinning of Earth should also act on the propagation of light which have not been taken into consideration for the explanation of the results of the Michelson-Gale type experiments as proposed by Michelson-Gale, Kelly, Marmet and others.

If there were any $c+v$, $c-v$ effects for the spinning of Earth on the velocity of light as measured on Earth, the magnetic field due to a system of charges slowly moving eastward on the equator would be twice the magnetic field of the same system of charges moving similarly at the 60° latitude.

More interestingly, if $c+v$, $c-v$ effects would be correct for the spinning of Earth, the direction of the magnetic field would remain the same in both the cases when the charges move slowly either eastward or westward in the equator or in many other places on Earth.

Similarly, if a wire is kept stretched in the equator of Earth (or in many other places) east to west and current changes its direction inside the wire, the magnitude of the magnetic field at any point should differ, all of which are improbable.

Therefore, the explanation of the Michelson-Gale type experiments as proposed by Michelson-Gale, Kelly, Marmet and others are improbable].

v) When a light beam falls on a moving mirror, the law of reflection of light ($\theta_i = \theta_r$) is violated.

In the same analogy, the laws of reflection, refraction diffraction and interference on Earth using starlight and sunlight should differ from the analogous laws of optics when light from terrestrial sources on Earth is used**.** But no such difference is observed [12].

Note: this can only happen in the case when the electric magnetic fields (though originating from stars or from the sun) spin translate and rotate with Earth at the near vicinity of Earth's surface.

vi) The magnitude of magnetic field should appreciably change depending on the position and orientation of a current carrying wire on the moving Earth. But, that was not reflected in the results of the relevant experiments.

vii) The speed of light in water moving on the surface of the moving Earth should appreciably vary with the position and orientation of the Fizeau Apparatus on the moving Earth. No such variation was observed.

viii) If a man moves through rain falling straight, he is to lean his umbrella to protect his body from rain due to the motion of rain relative to the motion of the man. Similarly, when light beam (photon rains) comes from the stars, the astronomer to see these stars is to tilt the telescope due to the motion of the light beams relative to the motion of Earth. This is commonly called raindrop effects for starlight or Stellar aberration observed by Bradley. Similar raindrop effects should be observed for light rays coming from a source a little above on the surface of the moving Earth. No raindrop effect is observed at Earth's surface for light rays coming from a source a little above the surface of this planet (Zapffe 1992[13]). Whereas such effects are seen for star rays as observed by Bradley (1729).

ix) The Michelson-Morley experiment performed on the surface of Earth with starlight (Tomaschek, 1924) and with sunlight (Miller, 1925) has also registered null results.

x) Bradley (1728) observed that the stars appear to move in circles, the angular diameter of these circles being 41 seconds of an arc (2v/c where v is velocity of Earth in solar space). But when Airy (1871) observed these stars with a telescope filled with water, with the above analogy, he should measure the angular diameter of these circles as $2nv/c = 54$ seconds of arc, where n is the refractive index of water. But, surprisingly he measured the same angle 41 seconds of an arc for the cone of aberration of stars when seen though a telescope filled with water.

xi) Three mirrors and a semitransparent plate, *i.e.*, a splitter, together with a light source and a photographic plate, are mounted on a turntable. Now, if a beam of light is split by the splitter and sent in opposite directions by mirrors around the circumference of the turntable, an interference pattern is observed. The turntable is capable of being rotated inside the laboratory fixed on the surface of Earth. If the turntable is rotated, the interference fringe is shifted on the interferometer relative to the stationary turntable position. If the turntable be rotated in the opposite direction, the fringes moves to the opposite side. The effect is seen irrespective of whether the observer rotates with the turntable or is stationary. This is the celebrated Garress (1912) – Sagnac (1913) – Pogany (1928) Expt, confirmed by Dufour and Prunnier (1942) and Macek and Davis (1963) with ring laser.

The experiments enumerated in **v)** to **xi)** could be understood in the light of the notes in the experiments enumerated in i) to(iv). All these paradoxical results will be collectively treated in Section 5. We shall show therein that the results of all the experiments clearly imply that the electric and magnetic fields originating from Earth or from the stars and existing at the near vicinity of Earth's surface translate, spin and rotate with the translation, spinning and rotation of Earth, exactly in the same way as all other physical objects on Earth's surface do *i.e.*, Earth carries electric and magnetic fields (which are certainly some real physical entities) along with it at the vicinity of its surface [14], just like it carries all other real physical objects along with its surroundings. Probably, all large heavenly bodies act in the same way. However, it has been pointed out earlier in this section that small- field-creating bodies cannot carry these fields with them [3,4].

