Research Article

Gravity to Electricity as Quantum

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1 Abstract

2 When gravity exists in this experimental model's magnetic fields, gravity interacts with magnetic
3 fields to generate electricity Earth direction or opposite direction. Moreover, the relationships
4 between current, voltage and time were redefined by analysing data for 0.1-1 second. The voltage
5 (potential) can be recorded on the x-axis and time on the y-axis. Voltage and time also have a
6 direct matching relationship. It explains two expressions of the Schrödinger equation. Through
7 this experiment about the voltage, time and hidden space (Hieut), we might calculate a good
8 unification equation of gravity and magnetism.

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12 Keywords:

13 This experiment presents a new space for physics: $\overline{\text{O}}$ is read as Hieut. Hieut is the first letter
14 when reading 'hidden space' in Korean.

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1. Introduction

If gravity is particle [1], we assumed that gravity could interact in the magnetic fields and collide to induce magnetic fields' changes. When Maxwell formulated his electromagnetic wave theory of light in the year 1864, we could accomplish a proper unification of electricity and magnetism alone after a decade later [2]. Maxwell observed theoretically that an electromagnetic wave travels in free space equal to the speed of light and then speculated that light is a transverse electromagnetic wave. Although the idea of electromagnetic waves was hidden in the set of Maxwell's equations, Maxwell did not propose why such electromagnetic waves were generated [3].

It is a simplified assumption for explaining the experimental results. It was assumed that energy of gravity must be mutually transferred to the energy of electromagnetic force.

[Newton-Schrödinger- Gauss equation for the gravity generator]

$$mg = -N \frac{d\Phi}{dt} \quad (\text{weight from this experiment's equilibrium state}) \quad (1)$$

$$\int F \cdot dl = \frac{\epsilon_0}{2} \left[\int_V E^2 d\tau + \oint_S V \mathbf{E} \cdot d\mathbf{a} \right] \quad (2)$$

$$\langle \hat{T} \rangle = \left\langle \psi \left| \sum_{i=1}^N \frac{-\hbar^2}{2m_e} \nabla_i^2 \right| \psi \right\rangle = -\frac{\hbar^2}{2m_e} \sum_{i=1}^N \left\langle \psi \left| \nabla_i^2 \right| \psi \right\rangle \quad (3)$$

($\langle \hat{T} \rangle$: The expected value of the kinetic energy of a system of N electrons, m_e is the mass of the electron, and ∇_i^2 is the Laplacian for i th. electron.)

If quantum (or graviton) is present, $T[\rho]$

$$\frac{\epsilon_0}{2} \left[\int_V E^2 d\tau + \oint_S V \mathbf{E} \cdot d\mathbf{a} \right] = \frac{1}{8} \int \frac{\nabla \rho(\mathbf{r}) \cdot \nabla \rho(\mathbf{r})}{\rho(\mathbf{r})} d^3 r \quad (4)$$

A magnetic/electric field can vary the gravitational field. The gravitational redshift/blue shift, the bending of light by gravity and Shapiro time delay showed that gravity has an action on photon [4]. From the law of energy conservation, we know that the photon accordingly varies the gravitational field's energy. According to the law of conservation of energy describing the gravitational redshift with quantum field theory, some researchers obtained equations for the interaction between gravitational and magnetic/electric field [5]. In the Pound–Rebka experiment for gravitational redshift, photon frequency is varied by gravity [6]. We tried to demonstrate that gravity has induced magnetic fields by monitoring electricity, voltage and time. It will provide a bench-top setting for studies of phenomena relevant to the string theory.

2. Materials and Methods

2.1. Experimental design

This experiment presents a new space for analysis. The hidden space (H: Hieut) will be applied for unification theories of gravity and electromagnetic field with Schrödinger equation. The gravity generator (GG) exhibits electronic properties distinctive for quantum particles described by Dirac or Schrödinger equation. This system is not only impressive in itself but also allows one to access – in a condensed magneticogravity field experiment – the subtle and rich physics of quantum electrodynamics.

