

# Could Podkletnov effect be understood using

$h_{gr} = h_{eff}$  hypothesis?

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## Abstract

Podkletnov effect generated a fury when it was reported and Podkletnov had to leave his job at Tampere University. The experiment involves a levitating disk above a toroidal magnet. Solenoids generating AC fields with frequency in the range  $50 - 10^6$  Hz are used to rotate the disk. Above the disk at height of 15 mm is a sample of silicon with weight of 5.47834 g. The claim is that both the rotating disk and sample lose part of their weight: the estimate varies from .3 per cent to few per cent. The effect was resonance like above frequency  $10^5$  Hz: below this the weight fluctuates. The size of the effect increases with rotation frequency. In this article a possible TGD inspired interpretation of Podkletnov effect as an effect somewhat analogous to fountain effect in superfluidity is discussed.

## 1 Introduction

Podkletnov discovered his effect around 1982. There are funny co-incidences involved. I got my PhD. Podkletnov was kicked out from Tampere University and I was soon to find that it is impossible to find any funding for my work: situation is still the same! God can forgive but not colleagues. I have considered possible models for Podkletnov effect [H2, H3, H1] in TGD framework for years ago assuming that the propagation of gravitons along topological light rays attached to magnetic flux tubes mediate gravitational interaction. A lot of progress has taken since then. Therefore reconsideration is well-motivated.

The effect itself looks rather complex. The experiment involves a levitating disk above a toroidal magnet. Solenoids generating AC fields with frequency in the range  $50 - 10^6$  Hz are used to rotate the disk. Above the disk at height of 15 mm is a sample of silicon with weight of 5.47834 g. The claim is that both the rotating disk and sample lose part of their weight: the estimate varies from .3 per cent to few per cent. The effect was resonance like above frequency  $10^5$  Hz: below this the weight fluctuates. The size of the effect increases with rotation frequency.

## 1.1 Some background about TGD

It is best to start by introducing some background about TGD.

1. The first thing to notice is that  $f = 6 \times 10^5$  Hz is cyclotron frequency of electrons in the magnetic field  $B_{end} = .2$  Gauss introduced to explain the quantal effects of ELF em fields on brain which appear at multiples of cyclotron frequencies of biologically important ions. The recent model for bio-photons as decay products of dark protons predicts that their spectrum correspond to a spectrum of  $B_{end}$ . Could it be that the magnetic fields at the flux tubes involved has spectrum of  $B_{end}$  and resonant transfer of energy in the frequency range containing  $f = 6 \times 10^5$  Hz takes place?
2. The hypothesis  $h_{eff} = h_{gr} = GM_D m/v_0$ , where  $M_D$  is the dark mass assignable with large system (Earth now) and  $v_0$  is velocity parameter [K2] is relatively new piece of TGD inspired quantum biology. One obtains a rough estimate  $M_D/M \simeq 2. \times 10^{-4}$  for the fraction of dark matter in the case of Earth and assignable to the dark magnetic body of Earth. One implication of  $h_{gr} = h_{eff}$  hypothesis at gravitation mediating flux tubes is that cyclotron frequencies of particles do not depend on the mass of the particle and cyclotron energy spectrum of dark photons is universal and identifiable as that associated with bio-photons. Second implication is that each charged particle corresponds to particular value of Planck constant so that in many-sheeted space-time they populate different flux tubes: this could be very relevant for biology since cell would not be anymore a random soup of molecules. The model for the Pioneer and Flyby anomalies leads to the estimate  $M_D/M \simeq 1.3 \times 10^{-4}$  consistent with the above estimate.
3. I have considered recently a model for the fountain effect of superfluidity [K1] considering the possibility that dark phases of matter in TGD sense might be associated with all critical situations - both ordinary critical and quantum critical phase transitions - in which long range fluctuations correlations explained in terms of generation of dark matter are present.

The superfluid is able to climb from vessel along its walls apparently defying gravitation. The TGD explanation is in terms of large Planck constant  $h_{gr} = h_{eff}$  hypothesis. The large value of  $h_{gr}$  implies macroscopic quantum gravitational coherence and that the quantum states in gravitational field for dark  ${}^4\text{He}$  atoms have macroscopic size. In particular, the flow along walls is effectively free flow.

## 2 The anomaly in the measurement of Cooper pair mass in rotating superconductors

One has discovered an anomalous outcome in the mass measurements of Cooper pairs in the case of rotating superconductors [E1]. The measured mass of Cooper pair in rotating super conductor is slightly larger than the mass of the pair which must be slightly below the sum of the masses. Tajmar et al [E3, E2] try to explain

the anomaly is in terms of a gigantic gravimagnetic London effect associated with a rotating superconductor.

