Notes on a Measured Gravito-Magnetic London Moment

As Measured and Formulated by Tajmar & de Matos (2006)

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Draft - March 27, 2006

ABSTRACT

Prompted by an ESA announcement of experimental results, a brief on the Gravito-Magnetic London Moment is presented. The brief is based on a summary of two papers by Tajmar, de Matos, et.al. released for prepublication review on 3/23/06.

INTRODUCTION

An announcement of the first laboratory measurement of the Gravito-Magnetic London Moment was made by the European Space Agency (ESA) on March 23rd, 2006. The laboratory work was performed at the ARC Seibersdorf Reseach organization in Seibersdorf Austria under the direction of Dr M. Tajmar, with theoretical support provided by Dr. C.J. de Matos at ESA-HQ in Paris, France.

NOTES FROM THE EXPERIMENTAL PAPER [1]

What was actually measured? The first repeatable generation of a gravitational field in the lab. The effect was successfully reproduced over 200 times and is described in reference [1].

More specifically, a tangential acceleration field was measured on the inside of a rotating superconductor. The largest effect was during sharp accelerations and decelerations of the rotating superconductor. With a Niobium superconductor, the application of a tangential acceleration to the disk of 1500 rad/s^2 resulted in an acceleration field outside of the disk of 100uG, 30 orders of magnitude larger than predicted by classical general relativity. Signal to noise ratios of the accelerometers were better than 3:1, and differential signals (derived with reference accelerometers) were used for bias removal.

The experimental configuration and measured field orientation are depicted together in figure 1.

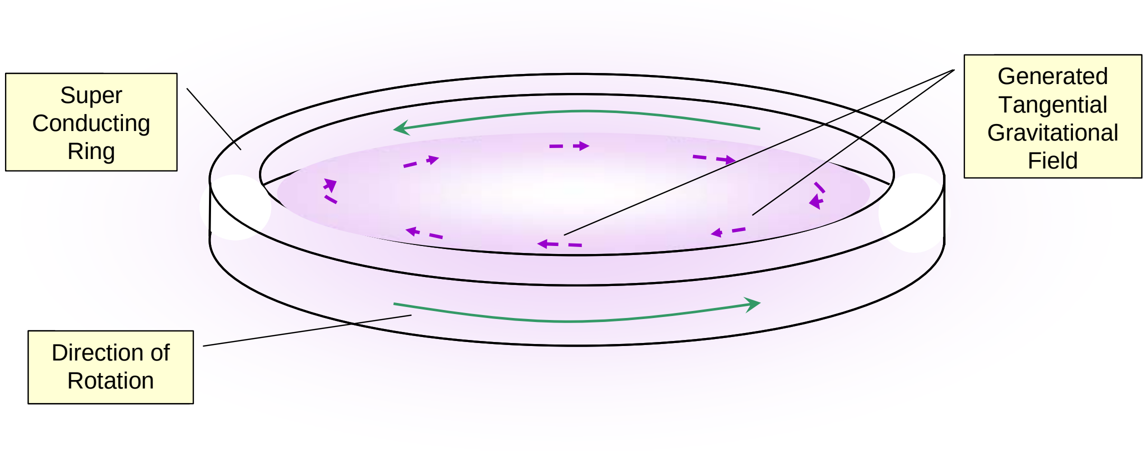

Figure 1: Measured gravitational field generated by the Gravito-Magnetic London Moment

The measurements are consistent with predictions of the Gravito-Magnetic London Moment, described in reference [2].

NOTES FROM THE THEORETICAL PAPER [2]

The London Moment is the magnetic field produced by rotating a superconductor (SC). It is the result of the Cooper electron pairs inside the SC lagging somewhat from the rest of the rotating SC material. This field does not occur in ordinary matter because the photon mass varies as a function of the type and density of matter, i.e. photon mass is a local, not universal, value, and the mass of the photon in ordinary matter makes it ineffective at producing the moment. Photon mass is derived in [2] from Larmor's theorem (magnetic field is equivalent to the spin of a charge with mass.)

A similar argument is made for the Gravito-Magnetic London Moment, a gravitational (frame dragging) field produced by the rotation of a superconductor. In this case the gravitons experience a local variable mass in SC matter which impacts its effectiveness, allowing the effect. The graviton mass can be derived from the gravitational Larmor theorem, which is simply a description of the properties of inertia. Stated another way, matter can not distinguish between acceleration from a rotating reference frame or from gravito-magnetic fields.

The problem with this formulation of the graviton is that it is at odds with quantum mechanics. The "classical" graviton that propagates quadrupolar gravitational waves in a vacuum (& in mass) is a spin 2 particle, but the graviton that varies its mass inside matter is a spin 1 particle. In a manner vaguely reminiscent of Heim quantum theory, the authors escape this problem by allowing both types of graviton, renaming the latter spin 1 particle a "gravito-photon." In the case of no matter (no local gravitational sources), i.e. the vacuum case, there are no gravito-photons, and therefore general relativity is still correct, but both types are present in matter, and gravito-photons allow field production for coherent matter, purely a quantum mechanical effect.

PRACTICAL IMPLICATIONS

Two types of gravity

It was also shown in reference [2] that the local gravito-photon mass is directly related to the Higgs boson mass. If the two can be shown to be equivalent, this would provide a long sought bridge that may be used to unify a Maxwellian quantum gravitational theory with the Standard Model, providing a UFT.

It this formulation is valid, it will also have a profound effect on the emerging theory of HFGW (high frequency gravitational waves). In a vacuum the theory will still be correct, but inside matter there may be much easier ways to generate HFGW than has previously been imagined. It would be a worthwhile exercise to revisit HFGW generator designs in light of this paper's results.

"Coherent matter can be used to engineer the vacuum." – Ref. [2]

Since the tangential field extends to outside the SC, there may be ways to scale up the effect and direct it in such a manner as to provide propulsion. At 100uG's, the effect is just 4 orders of magnitude away from providing a 1 G acceleration. While the direction of acceleration in the current configuration in not useful, providing a more useful vector direction is essentially an engineering problem.

CONCLUSIONS

- A gravitational field has been created in the laboratory. It is 30 orders of magnitude larger than predicted by general relativity. If it is magnified another 4 orders of magnitude it will provide lift, i.e. field propulsion.
- A theoretical paper was also written that explains the effect in terms of a frame dragging field that is produced by the lagging of gravito-photons inside the bulk of the SC.
- The resultant gravitational field can extend to outside the superconductor, and may therefore be used to "engineer the vacuum" in a variety of useful ways, including communication and propulsion applications.

REFERENCES

[1] Tajmar, M., Plesescu, F., Marhold, K., de Matos, C.J., "Experimental Detection of the Gravitational London Moment," *Physcia C* (submitted)
[2] Tajmar, M., de Matos, C.J., "Local Photon and Graviton Mass and its Consequences," *International Journal of Modern Physics D* (submitted)