

# **THE WALLACE INVENTIONS, SPIN ALIGNED NUCLEI, THE GRAVITOMAGNETIC FIELD, AND THE TAMPERE EXPERIMENT: IS THERE A CONNECTION?**

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From: Robert Stirniman  
To: Patrick Bailey  
Subject: [Fwd: Wallace & Tampere (Long)]

[with corrections to the "Gravitomagnetic Field" definition in the Appendix, made in a recent email to James Cox, CC to me. PB.]

[snip]

The Wallace Inventions, Spin Aligned Nuclei, The Gravitomagnetic Field, and The Tampere Experiment: Is there a connection?

By: Robert Stirniman, May 1998

During the 1960s through the mid 1970s, Henry William Wallace was a scientist at GE Aerospace in Valley Forge PA, and GE Re-Entry Systems in Philadelphia. In the early 1970s, Wallace was issued patents (1,2,3) for some unusual inventions relating to the gravitational field. Wallace developed an experimental apparatus for generating and detecting a secondary gravitational field, which he named the Kinemassic field, and which is now better known as the gravitomagnetic field.

Wallace's experiments were based on aligning the nuclear spin of elements and isotopes, which have an odd number of nucleons. These materials are characterized by a total nuclear spin, which is an odd integral multiple of one-half, resulting in one nucleon with un-paired spin. Wallace drew an analogy between the un-paired angular momentum in these materials, and the un-paired magnetic moments of electrons in ferromagnetic materials.

Wallace created nuclear spin alignment by rapidly spinning a brass disk, of which essentially all isotopes have an odd number of nucleons. Nuclear spin becomes aligned in the spinning disk due to precession of nuclear angular momentum in inertial space -- a process similar to the magnetization developed by rapidly spinning a ferrous material (known as the Barnett effect). The gravitomagnetic field generated by the spinning disk is tightly coupled (0.01 inch air gap) to a gravitomagnetic field circuit composed of material having half integral nuclear spin, and analogous to magnetic core material in transformers and motors. The gravitomagnetic field is transmitted through the field circuit and focused by the field material to a small space where it can be detected.

In his three patents, Wallace describes three different methods used for detection of the gravitomagnetic field -- change in the motion of a body on a pivot, detection of a transverse voltage in a semiconductor

crystal, and a change in the specific heat of a crystal material having spin-aligned nuclei. In a direct analogy with a magnetic circuit, the relative amount of the detected gravitomagnetic field always varied directly with the size of the air-gap between the generator disk and the field circuit.

Wallace's patents are written in great detail, and he appears to be meticulous in his experimental design and practice. In my opinion, it is nearly certain that his experiments performed as claimed. Nonetheless, there has been no scientific acknowledgment whatsoever of Wallace's discoveries. An in-depth search of the literature has uncovered only two references to Wallace's work (4, 5), and each of these references merely creates further mystery.

The necessary existence of a magnetic-like gravitational field has been well established by physicists specializing in general relativity, gravitational theories, and cosmology. But, the existence of this field is not well known in other of arenas of physical science. The gravitomagnetic field was first hypothesized by Heaviside in the 1880's. The field is predicted by general relativity, and was first formulated in a relativistic context in 1918 by Lense and Thirring (6). In 1961, Forward (7) was the first to express the gravitational field equations in a vector form directly analogous and nearly identical to Maxwell's equations for electromagnetics.

During the last 20 years many other scientists, (8 to 17), have published articles demonstrating the necessary existence of the gravitomagnetic field, using arguments based on general relativity, special relativity, and the cause and effect relationship which results from non-instantaneous propagation of energy (retardation). Nearly all of these authors present the gravitational field equations in a vector form similar to Maxwell's equations. Some authors comment that these equations provide fundamental insights into gravitation, and it is unfortunate that they are not at all well known. Despite their relative simplicity and possible practical value, Maxwell's equations for gravitation do not appear in any under-graduate physics textbook.

Just as in Maxwell's equations for electromagnetics, it is found that in the presence of a time varying gravitomagnetic flux there will always exist concurrently a time varying gravitoelectric field. The secondary generated gravitoelectric field is a dipole field, and unlike the background gravitoelectric field due to mass charges, the generated gravitoelectric field always exists in closed loops. Henry Wallace recognized this and described it in his inventions.