In 2018, we designed an experiment device to convert gravity into electricity. (Supplement section 1) The experimental device was assembled on September 26, 2019. The electricity was measured by a precision source/measure device. (Supplement section 2) GG was operated to measure the number of electricity generations while rotating or stationary states. The electricity was measured step by step. To prove the electricity in the electromagnetic (EM) field by gravity, we assembled the generator that cannot generate electricity according to Maxwell's equations. N poles and N poles of the magnets were placed upwards, north, south, east and west. Coil Ass'Y was placed between N pole and N pole, and the generator was assembled by bearing-cover on top and bottom. The precision source/measure unit was connected to measure the electricity generated from Pico ampere (pA) to microampere (μ A).

2.2. Sample preparation and measurement

i. While the generator rotating (Supplement section 3)

The experiments were carried out three times by placing the dumbbell A, and dumbbell B on the generator, in turn, while the magnets rotating. The orders were as follows:

- ① We measured the amount of electricity generated while rotating without weight.
- ② To apply the weight in a three-dimensional world, we measured the amount of electricity generated by placing dumbbell A while rotating.
- ③ To apply more weight in the three-dimensional world, we measured the amount of electricity generated by placing dumbbell B on dumbbell A while rotating.
- ④ To reduce the weight in the three-dimensional world, we measured the amount of electricity generated by putting down dumbbell B from dumbbell A while rotating.
- ⑤ To reduce the weight in the three-dimensional world, we measured the amount of electricity generated by putting down dumbbell A while rotating.
- ⑥ We measured the amount of electricity generated while rotating without weight.

The experiments were conducted three times (A, B, C) while the magnets were rotating.

ii. While the generator stationary (Supplement section 4)

While the generator stationary, dumbbell A and dumbbell B were placed on the generator in turn and measured three times, the orders were as follows:

- ① We measured the electricity generation while the generator was stationary.
- ② To apply the weight, we measured the amount of electricity generated by placing dumbbell A while stationary.
- ③ To apply more weight, measured the amount of electricity generated by placing dumbbell B on dumbbell A while stationary.
- ④ We measured the amount of electricity generated by putting down dumbbell B from dumbbell A while stationary to reduce the weight.
- ⑤ We measured the amount of electricity generated by putting down dumbbell A while stationary to reduce the weight.
- ⑥ We measured the electricity generation while the generator was stationary free of dumbbell A, B.

These experiments were conducted three times (experiment D, E, F) while the generator stationary.

iii. Only voltage measurement (Supplement section 5, section 6)

Experiments were performed to compare the voltages only while the generator was rotating or stationary. We used the voltage meter of TDS 2014 four-channel digital storage oscilloscope (100 MHz, 1 GS / s). The video was taken because the voltage meter could not save and output the data.

2.3. Calculations of data

Among the experiments D, E, F in which GG is stationary, the data were generated in experiment D1, E1, F1 and D6, E6, and F6 without dumbbells. Among those, the excel data of experiments D1, E1, and F1 were analysed in rows 312 to 412 [7]. We did not choose experiments D6, E6, and F6 because of weight after removing the dumbbell. The time was 0.1 seconds, and the measured points were 100. The x-axis is time, and the y-axis is voltage and Current in a radial chart.

2.4. Current while stationary in the vacuum chamber

The amounts of electricity and voltage generated in the vacuum chamber were measured. Korea Institute of Civil Engineering and Building Technology (KICT) has operated the centre of extreme environmental construction technology. (Supplement section 7) This experiment was done in the vacuum chamber. The measured points from 1 to 100,000 for 10 seconds were all added together, so we compared the increase and decrease trend. It is to observe the change in the amount of Current generated as the barometric pressure decreases.

3. Results

GG was connected to measure the amount of electricity. When it rotates the faster, electricity was produced the more. We measured electricity measured three times (A, B, C) whiles GG rotating (Supplement Section S3 – Table 1) and three times whiles GG stationary. (Supplement Section S4 – Table 2) Electricity generated in a stationary state was examined more precisely: Experiment D1, E1, F1, D6, E6, and F6.

