Quanta Exchange and Unified Phenomena: From Quantum to Cosmic (Version II)

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https://drive.google.com/uc?export=download&id=1gt_kbXLqMMvKVMfIIan15rvbyIv_DbM5

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Abstract

This paper is a revised and extended version of the paper previously posted at https://vixra.org/abs/2511.0061 under the title "Virtual Carrier Particle Quantumnization and Unified Phenomena: From Quantum to Cosmic." This paper proposes a unified theoretical framework, referred to as the Quanta Exchange Theory (QET), intended to describe natural interactions in a consistent manner from the quantum scale to the cosmic scale. Within this framework, fundamental interactions are not treated as independent forces but are instead interpreted as arising from the mutual emission and absorption of virtual carrier particles (VCPs) exchanged between physical systems. These exchange processes are taken to represent a common mechanism for the transfer of energy and momentum.

The theory introduces an Isolation Principle of Quanta, which characterizes interaction processes in terms of discrete exchange events and constrains the propagation behavior of virtual carriers. The effective velocity and exchange frequency of these carriers are modeled as functions of system acceleration and coupling parameters. In this way, interaction strength is related to both kinematic and interaction properties within a unified description.

As an illustrative application, observational data from the LIGO/Virgo neutron star merger event GW170817 are used to estimate parameters associated with gravitational interaction within the proposed framework. The inferred propagation speed of the corresponding gravitational carrier particles is found to be of the order of the speed of light, within the uncertainties of the observational data and the assumptions of the model. This example demonstrates how astrophysical observations may be employed to constrain or test elements of the QET formulation.

The paper further develops a potential decomposition method, in which the total interaction potential is expressed as a sum of an action potential and a perturbation potential. Based on this decomposition, unified expressions for kinetic energy and total energy of interacting systems are constructed. This formalism allows for the calculation of binding energies in atomic-scale systems. The resulting expressions are shown to reproduce, and in appropriate limits extend, results consistent with those obtained from the Bohr model, Dirac theory, and available experimental data.

Although different interactions may involve carrier particles with distinct properties, the underlying mechanism of energy exchange through virtual carriers is treated as common to all cases within the QET framework. Consequently, the theory emphasizes shared

exchange processes rather than separate force categories, providing a unified perspective on interaction phenomena. This approach offers a possible conceptual bridge between classical and quantum descriptions of physical interactions and establishes a basis for further theoretical refinement and empirical examination.

Introduction

In this paper, interactions between physical objects are described using virtual carrier particles (VCPs) based on the Quanta Exchange Theory (QET) framework. The velocity and frequency of these carrier particles regulate the strength of interactions, enabling precise computation of system-level potentials and particle binding energies. Using cosmic-scale observational data—such as GW170817—the study investigates the relationship between virtual carrier velocity and quantized virtual energy. This formalism provides a bridge between classical mechanics and quantum mechanics, offering a foundational structure for clarifying particle interactions and energy frameworks.

1 Basic Concepts

1.1 Quanta Exchange Theory (QET)

From the quantum scale up to the cosmic scale, what we call “force” does not truly exist as an independent entity. All motions and interactions in nature arise from the mutual **emission and absorption of energy-carrying particles** (photons, gluons, gravitons, etc.).

1.2 Isolation Principle of Quanta (IPQ)

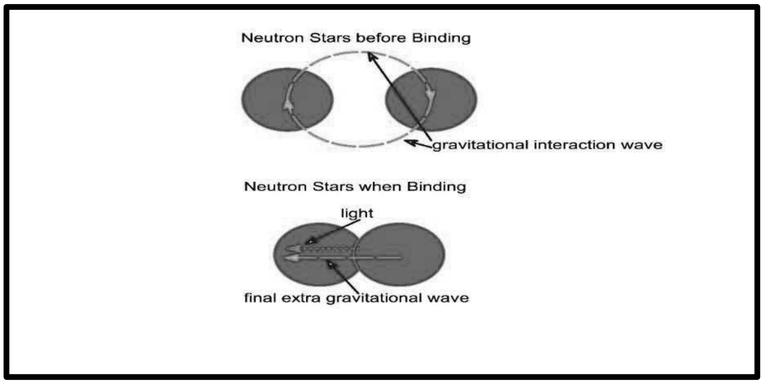
If a mass (or charged particle) exists in complete isolation, there is no exchange of energy-carrying particles.

1.3 Theory of Virtual Carrier Travelling Manner

Virtual carrier particles always propagate toward the real position of the interaction object.