Wallace also describes another effect, which may result from generation of a secondary gravitoelectric field. Wallace believed that a secondary gravitoelectric field can result in exclusion of an existing primary background field. In other words, a gravitational shield can be created. The bulk of Wallace's patents describe his experimental apparatus, and his detection of the gravitomagnetic field. The effects detected are minuscule, and as such, may not be of immediate practical value. In reading his patents it is possible to become immersed in the detail of his experimental apparatus, and to neglect the possible significance of the alternative embodiment of his invention (figures 7, 7A, and 7B of his first patent). The alternative embodiment uses a time varying gravitomagnetic flux to create a secondary gravitoelectric

field in an enclosed shell of material in order to shield the background gravitoelectric field of the earth.

Unfortunately, Wallace does not state whether this embodiment was ever actually produced, and unlike the detailed discussion of his experimental apparatus, he provides no experimental findings or data to back his claim. Nor does he provide much in the way of theoretical arguments about how a secondary gravitoelectric field can act to exclude a primary field, except to state: "It is well known that nature opposes heterogeneous field flux densities."

Is it well known that nature opposes heterogeneous flux densities? Well, not to me, and I can not find anything in the way of scientific literature to directly support this idea. But it does seem to make sense. It could be argued thusly. In a well-ordered manifold all derivatives of the fields, time-like and space-like, must be continuous. If you force a field to exist in a region of space, the existing background field is somehow required to form a pattern around or smoothly merge with the created field. Nature does not permit flux lines to act with cross-purposes and to exist with widely different directions in the same region of space. Flux lines can never cross. Wallace seems to have gotten his experiments right -- maybe he is also right in his claim of inventing a gravitational shield?

In a ground breaking paper in 1966, Dewitt (18) was first to identify the significance of gravitational effects in a superconductor. Dewitt demonstrated that a magnetic-type gravitational field must result in the presence of fluxoid quantization. In 1983, Dewitt's work was substantially expanded by Ross (19).

Beginning in 1991, Ning Li, at the University of Alabama Huntsville, and Douglas Torr, formerly at Huntsville and now at the University of South Carolina, have published a number of articles about gravitational effects in superconductors (20, 21, 22). One interesting finding they have derived is the source of gravitomagnetic flux in a type II superconductor material. Guess what? It is due to spin alignment of the lattice ions.

Quoting from Li and Torr's second paper: "The interaction energy of the internal magnetic field with the magnetic moment of the lattice ions drives the lattice ions and superconducting condensate wave function to move together vortically within the range of the coherent length and results in an induced precession of the angular momentum of the lattice ions." And quoting from their third paper:

"Recently we demonstrated theoretically that the carriers of quantized angular momentum are not the Cooper pairs but the lattice ions, which must execute coherent localized motion consistent with the phenomenon of superconductivity." And, "It is shown that the coherent alignment of lattice ion spins will generate a detectable gravitomagnetic field, and in the presence of a time-dependent applied magnetic vector potential field, a detectable gravitoelectric field."

Li and Torr also demonstrate that the gravitomagnetic field in a superconductor has a relatively large magnitude compared with the magnetic field -- a factor of  $10E_{11}$  times larger. The gravitational wave velocity in a superconductor is estimated as a factor of two magnitudes smaller than the velocity in free space. And the resulting estimate of

relative gravitomagnetic permeability is four magnitudes (10 thousand times) greater than the permeability of free space. In their third paper, Torr and Li, demonstrate that it is possible to generate a time varying gravitomagnetic field in a superconductor, which must exist concurrently with a time varying gravitoelectric field.

In 1995, Becker et al (23), show mathematically that a significant size Gravitomagnetic field must always exist along with a magnetic field whenever there is flux pinning or other forms of flux trapping in a type II superconductor. They propose a macroscopic experiment to detect the gravitomagnetic field. Becker et al, choose not to speculate about the source of the gravitomagnetic field, except to provide a brief comment that it may result from spin of the lattice ions. One might ask, what is a pinning center if not a microscopic hole which carries trapped flux, and what must be source of the gravitomagnetic dipole moment if not the angular momentum of the lattice ions at the pinning center?

In 1992, an experiment at Tampere University was reported by Podkletnov (24, 25). A toroidal shaped type II superconductor disk was suspended via the Meissner effect by a constant vertical magnetic field, and was rapidly rotated by a time varying horizontal magnetic field. Masses located in a cylindrical spatial geometry above the rotating disk were found to lose up to 2% of their weight. A gravitational shielding effect is claimed.

Conclusion.

Is a time varying gravitomagnetic field generated in the Tampere disk due to the horizontal time varying magnetic field used to rotate the disk, and does this result in a time varying gravitoelectric field in the disk, and possibly also in the space surrounding the disk, and could this result in exclusion of the earth's primary background gravitoelectric field as claimed by Henry Wallace?

Acknowledgments.