We connected GG to the TDS 2014 four-channel digital storage oscilloscope (100 MHz, 1 GS / s) (Supplement Section 5, 6). Furthermore, the voltage was measured by experiment D1 to F6 in order while the generator was stationary through the monitor. Gravity only generates electric potentials. (Supplement Section 6)

The data are

3.60→3.20→3.40→3.20→4.00→3.60→3.40→3.80→4.00→5.00→3.40→2.80→3.80→4.00→3.40→4.00→3.60→3.40→4.00→3.80→3.40→4.20→3.40→3.80→3.40→3.20→3.40→4.00→3.20→4.20→3.40→3.60→3.00→3.20→3.80→4.20→3.40→3.60→3.40→4.00→3.40→4.00→3.80→3.00→3.80→4.00→3.00→3.20→3.80→3.20→3.40→3.80→4.00→3.40→4.40→3.20→4.00→7.60→4.60→3.60→4.00→3.80 (V) while the generator was stationary.

The data of experiments D1, E1, and F1 were analysed in rows 312 to 412 to remove the effects of weight and the time interval was 0.1 seconds, and the measured points were 100 [7]. The x-axis is time, and the y-axis is voltage and Current in a radial chart. Gravity and magnetic force were in a balanced state while the gravitational generator was stopped, but in Experiment D1, the voltage occurred -11.1 to 13.0 microvolts, and the Current occurred -1.90 to 29.0 microamps. In Experiment E1, voltage occurred -11.9 to 9.60 microvolts, and Current occurred -2.00 to 2.40 microamps. In experiment F1, voltage occurred -8.10 to 14.1 microvolts, and Current occurred -3.30 to 3.00 microamps. (Figure 1)

Figure 1. The D1, E1 and F1 experiment were measured with the gravity generator stopped. It is the data from columns 312 to 412 of the Excel file [7]. The purple star is voltage, and the pink triangle is current. Located on the y-axis, the round black X-axis is the time in 0.001-second increments.

The amounts of electricity generated in the vacuum chamber were measured. (Supplement Section 7) This vacuum experiment demonstrated the change in the amount of Current generated as the barometric pressure decreased. It indicates gravity can be transferred to electricity using air as a medium. If electricity is generated in a vacuum, it means the presence of particles.

Table 1. The experiment of the gravity generator in the vacuum chamber. They each measured currents from 1 to 10000 were all summed. The changes in the amount of current were observed as the barometric pressure decreased.

Barometric pressure (mbar)	1000	100	10	1	0.1	0.01	0.0001
1 st measurement	-5.69E-03	-5.70E-03	-5.68E-03	-5.69E-03	-5.73E-03	-5.70E-03	-5.68E-03
2 nd measurement	-5.77E-03	-5.69E-03	-6.00E-03	-5.67E-03	-5.70E-03	-5.70E-03	-5.33E-03
3 rd measurement		-5.72E-03	-5.78E-03	-5.31E-03	-5.31E-03	-5.38E-03	-5.69E-03
4 th Measurement						-5.74E-03	-5.66E-03
5 th measurement						-5.74E-03	-5.69E-03
6 th measurement							-5.27E-03
7 th measurement							-5.76E-03
8 th measurement							-5.76E-03
9 th measurement							-5.68E-03
10 th measurement							-5.69E-03
Average (Current)	-5.73E-03	-5.70E-03	-5.82E-03	-5.56E-03	-5.58E-03	-5.65E-03	-5.62E-03

The 4th measurement measured for 10 seconds in the vacuum chamber experiment was selected for data analysis: the data was analysed from point 4000 to point 4999 correspondings to 1 second. The x-axis was arranged as time, the y-axis as voltage. And then the x-axis was arranged as voltage, the y-axis as time. (Figure 2) We could find cases with the same voltage and different times. There were 93 cases where voltage had two times and 15 cases where voltage had three times.