2. Relativistic Approaches

Both Lorentz and Einstein overlooked the easy solution to the problems stated in Section 1 of this part of the paper. To reach a solution, they developed a new theory, SRT, which could be summed up as follows [14]:

FitzGerald-Lorentz Assumption

To overcome the difficulty, especially to explain the null result of the Michelson-Morley Experiment, FitzGerald [15] in 1889 suggested the real contraction of moving bodies.

As discussed previously in [1], by proceeding from the Heaviside-Thomson auxiliary space equations {Eq. (17) in [1]} [*i.e.*, $x' = \gamma(x - ut)$, $y' = y$, $z' = z$], Lorentz developed his auxiliary time equation $t' = \gamma(t - ux/c^2)$ to solve radiation problems of moving bodies. But, Lorentz could not explain the null result of the Michelson-Morley experiment from any electro-dynamic principle. So he accepted the doctrine of FitGerald that moving bodies really contract *i.e.*, the equations $x' = \gamma(x - ut)$, $y' = y$, $z' = z$, are real for moving electromagnetic bodies as well as moving mechanical bodies. This view was endorsed by Larmor [16].

From this consideration, Earth is also really dilated to its direction of motion when measured on Earth.

Now, if $x' = \gamma(x - ut)$ is a real equation for the moving Earth, then x', y', z' are not some arbitrary auxiliary elongated unreal Cartesian co-ordinates, and $\mathbf{E}'$ and $\mathbf{B}'$ will not be auxiliary fields of similar nature, invented to solve some problems, as classical electro-magneticians did. Instead, x', y', z' will be the real co-ordinates of the moving Earth, and $\mathbf{E}'$ and $\mathbf{B}'$ are the real fields measured on the moving Earth. Thus, when a stick on the moving Earth is kept parallel to the direction of motion of Earth and is measured on Earth, its length, according to Lorentz, will be greater on Earth than its length if measured from the free space. Fitzgerald, Lorentz and Larmor have interpreted this as meaning that moving objects contract towards their directions of motions.

Lorentz, however, considered that his time equation is auxiliary and unreal. Thus, to Lorentz, the Cartesian co-ordinate derivative part of Eq. (78) is real, while the time derivative part of Eq. (78) is auxiliary and unreal and the equation (78) is quasi-real to him.

Max Abraham [17] contradicted correctly the real contraction of moving objects. Thus the Lorentz transformation equations, though derived from classical electro-dynamics, when infused with the idea of real contraction while moving violated classical mechanics. These masterpieces of Lorentz, although immensely effective in calculating the radiation problems of moving point charges, were illegitimate from the standpoint of mechanics. Lorentz was fully aware of this.

Einstein's Assumptions

Einstein assumed with a further novelty that the time equation of Lorentz was also real, in addition to the reality of the transformation equations of Heaviside-Thomson. So to him the equation (78) was not quasi-real as it was to Lorentz; it was fully real to Einstein. Lorentz did not proceed to prove the real contraction of his transformation equation from any electro-dynamic or general principle. It was accepted by him as an *ad-hoc* basis to explain the null result of the Michelson-Morley Experiment.

Einstein's step was however to justify by some arbitrary principles the reality of the useful Lorentz transformation equations, and to qualify that these principles are absolutely real as such, and that Lorentz transformation equations derived inversely from those principles are also absolutely real. Thus, Einstein justified the equations (77) and (78) *i.e.*, equations (77a) and (78a), by the principle that *the velocity of light is the same for all inertial frames by which he means (with some philosophy) the dyad of equations i.e.,* $x^2 + y^2 + z^2 = c^2t^2$ and $x'^2 + y'^2 + z'^2 = c^2t'^2$, and, thereafter to justify the sets of equations (81a-c) & (82a-c), he principled *that all physical laws are covariant to all inertial frames, by which he means (obviously with some philosophy)* $x' = \gamma(x - ut)$, $x = \gamma(x' + ut')$, *and* $y' = y$ *and* $z' = z$, *where* γ *is an arbitrary constant.* Thus, these two sets of two equations when solved will give Lorentz transformation equations, and if those principles are real, then all the four Lorentz Transformation Equations will also be real.

