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Unification of gravitation and electromagnetic force (First Portion)

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The contents of this article fall within Fields, Wave and Electromagnetics; Photonics and Electrooptics area of scope of [TechRxiv](#), part of it are published in my book (ISBN: 9789881767592) but is not published in journal. For convenience readers, I revise and submit it to here

Abstract: Since electron has been discovered, people have been thinking it possess one electric charge, the nuclear possess contrary charge. Based on the provided new discovery that moving photons do create force, I have calculated the number Z of elements, discovered that the number Z of elements can be calculated by frequency of x-ray, and the atomic weight can also be calculated by frequency of x-ray. This method of calculated way shows the essence of electric charge, and shows the essence of gravitational mass, from this way; here in first time provide one fact show the unification of gravitation and electromagnetic force.

Keywords: frequency of x-ray, force, gravitation, electromagnetic force, unification.

INTRODUCTION

Since Newton discovered universal gravitation^[1], people have been thinking that the origin of gravitation only relate to the gravitational mass, and define gravitational mass in the expression of the gravitation without investigating other origin theories. While during the process of investigating the origin of gravitation, my experiments showed that moving photons produce gravitation. This discovery reveals the origin of gravitation. Meanwhile I found that the atomic weight can be calculated by frequency of x-ray^[2]. On the other hand, I have also found that the number Z of elements can also be calculated by frequency of x-ray. By these experiments and calculations, to show that the electromagnetic force and gravitation are generated from the same origin. Their essence is the same. So we can comprehend the meaning of the gravitational mass which defined by Newton and Einstein and the meaning of charge which defined by Coulomb and Franklin. This shows the unification of gravitation and electromagnetic force.

Chapter. 1. Moving photon generate force

The experimental devices are indication in picture **a, b, c** of Figure1. The process of experiment is below: first the light beam **L** is separated into 2

parts by a ring as position in picture **c, d** of Figure1. Light beam **L** then become two new light beams **P** and **O**, as shown in picture **d** of Figure1. Along with light moving forward, the five light beams possessing highest intensity in the light beam **P** with biggest attractive force have been obviously attracting light beam **O** to become a pentagon (see picture 1-12 of Figure1). Only the five spots of light beams **O** that corresponding five points of light beams which possessing highest intensity in light beam **P**, have been moving to contact, and become gradually link to together. Note: at first light beam **P** and light beam **O** do not contact at all. It is impossible that this contact action can occurs in the light wave theory. This action is not an effect of wave interaction. On the contrary, it is indicating an effect of moving photons create gravitation. (See picture 1-12 of Figure1)

Figure1. Picture **b** shows the device of the experiment. Picture **c, d** shows the site of ring in light beam **O**, and pictures 1-12 showing that the form of light beam **O** has been changed from a circular shape to a pentagon by moving photon creates gravitation.

In order to verify this phenomenon is brought on by gravitation, the second experiment is performed. The experiment device is shown in picture **a** of Figure2. Picture **b, c** in Figure2 show

that other light beams do not move forward and that only light beam O is allowed to move forward; under this status, light beam O has been keeping its circular shape. This phenomenon is shown in pictures 1-12 of Figure2. This result demonstrates that if there was no other light beam, the light beam O would not accept the foregone gravitation.

Figure2. This experiment shows that light beam O does not change its circular shape when there are no other light beams moving forward.

In comparison with experiment 1, it is appearing that the light beam O keeps its circular shape in unchanged form when there are no other light beams moving forward. From this experiment, the light beam O does not appear before phenomenon of gravitation acted upon it become, it is confirm that this is only appeared with interaction force indicating gravitation brought about it, thus we find that moving photons create gravitation.

Chater.2. The quantitative experiment

In before article: [Gravitation origin](#) ^[2], we get below formula: $\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\theta\vec{r}_{12}^3} G_a$

About describing of this effect, see [Gravitation origin](#) ^[2], here do not repeat it.

Chater.3. The essence of electric charge

According to above discoveries and formula:

$$\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\theta\vec{r}_{12}^3} G_a \quad [2]$$

we can get a formula that can calculate the nuclear charge of element, see formula: $Q_Z = \sqrt{\frac{c}{\lambda}} \times Zb \times (1 - (A_m - Z)k_1)k_2$ Where, Q_Z is the nuclear

charge of element, A_m is the atomic weight of element, Z is the atomic number, $\lambda_{k1}, \lambda_{k2}$ are the first and second wavelength of X-Ray Emission in $k, \bar{\lambda}$ is the mean wavelength of these two wavelengths of X-Ray Emission. b, k_1, k_2 are all constant. The result of test about this formula see below table 1 ^{[3],[4]}.