1.4 Virtual Carrier Velocity

Virtual carrier particles travel with a velocity $\mathbf{v\_vcv \approx c + 1.2715183495 \times 10^{-7}\ m \cdot s^{-1}}$,and they propagate **only within the space shared by two or more interaction objects**. They do not extend their influence to any space outside the region between those interacting objects.



In 2017, the LIGO/Virgo collaboration measured **GW170817**, a binary neutron star merger

$$arrival\ time\ difference\ between\ Gravitational\ wave\ and\ gamma\ ray\ burst \sim 1.74s$$

$$\Delta t \sim 1.74s$$

$$Event\ distance \sim 130\ million\ light\ years$$

$$d \sim 130 \times 10^6\ light\ years \sim 1.30 \times 10^8\ light\ years$$

$$d \sim 1.2298949614 \times\ 10^{24} meters$$

At the moment of the most intense collision, both the **gravitational wave** and the **gamma-ray burst** were emitted nearly simultaneously.

$$\Delta t \sim \frac{d}{c} - \frac{d}{v_{vcv}}$$

$$\frac{d}{v_{vcv}} \sim \frac{d}{c} - \Delta t$$

$$v_{vcv} \sim \frac{d}{\frac{d}{c} - \Delta t}$$

$$v_{vcv} \sim c + \delta_{vcv}$$

$$c + \delta_{vcv} \sim \frac{d}{\frac{d}{c} - \Delta t}$$

$$\delta_{vcv} \sim \frac{d}{\frac{d}{c} - \Delta t} - c$$

$$\delta_{vcv} \sim \frac{1.2298949614 \times\ 10^{24}}{\frac{1.2298949614 \times\ 10^{24}}{299792458} - 1.74} - 299792458$$

$$\delta_{vcv} \sim 1.2715183495 \times 10^{-7} ms^{-1}$$

The gravitational wave speed measured by LIGO for the **GW170817** event, **v_gw ≈ c + 1.2715183495 × 10^{-7} m·s^{-1}**,represents the propagation speed of an individual wave in the virtual carrier exchange. Since this difference is extremely small, all calculations can be effectively performed using **c**.

1.5 Potential Energy of Virtual Carrier Particles

The total virtual energy (potential energy) of virtual carrier particles is calculated using the **Planck equation**.

$$V_{ve} = nhf_{vcf}$$

$$V_{ve} = virtual\ energy(potential\ energy)$$

$$n = number\ of\ carrier$$

$$h = Plank'constant$$

$$f_{vcf} = virtual\ carrier\ frequency$$

1.6 Virtual Carrier particle Frequency

The frequency of virtual carrier particles is directly proportional to acceleration and inversely proportional to the speed of light.

$$f_{vcf} = \check{T}\frac{a_E}{c}\left(\check{T} = 21.80995629 = \frac{1}{2\pi\alpha} = \frac{m_e c\alpha_0}{h}\right)$$

$$a_E = \frac{GM}{s^2}(for\ gravity) = \frac{kq_1q_2}{s^2m_e}(for\ EM) = \cdots)$$

Virtual Carrier Particle Properties

Carrier Type	*Mass / Energy*	*Charge / Coupling*	*Spin / Polarization*	*Frequency Relation*
Gravity Carrier (Graviton)	*0 (massless) / $E = hf_{vcf}$*	*Coupling ~ G (gravitational constant)*	*Spin 2*	$f_{vcf} = \tilde{T}a_E/c$
Electromagnetic Carrier (Photon)	*0 / $E = hf_{vcf}$*	*Coupling ~ α (fine-structure constant)*	*Spin 1, polarization*	$f_{vcf} = \tilde{T}a_E/c$
Strong Interaction Carrier (Gluon)	*0 / $E = hf_{vcf}$*	*Coupling ~ α_s*	*Spin 1, color charge polarization*	$f_{vcf} = \tilde{T}a_E/c$
Weak Interaction Carrier (W/Z boson)	*Non-zero / $E = hf_{vcf}$*	*Coupling ~ weak constant*	*Spin 1*	$f_{vcf} = \tilde{T}a_E/c$

1.7 Carrier Spin–Mediated Modulation Frequency

When the virtual carrier frequency acting on an object or particle in a **low carrier-spin system** is measured within a **high carrier-spin field**, a **frequency coupling modulation** occurs depending on the mediator spin. This modulation coupling frequency can be defined as follows:

$$f_{MF} = f_0\left[1 + \sum_i \kappa_i\,\alpha_i^2\right]$$

$$\boldsymbol{\kappa_i} = \frac{\boldsymbol{S_i(S_i+1) - S_o(S_o+1)}}{\boldsymbol{4}}$$

$$f_{MF} = modulation\ virtual\ carrier\ frequency$$

$f_o =$ primary virtual carrier frequency

$S_o = spin\ of\ carrier(observe)$

$S_{i1} = spin\ of\ first\ influence\ carrier$

$S_{i2} = spin\ of\ second\ influence\ carrier$

$$\alpha_{i1}^2 = \frac{V_{i1}}{mc^2} = first\ influence\ potential\ coupling\ strength$$

$$\alpha_{i2}^2 = \frac{V_{i2}}{mc^2} = second\ influence\ potential\ coupling\ strength$$