3. Other Approaches

Neo-Relativistic

Marmet uses "the increase of length of matter" and "slowing down of clocks" – which according to him are natural consequences of mass energy conservation, and he likes to combine these with classical physics to explain electromagnetic phenomena [18]. This is nothing but SRT in a new format. Selleri has invented some other relativistic transformation equations from "empirically based assumptions", one of which reads, "the two way velocity of light is the same in all inertial frames" [19]. It is only verified from experiments that the two-way velocity of light is the same in all directions on the surface of the moving Earth, which is a very large body. It has not been verified at all in any other inertial frames. Therefore, Selleri's theory in essence is likely to be neither correct nor different from SRT.

Anti-Relativistic Approaches

Analyses of AG Kelly [20], R. Manaresi [21] and excellent papers of Jo'zef Wilczyn'ski and C.A. Zapffe published in the 80's and 90's in the Indian Journal of Theoretical Physics and in the Toth-Maation Review are rich with insight and help us much to understand nature, physics and SRT. Nowadays, apart from Tangherlini (1961), Marinov (1979), Chang (1983), Podlaha, Tian and Li (1990), a host of contributors have raised important objections about the foundation of relativity, and have tried to reduce absurdity in relativity; see the writings of W.M. Honig, A.G. Kelly, J. Levy, R. Manaresi,, P. Marmet, W. Petry, V. Pope, Z. Reut, F. Selleri and C.K. Whitney in the Proceedings of PIRT Conference 2000, London, edited by Dr. M. C. Duffy.

4. Criticisms of SRT

The Lorentz transformation equations are actually the relation of coordinates and time between the imaginary auxiliary state and real dynamic state of electro-dynamics. The equations are never real even in the domain of electro-dynamics.

Einstein made an effort to justify the reality of those relations with the assumption (or with some principles originating from this assumption) that auxiliary state itself is real. Therefore, the transformation equations are general laws of Nature.

But, to the electro-magneticians, the reality of these relations is artificial and meaningless. Incidentally, for point-charge electro-dynamics, the calculations of both electro-magneticians and relativists concur owing to the same geometry of a point charge in the static as well as the auxiliary state.

In big-charge electro-dynamics, electro-magneticians will correlate between S and S_0 through the auxiliary state S/. Whereas, relativists will correlate between S and S/, S/ having been assumed as the real system by them. This leaves no room for S_0. Therefore, for big-charge electro-dynamics, this difference of approach leads to different results. So, any effort to explain electrodynamics by means of SRT can only be partly successful in case of big-charge experiments. However, this was never gone into.

In a situation where line current flows in any arbitrary direction, and surface current and volume current flow in the direction of the movement of the system, equations (32a) and (32b) work for both electro-dynamics as well as SRT. In this situation too, electro-dynamic calculations will differ much from relativistic calculations, excepting a few special cases for the reasons stated in the previous paragraph.

In the surface current and volume current electro-dynamics, when these currents flow in any arbitrary direction, equations (32a) and (32b) fail to work for electro-dynamics, whereas, these equations work for SRT. Therefore one wonders why relativists do not make any effort to substantiate their claim by conducting experiments relating to surface current and volume current within the moving system in any arbitrary direction. [22]

To justify the theory that the auxiliary state itself represents reality for all physical phenomena, relativists make use of the situation that for all mechanical bodies the quantity $\sqrt{1 - u^2/c^2}$ is approximately equal to 1. This, however, does not in any sense prove the reality of the auxiliary state in mechanics.

In order to demonstrate the relativity of space, one should be able to produce results like a transverse Doppler effect when the source is at rest and the observer is in opposite motion, and so on.

Out of four famous assumptions of SRT; *i.e.*, **i)** $x^2 + y^2 + z^2 = c^2t^2$, **ii)** $x'^2 + y'^2 + z'^2 = c^2t'^2$, (commonly known as the principle of constancy of the velocity of light in all inertial frames), **iii)** $x' = \gamma(x - ut)$; (iv) $x = \gamma(x' + ut')$ (commonly known as the principle of covariance of all physical laws), the first one is applicable only in free space and not in other inertial frames. The three other assumptions are absurd from any realistic viewpoint.