Z	symbol	atomic weight(A_m)	$A_m - Z$	$\lambda_{k1} \times 10^{-10}$	$\lambda_{k2} \times 10^{-10}$	$\bar{\lambda} = \frac{\lambda_{k1} + \lambda_{k2}}{2} \times 10^{-10}$	b	k_1	k_2	$Q_Z = \sqrt{\frac{c}{\lambda}} \times Zb \times (1 - (A_m - Z)k_1)k_2$
3	Li	6.941	3.941	241.686	226.456	234.071	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	3.000
4	Be	9.012	5.012	114.272	111.698	112.985	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	4.026
5	B	10.811	5.881	67.6400	65.9490	66.7950	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	5.005
6	C	12.011	6.011	44.7600	43.6813	44.2080	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	6.003
7	N	14.006	7.006	31.5966	30.9899	31.2930	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	7.010
8	O	15.999	7.999	23.6207	23.3186	23.4696	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	7.995
9	F	18.998	9.998	18.3193	18.0894	18.20438	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	8.984
10	Ne	20.179	10.179	14.6105	14.3023	14.4564	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	10.003
11	Na	22.989	11.989	11.9102	11.5755	11.7428	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	11.020
12	Mg	24.305	12.305	9.8903	9.8077	9.8490	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	11.977
13	Al	26.981	13.981	8.3420	8.2075	8.2747	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	12.999
14	Si	28.085	14.085	7.1256	7.0665	7.0961	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	13.988
15	P	30.973	15.973	6.1661	6.1088	6.1345	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	14.985
16	S	32.065	16.065	5.3751	5.3723	5.3737	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	15.969
17	Cl	35.453	18.453	4.7308	4.6979	4.7144	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	16.987
18	Ar	39.948	21.948	4.1948	4.1919	4.1919	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	17.947
19	K	39.098	20.098	3.7445	3.7414	3.7430	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	18.975
20	Ca	40.078	20.078	3.3617	3.3585	3.3661	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	19.977
21	Sc	44.955	23.955	3.0343	3.0309	3.0326	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	20.973
22	Ti	47.876	25.876	2.7486	2.4985	2.7486	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	21.978
23	V	50.941	27.941	2.5074	2.5036	2.5055	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	22.967
24	Cr	51.996	27.996	2.2936	2.2897	2.2917	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	23.987
25	Mn	54.938	29.938	2.1018	1.9102	2.1018	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	24.996
26	Fe	55.845	29.845	1.9400	1.9361	1.9380	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	26.007
27	Co	58.933	31.933	1.7929	1.7890	1.7909	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	27.001
28	Ni	58.693	30.693	1.6579	1.6617	1.6598	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	28.042
29	Cu	63.546	34.546	1.5444	1.5406	1.5425	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	29.010
30	Zn	65.409	35.409	1.4390	1.4351	1.4371	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	30.020
31	Ga	69.723	38.723	1.3440	1.3401	1.3420	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	31.151
32	Ge	72.641	40.641	1.2580	1.2540	1.2560	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	31.986
33	As	74.921	41.921	1.1799	1.1759	1.1779	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	32.989
34	Se	78.963	44.960	1.1048	1.1088	1.1068	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	33.960
35	Br	79.904	44.904	1.0438	1.0397	1.0412	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	34.997
36	Kr	83.798	47.798	0.9841	0.9801	0.9821	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	35.963
37	Rb	85.467	48.467	0.9292	0.9255	0.9273	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	36.981
38	Sr	87.621	49.620	0.8794	0.8752	0.8773	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	37.983
39	Y	88.905	49.905	0.8330	0.8288	0.8309	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	39.006
40	Zr	91.224	51.224	0.7901	0.7859	0.7880	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	40.011
41	Nb	92.906	51.906	0.7504	0.7462	0.7483	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	41.029
42	Mo	95.942	53.940	0.7136	0.7093	0.7114	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	42.021
43	Tc	97.907	54.907	0.6793	0.6750	0.6771	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	43.036
44	Ru	101.07	57.070	0.6474	0.6431	0.6452	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	44.024
45	Rh	102.905	57.905	0.6176	0.6132	0.6254	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	44.691
46	Pd	106.421	60.420	0.5898	0.5854	0.5875	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	46.027
47	Ag	107.868	60.868	0.5638	0.5594	0.5616	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	47.170
48	Cd	112.411	64.411	0.5394	0.5350	0.5372	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	48.009
49	In	114.818	65.818	0.5165	0.5121	0.5143	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	49.017
50	Sn	118.711	68.711	0.4950	0.4906	0.4928	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	49.988
51	Sb	121.761	70.761	0.4748	0.4703	0.4726	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	50.979
52	Te	127.603	75.603	0.4558	0.4513	0.4535	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	51.889
53	I	126.904	73.904	0.4378	0.4333	0.4355	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	52.996
54	Xe	131.293	77.293	0.4208	0.4163	0.4186	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	53.948
55	Cs	132.905	77.905	0.4048	0.4003	0.40258	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	54.983
56	Ba	137.327	81.327	0.3896	0.3851	0.38740	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	55.938
57	La	138.905	81.905	0.3753	0.37070	0.37300	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	56.979
58	Ce	140.116	82.116	0.3617	0.35760	0.35930	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	58.038
59	Pr	140.907	81.907	0.3487	0.34410	0.34645	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	59.101
60	Nd	144.243	84.240	0.3565	0.33185	0.33417	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	60.093
61	Pm	144.910	83.910	0.3249	0.32177	0.32249	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	61.172
62	Sm	150.363	88.363	0.3137	0.30900	0.31135	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	62.102
63	Eu	151.964	88.964	0.3031	0.29845	0.30077	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	63.162
64	Gd	157.253	93.253	0.2932	0.28836	0.29068	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	64.087
65	Tb	158.925	93.925	0.2834	0.27873	0.28108	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	65.140
66	Dy	162.500	96.500	0.2743	0.26954	0.27190	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	66.131
67	Ho	164.930	97.930	0.2655	0.26076	0.26313	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	67.164
68	Er	167.259	99.259	0.2572	0.25337	0.25475	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	68.203
69	Tm	168.934	99.934	0.2491	0.24435	0.24673	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	69.269
70	Yb	173.043	103.04	0.2415	0.23666	0.23903	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	70.251