$V_{i1} = first\ influence\ potential$

$V_{i2} = second\ influence\ potential$

For example.Coulomb field in gravity field

$$f_{MF} = f_C\left[1 + \left[\frac{\mathbf{2(2+1)-1(1+1)}}{\mathbf{4}}\right]\frac{V_G}{mc^2}\right] = f_C\left[1 + \frac{V_G}{mc^2}\right](S_i = 2, S_o = 1,)$$

For example.Coulomb field in External EM field

$$f_{MF} = f_C\left[1 + \left[\frac{\mathbf{1(1+1)-1(1+1)}}{\mathbf{4}}\right]\frac{V_{EM}}{mc^2}\right] = f_C(S_i = 1, S_o = 1,)$$

1.8 Adjust of interaction angle and motion

The **interaction angle** represents the adjustment of the classical potential and the orbital path due to curvature effects. When defining the classical potential between particles, the curvature of the path traversed by virtual carrier particles can slightly reduce the effective potential or interaction strength. This reduction can be expressed by adjusting the **interaction angle**, which can be defined using the **adjusted coupling strength** α_MMO as:

$$\theta = \sin^{-1}(\alpha_{\mathrm{MMO}})$$

$$mv^2 = \frac{K}{\frac{c\sin^{-1}\frac{v}{c}}{v}r}\left(K = GMm(or)\frac{Ze^2}{4\pi\varepsilon_0}\right) = \frac{v}{c\sin^{-1}\frac{v}{c}}\frac{K}{r}$$

$$mv^2 = \frac{v}{c\sin^{-1}\frac{v}{c}}V_{classical}$$

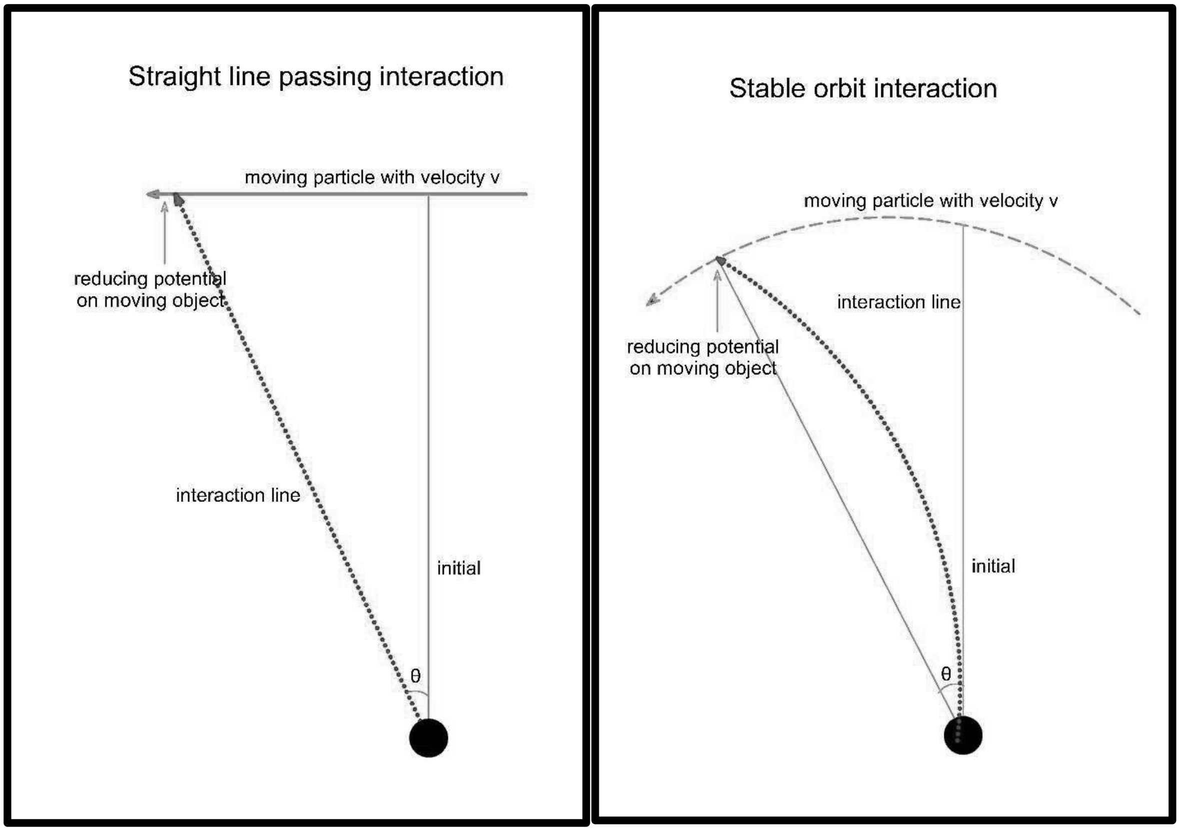
$$\frac{v}{c}\sin^{-1}\frac{v}{c} = \frac{V_{classical}}{mc^2}$$