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References:

1. US Patent No 3626605, Method and Apparatus for Generating a Secondary Gravitational Force Field, Henry Wm Wallace, Ardmore PA, Dec 14, 1971. Wallace's first patent. The gravitomagnetic field is named the kinemassic field. The patent describes the embodiment of his experiment. An additional embodiment of the invention (Figures 7, 7A, and 7B) describes how a time varying gravitomagnetic field can be used to shield the primary background gravitoelectric field. Available on the net. <http://www.eskimo.com/~billb/weird/wallc/>
2. US Patent No 3626606, Method and Apparatus for Generating a Dynamic Force Field, Henry Wm Wallace, Ardmore PA, Dec 14, 1971.

Wallace's second patent provides a variation of his experiment. A type III-V semiconductor material (Indium Arsenide), of which both materials have unpaired nuclear spin, is used as an electronic detector for the gravitomagnetic field. The experiment demonstrates that the material in his gravitomagnetic field circuit has hysteresis and remanence effects analogous to magnetic materials. Available on the net.  
<http://www.eskimo.com/~billb/weird/wallc/>

3. US Patent No 3823570, Heat Pump, Henry Wm Wallace, 60 Oxford Drive, Freeport NY, July 16, 1974 Wallace's third patent provides an additional variation of his experiment. Wallace demonstrates that by aligning the nuclear spin of materials having an odd number of nucleons, order is created in the material, resulting in a change in specific heat.

4. New Scientist, 14 February 1980, Patents Review This article is one of the only references to Wallace's work anywhere in the literature. The article provides a brief summary of his invention and ends with this intriguing paragraph. "Although the Wallace patents were initially ignored as cranky, observers believe that his invention is now under serious but secret investigation by the military authorities in the US. The military may now regret that the patents have already been granted and so are available for anyone to read."

5. Electric Propulsion Study, Dennis L. Cravens, Science Applications International Corp, August 1990, Prepared for Astronautics Laboratory, Edwards AFB. This report provides a detailed review of a variety of 5-D theories of gravitational and electromagnetic interactions. It also provides a summary of a variety of possibly anomalous experiments, including experiments relating to spin aligned nuclei. The reports contains two paragraphs about Wallace's inventions -- partially quoted here: "The patents are written in a very believable style which include part numbers, sources for some components, and diagrams of data. Attempts were made to contact Wallace using patent addresses and other sources but he was not located nor is there a trace of what became of his work. The concept can be somewhat justified on general relativistic grounds since rotating frames of time varying fields are expected to emit gravitational waves."

6. On the Gravitational Effects of Rotating Masses: The Lense-Thirring Papers Translated, B. Mashhoon, F.W. Hehl, and D.S. Theiss. General Relativity and Gravitation, Vol 16:711-50 (1984) A translation of the original article in German by J. Lense and H. Thirring published in 1918. This article is the first fairly comprehensive analysis of the necessary existence of the gravitomagnetic field. An earlier prediction of the existence of this field was made by Heaviside in the 1880s.

7. Proceedings of the IRE Vol 49 p 892, Robert L. Forward (1961) Forward was the first to express the gravitomagnetic field in the modern form of Maxwell's equations for gravitation. He named it the prorotational field.

8. Gravitation, C.W. Misner, K.S. Thorne, and J.A. Wheeler, Freeman Publishing, San Francisco (1973). MTW is the bible of gravitational theorists. Among many other theories presented, gravitational field

equations are derived from general relativity in a form similar to Maxwell's equations.

9. Laboratory Experiments to Test Relativistic Gravity, Vladimir B. Braginsky, Carlton M. Caves, and Kip S. Thorne, Physical Review D, Vol 15 No 8 p2047, April 15 1977 Gravitational field equations are derived from General Relativity in a form similar to Maxwell's equations. The gravitomagnetic field is called magnetic-type gravity. A variety of experiments are proposed and analyzed for detecting the gravitomagnetic field.

10. Foucault Pendulum at the South Pole: Proposal for an Experiment to Detect the Earth's General Relativistic Gravitomagnetic Field, Vladimir Braginsky, Aleksander Polnarev, and Kip Thorne, Physical Review Letters, Vol 53 No 9 p863, August 1984 Analyses an experiment for detecting the earth's gravitomagnetic field. Possibly the first authors to use the terms gravitomagnetic and gravitoelectric.

11. On Relativistic Gravitation, D. Bedford and P. Krumm, American Journal of Physics, Vol 53 No 9, September 1985 The necessary existence of the gravitomagnetic field is derived from arguments based on special relativity. The field is referred to as the gravitational analog of the magnetic field.