1 voltage 2 times - 0.0003373, 0.0003377, 0.000339, 0.0003445, 0.0003462, 0.0003476, 0.0003488, 0.0003492, 0.0003514, 0.0003523, 0.0003539, 0.0003578, 0.0003584, 0.0003593, 0.0003605, 0.0003646, 0.0003648, 0.000366, 0.0003669, 0.0003675, 0.0003683, 0.0003684, 0.0003691, 0.0003696, 0.0003715, 0.0003719, 0.0003721, 0.0003741, 0.0003745, 0.0003752, 0.0003764, 0.0003771, 0.0003797, 0.0003807, 0.0003819, 0.0003843, 0.0003862, 0.0003862, 0.0003874, 0.0003891, 0.0003896, 0.0003903, 0.0003905, 0.0003917, 0.0003922, 0.0003938, 0.0003961, 0.000398, 0.0003997, 0.0004004, 0.0004007, 0.0004009, 0.0004015, 0.0004016, 0.0004041, 0.0004078, 0.0004112, 0.000412, 0.0004131,

0.0004137, 0.0004147, 0.000416, 0.0004162, 0.0004205, 0.0004228, 0.0004254, 0.0004255, 0.000427, 0.0004303, 0.0004307, 0.0004317, 0.000435, 0.0004365, 0.0004366, 0.0004368, 0.0004379, 0.0004406, 0.0004412, 0.000446, 0.0004512, 0.0004549, 0.0004563, 0.0004581, 0.0004603, 0.0004626, 0.0004656, 0.0004669, 0.0004722, 0.0004833, 0.0004843, 0.0004924, 0.0004946, 0.0005178 (V) – (93)

1 voltage 3 times – 0.0003496, 0.0003636, 0.0003753, 0.0003761, 0.0003883, 0.0003972, 0.0004063, 0.0004105, 0.0004258, 0.0004344, 0.0004385, 0.0004444, 0.0004470, 0.0004877, 0.0005166 (V) – (15)

Figure 2. The data was analysed from point 4000 to point 4999 correspondings to 1 second from the 4th measurement measured in the vacuum chamber. It is the cases where the voltage is the same, and the time is different. There are 93 cases of one- voltage two-times and 15 cases of one-voltage three-times. The voltage with a multi-time graph of 99-199 among 273 times is displayed with a clock. (Supplement Section S7. DATA)

4. Discussion

4.1. On the possible relationship of gravity to electricity

GG produced a certain amount of electricity in the stationary state. The Current was produced in the downward direction when the bearing cover was pressed. Furthermore, electricity was also

produced upward when the bearing cover jumped by the magnetic field. Electricity was generated when the dumbbell 1, 2 were put on GG while rotating [8] or stationary [9]. (Supplement Section 3, 4)

However, electricity cannot be generated according to Maxwell's equation when GG is stationary in the equilibrium state.

[Maxwell's equation]

$$\frac{\partial B_x}{\partial x} + \frac{\partial B_y}{\partial y} + \frac{\partial B_z}{\partial z} = 0, \quad \varepsilon^{\mu\nu\kappa\lambda} \partial_\nu F_{\kappa\lambda} = 0 \quad (5)$$

If Current & voltage was generated at equilibrium state, there is no other way to explain other than generating electricity by dividing particles according to Weinberg-Witten theorem [10]. As we know as Lorentz invariance, that principle implies that all particles such as photons cross space at the same speed no matter how much energy they have. The LIGO and Virgo detectors observed that gravitational waves travel simultaneously as light and not more slowly. As Einstein's general theory of relativity had predicted, those observations confirmed the Lorentz invariance principle [11] [12] [13].

Many theories combine quantum mechanics with Einstein's theory of gravity, which predicted space and time's frothiness. Nevertheless, gravity (graviton or gravitational wave) was the sole factor influencing this experiment's magnetic fields in a firmly fixed space H on Earth. (Figure 3)

Figure 3. Gravity generator - Voltage (0) and Current (0) in equilibrium state on experiment F4 6380 (6379): earth direction by gravity and opposite earth direction by repulsive magnetic force [14].