5. Analysis

Ref. [1] deduced many electrodynamic equations that are applicable only in free space. The **'Surprising Expectatins'** of the

present paper pointed out that those quations are seen to be equally applicable on the surface of the moving Earth too. All other electromagnetic phenomena observed on the surface of the moving Earth are also seen to be independent of the motion of this planet. In other words, all the results of electromagnetic experiments performed on the surface of the moving Earth demand that the surface of the moving Earth is exactly similar to free space for our descriptions of electromagnetic phenomena on it.

Therefore, one must conclude that in the vicinity of its surface, Earth carries electric and magnetic fields along with it just like it carries all other physical objects with it.

In the two-photon absorption experiment (Riis *et al* 1989) and in the NASA jet-propulsion lab experiment (Krisher *et al*, 1990) the space near the surface of Earth is seen to remain isotropic for the one-way velocity of light. In the Michelson-Morley type experiments performed in any medium stationary on Earth, the two-way velocity of light remains the same c/n in all directions on Earth, if measured on Earth. In the Trouton-Noble Experiment, no magnetic field should be observed on the surface of the moving Earth due to the charges stationary on Earth. In the Fizeau and the Biot-Savart experiments, the results should not differ depending on the position and orientation of the Fizeau apparatus or Biot-Savart current carrying wire on the moving Earth. These happen because Earth carries electromagnetic fields along with it.

Electromagnetic radiation is propagation of vibration of electric and magnetic fields. In the Kennedy – Thorndike experiment, it is observed that the velocity of light on the surface of Earth is independent of spinning, translation and rotation of Earth in its orbit. This can only happen if the electric and magnetic fields at the vicinity of Earth's surface spin, translate and rotate with Earth.

Electric and magnetic fields and their vibrations originating from stars travel from astral space to galactic space. From galactic space, these enter the solar space and thence to the surroundings of Earth. Now, Earth carries electric and magnetic fields and their vibrations along with it. Therefore, the relative direction of electromagnetic vibrations coming from outside Earth becomes the real direction once it reaches inside Earth. Therefore, there will be the phenomena of aberration as observed by Bradley, and there will be no further aberration as observed by Airy.

The angle of aberration of stars as seen from the surface of Earth is related to the velocity of Earth with respect to the Sun. Moreover, the angle of aberration does not change when the telescope is filled with water. These happen because Earth carries electric and magnetic fields at the vicinity of its surface, and the Sun's action on the electromagnetic fields is the same as that of Earth. When light starts from an astral source, it propagates with respect to the stars and enter in the galactic regions, where it propagates with respect to the galaxy. Then it comes to the solar system, where it propagates with respect to the sun and finally travels towards Earth. Therefore, the angle of the aberration of stars $\approx v/c$, where v and c are measured with respect to the Sun.

Absence of a raindrop effect for light ray coming from a little above the surface of Earth as cited by Zapffe (1987) [13] confirms that the earth carries electromagnetic vibrations along with it.

If Earth moves with the electric and magnetic fields originating from terrestrial, astral or solar sources and existing at the near vicinity of Earth's surface, there should be no change of fields due to the motion of Earth inside any point of inducted body that is stationary on Earth. However, in such a situation, there will be change of fields at any point inside the inducted body when inducted body moves on the surface of Earth.

Therefore, induction is only possible when the inductor or the inducted body moves either in free space or on the surface of Earth. No induction is possible due to the motion of the Earth when the inductor or the inducted body moves along with Earth, whatever high speed of movement Earth may have with respect to the stars. (This also probably applies for all large heavenly bodies). Under such a situation, one would expect that all optical phenomena like reflection, refraction, diffraction, interference, *etc*., produced from astral, solar or terrestrial sources, if observed on the surface of the moving Earth should be independent of the motion of this planet. These are already confirmed by experiments.

The same explanation can easily be extended to Tomaschek (1924) and Miller's Experiment (1925) where the Michelson-Morley experiment has been performed with starlight and sunlight and to a host of experiments cited by Jo'zef Wilczyn'ski (1994) in his excellent papers published in the Indian Journal of Theoretical Physics in the 80's and 90's of the past century.

In the Sagnac experiment, when the turntable rotates, the interference fringes should be displaced owing to the change of the path length of the light beam on the surface of Earth.

The speed with which the light beam in the Sagnac experiment catches the mirror on the turntable in the direction of rotation is $c - v = c - \omega R$ (where ω is the angular velocity of the turntable and R is its radius). The motion of Earth should have no effect on this result, because the electromagnetic fields are carried along with the surface of the moving Earth.