$$K_c1 = KL3 = 1s1/2 - 2p3/2,$$

$$K_c2 = KL2 = 1s1/2 - 2p1/2^{[3],[4]}.$$

For example about Li: $Q_z = \sqrt{\frac{c}{\lambda} + Zb} \times (1 - (A_m - Z)k_1) \times k_2$
 $= \sqrt{\frac{3 \times 10^8}{234.071 \times 10^{-10}} + 3 \times 2.72641 \times 10^{15}} \times (1 - (6.941 - 3) \times 5 \times 10^{-4}) \times 2.075 \times 10^{-8} = 3.$

Other element number or nuclear charge of element can also be calculated by this formula. See above table1. This formula testifies that the nuclear charge of element can be calculated by wavelength of X-Ray of element, thus this formula indicate the essence of nuclear charge of element, namely reveal the essence of electric charge.

Chapter.4. Unification of gravity and electromagnetic force

From below formulas:

$$Q_z = \sqrt{\frac{c}{\lambda} + Zb} \times (1 - (A_m - Z)k_1) \times k_2 \quad ;$$

$$m_a = \sqrt{\frac{c}{\lambda} + Zb} \times (1 + k_1 \times \frac{A_m}{Z}) \times k_2 \quad [2] \quad \text{we can see}$$

below interaction between two uncles of lithium, between them, the size of their Coulomb force is:

$$F_c = \frac{Q_1 \times Q_2}{r^2} k = \frac{[\sqrt{\frac{c}{\lambda} + Zb} \times (1 - (A_m - Z)k_1) \times k_2]^2}{r^2} k = \frac{(\frac{c}{\lambda} + Zb)}{r^2} k \times [(1 - (A_m - Z)k_1) \times k_2]^2$$

Between them the size of their gravitational force is:

$$F_g = \frac{m_1 \times m_2}{r^2} G = \frac{[\sqrt{\frac{c}{\lambda} + Zb} \times (1 + k_1 \times \frac{A_m}{Z}) \times k_2]^2}{r^2} G = \frac{(\frac{c}{\lambda} + Zb)}{r^2} G \times [(1 + k_1 \times \frac{A_m}{Z}) \times k_2]^2$$

From above, we can know the electromagnetic force and gravitational force in atom are all produced by the moving photons in atom, so their origins are same: $\frac{(\frac{c}{\lambda} + Zb)}{r^2}$. the difference size of value between them is only due to the Coulomb force is the first interactional force by this produced force, it do not include gravitational force, the gravitational force include the effect of Coulomb force interacted: $(1 - (A_m - Z)k_1) \times k_2$, $(1 + k_1 \times \frac{A_m}{Z}) \times k_2$.

Now we have preliminary known the unification of the electromagnetic force and gravitational force^[5-6] first time .

Chapter.5. Conclusion

We have known the essence of electric charge and the essence of gravitational mass in atom; meanwhile we have also known the unification of gravitation and electromagnetic force by the way of applying new discoveries, about the more contents and the more evidences of unification of

the electromagnetic force and gravitational force, please waiting to see will be coming next article.

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