12. The Gravitational Poynting Vector and Energy Transfer, Peter Krumm and Donald Bedford, American Journal of Physics, Vol 55 No 4 p362, April 1987 Establishes the necessary existence of the gravitomagnetic field based on arguments from special relativity and energy conservation in mass flow. Derives the gravitational Poynting vector. Names the two types of gravitational fields as gravinetic and gravistatic.

13. Gravitomagnetism in Special Relativity, American Journal of Physics Vol 56 No 6 p523, June 1988 Predicts the existence of the gravitomagnetic field using special relativity and time dilation. Names the fields gravielectric and gravimagnetic.

14. Detection of the Gravitomagnetic Field Using an Orbiting Superconducting Gravity Gradiometer: Theoretical Principles, Bahram Mashhoon, Ho Jung Paik, and Clifford Will, Physical Review D, Vol 39 No 10 p2825, May 1989. Provides a summary analysis of Maxwell's equations for gravitation, and an in-depth analysis of the Gravity Probe-B orbital gyroscope experiment for detecting the earth's gravitomagnetic field.

15. Analogy Between General Relativity and Electromagnetism for Slowly Moving Particles in Weak Gravitational Fields, Edward G. Harris, American Journal of Physics, Vol 59 No 5, May 1991 Derives Maxwell's equations for gravitation from GR in the case of non-relativistic velocities and relatively weak field strengths. A somewhat more direct method of derivation is used compared with the PPN formulation used by Braginsky, et al.

16. Gravitation and Inertia, Ignazio Ciufolini and John Wheeler, Princeton Series in Physics, Princeton University Press (1995), Chapter 6 -- The Gravitomagnetic Field and its Measurement. Derives the electromagnetic analog of the gravitational field equations, and

provides in-depth analysis of experiments for detecting the gravitomagnetic field.

17. Causality, Electromagnetic Induction, and Gravitation. Oleg Jefimenko, Electret Scientific Publishing, Star City WV (1992). Jefimenko derives the electromagnetic field equations based on retarded sources, (charges, moving charges, and accelerating charges). He applies similar arguments to the gravitational field equations. If gravitational energy propagates at any finite speed, the gravitomagnetic field must exist. Maxwell's equations for gravitation are presented. He also presents an unusual configuration of mass, which is predicted to provide an antigravity effect.

18. Physics Review Letters, Vol 16 p1902, B.S. Dewitt (1966) I don't have this paper, and can not provide a summary. Dewitt was the first to analyze fluxoid quantization in a superconductor in the presence of a time varying magnetic-type gravitational field.

19. The London Equations for Superconductors in a Gravitational Field, D.K. Ross, Journal of Physics A, Vol 16 p1331. (1983) Maxwell's equations for gravitation are presented in vector form. Ross uses the name coined by Forward for the gravitomagnetic field -- the prorotational field. Fluxoid quantization is analyzed in the presence of a varying gravitomagnetic field. Ross establishes that the momentum of a charged particle in an electromagnetic and gravitational field is given (in MKS units) by:  $p = mv + qA + mV$ , where  $V$  is the gravitomagnetic vector potential, and  $A$  is the magnetic vector potential. The resulting modified London equations are presented in covariant form.

20. Effects of a Gravitomagnetic Field on Pure Superconductors, Ning Li and Douglas Torr, Physical Review D, Vol 43 No2 p457, January 1991 Li and Torr present Maxwell's equations for gravitation using MKS units. The equations are given in a form where the gravitomagnetic permeability of a superconductor material is presumed to be different than the permeability of free space. Vector equations for the gravitational potentials are also presented. The canonical momentum is derived (same finding as Ross paper). It is established that an electrical current also results in a mass current, and an inter-relationship is derived between the magnetic field and gravitomagnetic field in a superconductor. It is established that the magnetic flux in a superconductor is a function of the gravitomagnetic permeability, and vice versa, resulting in a more rigorous form of the Meissner equation and the London theory. It is shown that the gravitomagnetic field must have a relatively large size in a superconductor, and is on the order of  $10^{11}$  times larger than the magnetic field.

21. Gravitational Effects on the Magnetic Attenuation of Superconductors, Ning Li and Douglas Torr, Physical Review B, Vol 64 No 9 p5489. September 1992. Li and Torr elaborate on their theory of the interrelationship of the gravitomagnetic field and the magnetic field in superconductors. It is established that the gravitomagnetic field must be sourced by spin alignment of the lattice ions. The velocity of a gravitational wave in a superconductor is estimated to be two orders of magnitude slower than the vacuum velocity, resulting in an estimate of relative gravitational permeability of a superconductor material which is as much as four magnitudes greater than free space.