1. Recall that in the ordinary London effect a magnetic field proportional to the negative of rotation frequency is generated inside super-conductor: usually the magnetic field is expelled. London magnetic field corresponds to a magnetic dipole proportional the negative of the rotation frequency (this follows from the negative sign of the charge carriers). The natural expectation is that this gives rise to a dipole field outside the superconductor. The dipole moment would be generated by electron current at the surface of the superconductor.
2. The idea is to introduce gravitational superconductivity for which all kinds of particles participate in the flow which would be analogous to super-fluidity. One can also speak about gravitational Meissner effect and massivation of graviton as analog of massivation of photons in the ordinary Meissner effect. Also the notion of London magnetic field might generalize and gives rise to a dipole like gravimagnetic field outside the super-conductor. Now however negative charge is replaced by mass, which is positive so that the sign of the effect changes. The predicted effect is however completely negligible using the existing estimates for the mass of the graviton.
3. The crazy proposal of Tajmar et al is that a gravimagnetic field larger than that predicted by GRT by a factor of order  $10^{24}$  is associated with the rotating super-conductor and combines and produces the slight deviation of the measured mass of the Cooper pair from real when this since the Cooper pair couples also to gravimagnetic field besides magnetic field. The reason is that the effective magnetic field contains a small contribution of gravimagnetic field so that the measurement gives too large a result for the mass of the Cooper pair.

In standard model plus GRT this kind of effect is impossible. In TGD framework the hierarchy of Planck constants suggests two alternative explanations.

1. The London magnetic field (also gravimagnetic) is a purely quantal effect and proportional to the square  $h^2$  of Planck constant. If  $h$  is replaced with say  $h_{eff} = h_{gr} \simeq 10^{12}h$  the effect is enormous as compared to that predicted by GRT! There is however an objection: one cannot perform this replacement for ordinary London field! Why?
2. Many-sheeted space-time allows to consider also alternative model in which the change of mass is due to a generation of the analog of dark London magnetic field at dark magnetic flux tubes: electron would couple to the sum of these fields since it would have topological sum contacts to both space-time sheets This magnetic field is proportional to dark matter density and  $\rho_D/\rho = M_D/M \simeq 2 \times 10^{-4}$  would give a correct order of magnitude estimate.
3. Since gravimagnetic and magnetic fields are expressible in terms of  $CP_2$  coordinates and their gradients, one can wonder whether the two explanations are actually equivalent.

### 3 What about Podkletnov effect?

Also Podkletnov effect is associated with a rotating superconductor and one can ask whether the above ideas apply also to it.

1. The vision that dark variants of elementary particles are associated with all critical phenomena suggest that a critical phenomenon is in question also now and part of the matter - at least part of Cooper pairs - are in dark phase at magnetic flux tubes satisfying  $h_{eff} = h_{gr}$ . Could large  $h_{eff} = h_{gr}$  be involved also with Podkletnov's effect? Could the reported loss of the weight of the (not necessarily) rotating disk and of the sample by .3 per cent be due to the transformation of part of Cooper pairs to large  $h_{eff} = h_{gr}$  phase delocalized to the magnetic flux tubes along which gravitational force is mediated in a scale considerably larger than that of the sample and disk? Also the air above the rotating superconductor was reported to start to rise. Could this be that also air molecules lost some of their electrons to the dark flux tubes in this manner? Since electron mass is about  $2^{-11}$  fraction of proton mass, also protons and heavier particles should leak to the dark phase to achieve weight loss of order per cent. This effect would be present already for the non-rotating superconductor and would be much like the fountain effect in superfluidity according to TGD [K1].
2. As the frequency of AC fields is increased, the weight of the sample fluctuates but above  $10^5$  Hz it stabilizes and is resonant like. Levitation is essentially due to the gradient of the magnetic energy associated with AC fields. Could part of AC photons transform to dark photons and could the large energy of dark photons - in visible and UV range - mean much larger excluded magnetic energy in the volume of the gravi-superconducting sample and rotating superconducting disk and in this manner induce stronger levitating effect becoming strongest at cyclotron resonance energies. Resonance absorption would take place when the frequency is in the region of electron cyclotron frequencies for the flux tubes. Also coherence would be achieved thanks to the presence of Bose-Einstein condensates of electronic Cooper pairs.
3. One should explain also the increase of the reported loss of the weight with the rotation velocity of the superconducting disk. Rotation generating the mass current should generate dipolar gravimagnetic field with strength proportional to the rotation frequency (and accompanied by ordinary magnetic fields). The increasing strength of the gravimagnetic field would mean increase in the number of flux quanta or increase of the field strength at the flux tubes. At least in the first case more particles could end up to the dark phase leading to the reduction of effective weight of the sample and rotating disk. This gravimagnetic dipole field would naturally correspond to the gravimagnetic London field continued outside the superconducting rotating disk acting as a magnetic dipole.

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