We can express the magnetic-electric field through its respective gravitational analogues using the proportionality coefficient k. This coefficient k depends on the ratio of mass and charge. Although the last coefficient is minimal, the ratio is between the electromagnetic and gravitic-

gravitomagnetic permittivity and permeability [15]. Now we can uptake adequate coefficient from this experiment.

(Example: Coupled Maxwell-Einstein Equations in the weak field approximation) [15]

$$\begin{aligned} \text{rot } \vec{E} &= -\frac{1}{\kappa} \frac{\partial \vec{B}_g}{\partial t} \\ \text{rot } \vec{B} &= \frac{e}{m} \mu_0 \rho_m \vec{v} + \frac{1}{\kappa} \frac{1}{c^2} \frac{\partial \vec{g}}{\partial t} \end{aligned}$$

(6)

(Gravitation → Electromagnetism in the weak field approximation)

(Coupled Maxwell-Einstein Equations in the weak field approximation) [15]

$$\begin{aligned} \text{rot } \vec{g} &= -\kappa \frac{\partial \vec{B}}{\partial t} \\ \text{rot } \vec{B}_g &= -\frac{m}{e} \mu_g \rho \vec{v} - \kappa \frac{1}{c^2} \frac{\partial \vec{E}}{\partial t} \end{aligned}$$

(7)

(Electromagnetism → Gravitation in the weak field approximation)

It was found that every EM field is coupled to a gravitoelectric and gravitomagnetic field [15]. If gravity is present in the EM field, gravity interacts to generate electricity due to magnetic field changes.

4.2. Time to the voltage by Dirac equation

Experiments on the electrical conversion of gravity obtained the data: a stationary mass moves freely without being influenced by the outside. The data were rearranged and reinterpreted by JH. The data were reconstructed with the voltage on the x-axis and the time on the y axis. The D1, E1, F1 experiments were measured while GG stationery. (Supplement Section 2, 4) It is the data from columns 312 to 412 of each Excel file. The X-axis is the voltage. The black x on the y axis is time, and the pink triangle on the y axis is current. It was displayed on the graph to compare the Current in microamperes with the time in other units by multiplying each time by 0.0001. (Figure 4)

D1 Voltage Curr-TIME graph
SDIMENSION

E1 Voltage Curr-TIME graph
SDIMENSION

F1 Voltage Curr-TIME graph
SDIMENSION

218 Figure 4. The D1, E1 and F1 Voltage Curr-Time graph. It is the data from columns 312 to 412 of the Excel file. The
219 X-axis is the voltage. The black x is time, and the pink triangle is current. Time and current are located on the y-
220 axis. It was displayed on the graph by multiplying each time by 0.0001.

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The time-independent equations of the Schrödinger equation represent the potential (voltage) formed between the electron and the nucleus. The voltage is formed among the nucleus and the electron clouds because their distances are not relatively long. The differences in time indicate the differences in voltage. The D1, E1 and F1 voltage-time graphs were rearranged in order of sizes based on voltage. (Figure 5)

Figure 5. The D1, E1 and F1 Voltage Time graph. One hundred data measured based on time were rearranged in order of size based on voltage with time. The x-axis is voltage, and the y-axis is time in a radial chart. It is the data from columns 312 to 412 of the Excel file. The black x is time. Located on the y-axis, the round black X-axis is the voltage in 0.001-second increments. It was displayed on the graph without multiplying each time by 0.0001.

The x-axis is voltage, and the y-axis is time in a radial chart. It was displayed on the graph without multiplying each time by 0.0001. The x-axis time & y-axis voltage graph and the x-axis voltage & y-axis time graph were almost the same patterns. Time and voltage have 1:1 matching relationships. The relationships between time and voltage explain the time-dependent Schrödinger equation and the time-independent Schrödinger equation. The super-many-time theory was based on the idea that each point of space has its own specific time. The field theory of the electron and electromagnetic fields, quantum electrodynamics, had an inherent contradiction that all calculated physical quantities became infinite. The super-many-time theory showed that each infinite term could be regarded as a correction to the mass and charge of electrons [16] [17] [18]. The Schwinger model exhibits a spontaneous symmetry breaking due to a chiral condensate due to a pool of instantons. This model can be solved precisely [19] [20] [21].