The light beam catches the mirror with the speed $c + v = c + \omega R$, when it travels in opposite direction for the same reason stated above.

For the first beam, time taken to travel around the circumference $\tau_1 = \dfrac{2\pi R}{c - v}$ and for the second beam $\tau_2 = \dfrac{2\pi R}{c + v}$. Therefore,

$$\Delta\tau = \tau_1 - \tau_2 = 2\pi R\left(\frac{1}{c - v} - \frac{1}{c + v}\right) = \frac{4\pi R\mathrm{v}}{\mathrm{c}^2}.\frac{1}{1 - v^2/c^2} \approx \frac{4\mathrm{A}\omega}{\mathrm{c}^2}$$

where A is the area of the turntable. The result is dependent on the angular velocity of the turntable and independent of the motion of Earth. The calculation matches with the result of the experiment exactly. Interestingly, an observer on the turntable measures the speed of light as $c - v$ when light moves in the direction of rotation of the turntable, and $c + v$ in the opposite direction.

The Sagnac effect demolishes SRT well and truly.

6. Conclusion

Therefore, we may conclude that electr omagnetic fields are real physical entities, and that, as Earth spins about its axis, translates, and rotates in its orbit, the electric field and the magnetic

field originating either from Earth, stars or from the Sun and existing at the near vicinity of Earth's surface, spins, translates and rotates with Earth, exactly in the same way as other physical objects on Earth do. (But, it is almost certain that for small bodies, any electric and magnetic fields originating from them do not translate and rotate with the bodies). This simple consideration, along with Maxwell's field equations, will naturally explain all electrodynamic phenomena in free space as well as on the surface of the moving Earth within a Newtonian framework and thereby, SRT is at a stroke overthrown from the domain of electrodynamics.

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References and Notes

[1] S. Hajra and A. Ghosh, "Collapse of SRT 1: Derivation of Electrodynamic Equations from the Maxwell Field Equations," Galilean Electrodynamics **16** (3) 63-71 (2005).
[2] A.S. Kompaneyets, **Theoretical physics,** p. 105 (Foreign Language Publishing House, Moscow, 1961),
[3] T. Alvager. *et al*, Physics Lett, **12**, 260 (1964).
[4] K. Brecher, Phy. Rev. Lett, **39**, 1051-54 (1977).
[5] Satya Prakash, **Relativistic Mechanics,** pp. 50-51 (Pragati Prakasan, Meerut, 2002).
[6] A.Brillet and H.L. Hall, Phy. Rev. Lett. **42**, 549-52 (1979).
[7] D. Hils and J.L. Hall, Phy. Rev. Lett. **64**, 1697–1700 (1990).
[8] C. M. Will, Phys. Rev. D **45**, 403 (1992),.
[9] Z. Bay and J.A. White, Phys. Rev. Lett. **62**, 841 (1989),.
[10] E. Riis *et al*, Phy. Rev. Lett. **60**, 81 (1988),.
[11] T.P. Krisher *et al*, Phy. Rev. D **42**, 731 (1990).
[12] H.A. Lorentz, **The Theory of Electrons,** p. 17 (Dover Publication Inc., New York, 1909, 1915),
[13] C.A. Zapfee, Ind.J. of Theo. Phy., **40**, 145-148 (1992).
[14] A. Einstein & H. Minkowski, **The principle of Relativity,** p. 1 (Translated by M.N. Saha and S.N. Bose, University of Calcutta, 1920).
[15] G.P. FitzGerald, Science **13**, 390 (1889),.
[16] J. Larmor, Phil. Trans. of the Roy. Soc. **CLXXXVI**, 695-743 (1895).
[17] H.A. Lorentz, **The Theory of Electrons**, p. 214.
[18] P. Marmet, **PIRT-2000**, edited by Dr. M.C. Duffy, London.
[19] F. Selleri, **Theory Equivalent to Special Relativity I**, 1 (1999).
[20] A.G. Kelly, **A New Theory on the Behaviour of Light**, Monograph 2, IEI (1996).
[21] R. Manaresi, **Relativity principle and Lorentz contraction are incompatible** (the paper has been kindly sent to me by the author).
[22] S. Hajra, "Large Charge Electrodynamics and Special Relativity," (PIRT 2002, London, edited by Dr. M.C. Duffy) to be published.