$$\alpha_{MMO}\sin^{-1}\alpha_{MMO} = \frac{V_{classical}}{mc^2}(\alpha_{MMO} = adjust\ coupling\ strength)$$

$$adjusted\ interaction\ angle = \theta = \sin^{-1}\alpha_{MMO}$$

1.9 Potential Decomposition of a system

When an object or particle interacts with another object or particle, the potential depends on their **relative velocity** and can be decomposed into **action potential** and **perturbation potential**.



$$V_{action} = \cos\theta\, V_{MP} = \sqrt{1-\alpha_{MMO}{}^2}\,nhf_{MF}\,(\theta = \sin^{-1}\alpha_{MMO})$$

$$V_{perturbation} = \sin\theta\, V_{MP} = \alpha_{MMO}\,nhf_{MF}$$

$$\mathbf{V}^2_{classical} = [V_{action}]^2 + [V_{perturbation}]^2$$

1.9.1 Action Potential

The **action potential** gives rise to the **binding state** of the object or particle.

$$\boldsymbol{action\ potential} = \mathbf{\cos\theta\, V}$$

Kinetic energy due to action potential

$$\boldsymbol{KE_{action}} = \frac{\mathbf{\cos\theta\, V}}{\mathbf{2}}(\boldsymbol{By\ Virial\ theorem})$$

$$\boldsymbol{KE_{action}} = \frac{\sqrt{1-\alpha_{MMO}{}^2}}{\mathbf{2}}nhf_{MF}$$

$$\boldsymbol{KE_{action}} = \alpha_{MMO}{}^2\frac{\sqrt{1-\alpha_{MMO}{}^2}}{\mathbf{2}}mc^2(for\ shortcut)$$

1.9.2 Perturbation Potential

The **perturbation potential** causes **path deviations** of the object or particle.

1.9.2.1 $$\boldsymbol{perturbation\ potential = \sin\theta\, V_{classical}}$$

1.9.2.2 $$\boldsymbol{perturbation\ momentum = mc}$$

1.9.2.3 **perturbation or drift energy**

$$\text{perturbation or drift rate}[v_d] = \frac{\boldsymbol{perturbation\ potential}}{\boldsymbol{pertutbation\ momentum}}$$

$$\boldsymbol{v_d} = \frac{\boldsymbol{\sin\theta\, V_{MP}}}{\boldsymbol{mc}} = \frac{\alpha_{MMO}\boldsymbol{V_{MP}}}{\boldsymbol{mc}}$$

$$\boldsymbol{E_{perturbation\ or\ drift}} = \boldsymbol{m v_d}^{\boldsymbol{2}}$$

$$\boldsymbol{E_{perturbation\ or\ drift}} = \boldsymbol{m}\left[\frac{\alpha_{MMO}}{mc} nhf_{MF}\right]^{\boldsymbol{2}}$$

$$\boldsymbol{E_{perturbation\ or\ drift}} = \frac{\alpha_{MMO}{}^2}{mc^2}[nhf_{MF}]^2$$

$$\boldsymbol{E_{perturbation\ or\ drift}} = \alpha_{MMO}{}^4 nhf_{MF}\left(\alpha_{MMO}{}^2 = \frac{nhf_{MF}}{mc^2}\right)$$

$$\boldsymbol{E_{perturbation\ or\ drift}} = \alpha_{MMO}{}^6 mc^2 (for\ shortcut)$$

1.10 Total Kinetic energy of Object or particle

The **total kinetic energy** of an object or particle is obtained by combining **KE_action** and **E_perturbation** using the **vector method**.