The Schrödinger equation is expressed in two ways.

[Time-dependent equation]

$$i\hbar \frac{d}{dt}\psi = \hat{H}\psi \quad (6)$$

[Time-independent equations]

$$E\psi = \hat{H}\psi \quad (7)$$

The Dirac equation is expressed when it satisfies when a particle with a stationary mass of m moves freely without being influenced by the outside is as follows [22].

$$i\hbar \sum_{\mu=0}^3 \gamma^{\mu} \frac{\partial}{\partial x^{\mu}} \psi - mc\psi = 0. \quad (8)$$

Renormalisation is a collection of techniques in quantum field theory. The theory of self-similar geometric structures is used to treat infinities arising in calculated quantities by altering values of quantities to compensate for effects of their self-interactions such as the magnetic moment of the electron [23] [24]. According to this experiment, each voltage point (potential) has its own specific time(s). Now, the relationship of time(s) and voltage might be defined by this gravity-electricity experiment as the renormalisation theory has modified the quantum mechanics in four-dimensional systems under the principle of Lorentz invariance.

4.3. Quantum Hall Effect and Berry's Phase in GG

The experimental observation was identifying pseudorelativistic massless charge carriers as the low-energy excitations. The relativistic quantum Hall effect was reported in September 2005 by two different groups [25]. Understanding more involved phenomena due to electronic interactions may provide the theoretical basis to the effect in terms of Landau quantisation for massless Dirac fermions [26]. Although it is reproducible for any time interval in the experiment, its shape varies from interval to interval on the details of the geometry [27].

This study also suggests potentially mesoscopic effects depending on the details of the geometry. The size of this experiment is in the range of nanometers to micrometres. It is useful for understanding quantum mechanics and relativity theory and attracts much attention by showing new phenomena.

In the strong-coupling regime of partially filled relativistic Landau levels limit by gravity, exotic magnetic phases and incompressible quantum (graviton) is expected to be the origin of Current and voltage observed in the D1, E1, F1 and vacuum experiments. (Figure 2, 4, 5) These unusual quanta (graviton) quantisation conditions result from GG's topologically unique magneto-gravity structure [28]. The quantum mass m_c of massless carriers (quantum: graviton) with energy E in GG is described by equation $E = m_c c^2$. If the potential, time and space equation are present, we might calculate a proper unification of gravity and magnetism based on the symmetric state (Figure 3).

5. Conclusions

With Quantum mechanics and Relative theory, it is possible to establish unification theories to gauge the electromagnetic, gravitational force in space H. The gravity – electromagnetic –time - potential equation might be derived in space H.

Supplement

Section S1. Gravity generator design

Section S2. Keysight B2901A manual

Section S3. Experiments (A, B, C – Table 1)

Section S4. Experiments (D, E, F – Table 2)

Section S5. Experiments (Voltage only while rotating)

Section S6. Experiments (Voltage only while stationary)

Section S7. Experiments (Current, voltage and time while stationary in the vacuum chamber)

Statements

Acknowledgement

Il-whan Kim designed the generator. He is a generator developer with 40 years of experience and asserted that electricity could never be generated from this device; James Oh, general manager of Jays, Inc., in South Korea, compiled data to assist with the Keysight B2901A electricity experiment when running the generator. He also used a TDS 2014 four-channel digital storage oscilloscope (100 MHz, 1 GS / s) to measure the voltage by connecting a resistance coil. Taeil Chung of Extreme Engineering Research Center of Korea Institute of Civil Engineering and Building Technology operated a vacuum chamber to assist in this experiment. Woo-Seung Maeng and Jae-yeol Shim provided the necessary expenses for this paper.

Disclosure Statement

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Author Contributions

JH Lee set the theory of gravity generation and performed the experiments and wrote the manuscript

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