22. Gravitoelectric-Electric Coupling Via Superconductivity, Douglas Torr and Ning Li, Foundations of Physics Letters, Vol 6 No 4 p371. (1993) Torr and Li continue their analysis of gravitational effects in superconductors. Abstract: "Recently we demonstrated theoretically that the carriers of quantized angular momentum are not the Cooper pairs but the lattice ions, which must execute coherent localized motion consistent with the phenomenon of superconductivity. We demonstrate here that in the presence of an external magnetic field, the free superelectron and bound ion currents largely cancel providing a self-consistent microscopic and macroscopic interpretation of near-zero magnetic permeability inside superconductors. The neutral mass currents, however, do not cancel, because of the monopolar gravitational charge. It is shown the coherent alignment of lattice ion spins will generate a detectable gravitomagnetic field, and in the presence of a time-dependent applied magnetic vector potential field, a detectable gravitoelectric field."

23. Proposal for the Experimental Detection of Gravitomagnetism in the Terrestrial Laboratory, Robert Becker, Paul Smith, and Heffrey Bertrand. September 1995. Published on the net. <http://www.inetarena.com/~noetic/pls/RBecker/Gmexp2.htm> Becker, et al, demonstrate mathematically that a significant size gravitomagnetic field must exist concurrently with a magnetic field in a superconductor whenever there is flux pinning or other forms of flux trapping. An experiment is proposed whereby a small hole is made in a superconductor, flux is trapped in the hole, and the gravitomagnetic field is detected by measuring counter-torque from a macroscopic cylindrical mass inserted through the hole.

24. A Possibility of Gravitational Force Shielding by Bulk YBa2Cu3O7-x Superconductor, E. Podkletnov and R. Nieminen, Physica C Vol 203 p441 (1992) Podkletnov describes an experiment where a 2% reduction in weight is created in a mass suspended over a levitated and rotating superconductor disk. A detailed compilation of information about this experiment is available on the net at Pete Skegg's website. <http://www.inetarena.com/~noetic/pls/gravity.html>

25. Weak Gravitational Shielding Properties of Composite Bulk Yba2Cu3O7-x Superconductor Below 70K Under EM Field, Eugene Podkletnov, LANL Physics Preprint Server, Cond-Mat/9701074, January 1997. Podkletnov provides greater detail about his experimental apparatus and the construction of the superconductor disk. Available on the net. <http://www.gravity.org/msu.html>

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Appendix - MKS Units for the Gravitomagnetic Field.

Gravitoelectric Charge = Kg  
(in purely electrical units, Kg = (Weber/Meter)(Coul/Meter)(Sec)

Gravitoelectric Field = Meter/Sec-Squared

Gravitoelectric Flux Density = Kg/Meter-Squared

Mass Current = Kg/Sec = (Weber/Meter)(Coul/Meter)



Gravitomagnetic Dipole Moment = (Kg)(Meter-Squared)/Sec  
= Angular Momentum  
= (Coulomb)(Weber)

Gravitoelectric Dipole Moment = (Kg)(Meter) (You would need the equivalent of negative mass to make one of these)

Gravitomagnetic Charge = (Velocity)(Meter) = Square-Meter/Sec

Gravitomagnetic Field = (Mass Current)/Meter  
= Kg/Sec-Meter  
= ((Kg-Meter^2)/Sec)/Meter^3  
= Spin Density  
= (Angular Momentum)/Cubic-Meter  
= (Coulomb)(Weber)/Meter^3

[A spin-wave is a gravtiomagnetic wave.]

Gravitomagnetic Flux Density = (Gravitomagnetic Charge)/Meter^2  
= Velocity/Meter  
= 1/Sec = Angular Velocity

Gravitoelectric Scalar Potential = Joule/Kg  
= (Acceleration)(Meter)  
= (Gravitoelectric Field)(Meter)  
= Velocity-Squared  
= Meter-Squared/Second-Squared

Gravitomagnetic Vector Potential = (Gravitomagnetic Charge)/Meter  
= Velocity = Meter/Sec

Gravitoelectric Permittivity = Gravitoelectric Flux per Gravitoelectric Field  
= (Kg)(Second-Squared)/(Cubic Meter)  
= 1/4(Pi)(G) = 1.1927E09 Kg-Sec^2/Meter^3

Gravitomagnetic Permeability = Gravitomagnetic Flux per Gravitomagnetic Field  
= Meter/Kg  
Assuming Gravitational Waves Propagate at the Velocity of Light --  
= 1/(c-squared)(epsilon0)  
= 9.316E-27 Meter/Kg

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