$$\boldsymbol{KE_{total}} = \sqrt{\boldsymbol{KE_{action}}^{\boldsymbol{2}} + \boldsymbol{E_{perturbation\ or\ drift}}^{\boldsymbol{2}}}$$

$$\boldsymbol{KE_{total}} = \sqrt{\left[\frac{\sqrt{1-\alpha_{MMO}{}^2}}{\boldsymbol{2}} nhf_{MF}\right]^{\boldsymbol{2}} + [\alpha_{MMO}{}^4 nhf_{FM}]^{\boldsymbol{2}}}$$

$$\boldsymbol{KE_{total}} = nhf_{MF}\sqrt{\left[\frac{\sqrt{1-\alpha_{MMO}{}^2}}{\boldsymbol{2}}\right]^{\boldsymbol{2}} + \alpha_{MMO}{}^8}$$

$$\boldsymbol{KE_{total}} = nhf_{MF}\sqrt{\frac{1-\alpha_{MMO}{}^2}{\boldsymbol{4}} + \alpha_{MMO}{}^8} = nhf_{MF}\sqrt{\frac{1-\alpha_{MMO}{}^2 + 4\alpha_{MMO}{}^8}{\boldsymbol{4}}}$$

$$KE_{total} = nhf_0\left[1 + K_{G,EM}\alpha_G^2\right]\sqrt{\frac{1-\left[\frac{Z\alpha}{n_\sigma}\right]^2 + 4\left[\frac{Z\alpha}{n_\sigma}\right]^8}{4}}\ (for\ EM\ in\ Gravity\ )$$

$$KE_{total} = mc^2\left\{\left[\frac{Z\alpha}{n_\sigma}\right]^2\left[1 + K_{G,EM}\alpha_G^2\right]\sqrt{\frac{1-\left[\frac{Z\alpha}{n_\sigma}\right]^2 + 4\left[\frac{Z\alpha}{n_\sigma}\right]^8}{4}}\right\}(for\ shortcut)$$

1.11 **Total Energy of a System**

The **total energy** of a system is the sum of its **total kinetic energy** and **potential energy**.

$$H = \boldsymbol{KE_{total}} + \mathrm{PE}$$

$$H = \boldsymbol{KE_{total}} - \mathrm{V}_{MP} (\mathrm{PE} = -\mathrm{V}_{MP})$$

$$H = nhf_{MF}\sqrt{\frac{1-\alpha_{MMO}{}^{2}+4\alpha_{MMO}{}^{8}}{\mathbf{4}}} - nhf_{MF}$$

$$H = nhf_{MF}\left[\sqrt{\frac{1-\alpha_{MMO}{}^{2}+4\alpha_{MMO}{}^{8}}{\mathbf{4}}} - 1\right]$$

$(\boldsymbol{for\ electron\ coulomb\ bound\ state\ in\ gravity})$

$$H = nhf_{MF}\left[\sqrt{\frac{1-\left[\frac{Z\alpha}{n_\sigma}\right]^{2}+4\left[\frac{Z\alpha}{n_\sigma}\right]^{\mathbf{8}}}{\mathbf{4}}} - 1\right](\alpha_{EM} = \frac{Z\alpha}{n_\sigma})$$

$$H = \left[\frac{Z\alpha}{n_\sigma}\right]^{2} mc^{2}\left[\sqrt{\frac{1-\left[\frac{Z\alpha}{n_\sigma}\right]^{2}+4\left[\frac{Z\alpha}{n_\sigma}\right]^{\mathbf{8}}}{\mathbf{4}}} - 1\right](\alpha_{EM} = \frac{Z\alpha}{n_\sigma})$$

$$\boldsymbol{n_\sigma} = \boldsymbol{n}\left\{\sqrt{\mathbf{1}+[\boldsymbol{Z\alpha}]^{\mathbf{2}}\left[\frac{\boldsymbol{l^2}}{\boldsymbol{\pi^2}}+\left[\frac{\mathbf{2}}{\mathbf{3}}\frac{\left[\boldsymbol{j}-\frac{\mathbf{1}}{\mathbf{2}}\right]}{\boldsymbol{j}}\right]\right]}\right\}$$

$n_\sigma = effective\ quantum\ number$

$n = principle\ quantum\ number$

$l = orbital\ quantum\ number$

$j = total\ angular\ momentum\ quantum\ number$

$\frac{1}{2} = electron\ spin$

$$H = nhf_{0}\left[1+K_{G,EM}\alpha_G^2\right]\left[\sqrt{\frac{1-\left[\frac{Z\alpha}{n_\sigma}\right]^{2}+4\left[\frac{Z\alpha}{n_\sigma}\right]^{\mathbf{8}}}{\mathbf{4}}} - 1\right](\alpha_G = \sqrt{\frac{GM}{rc^2}})$$

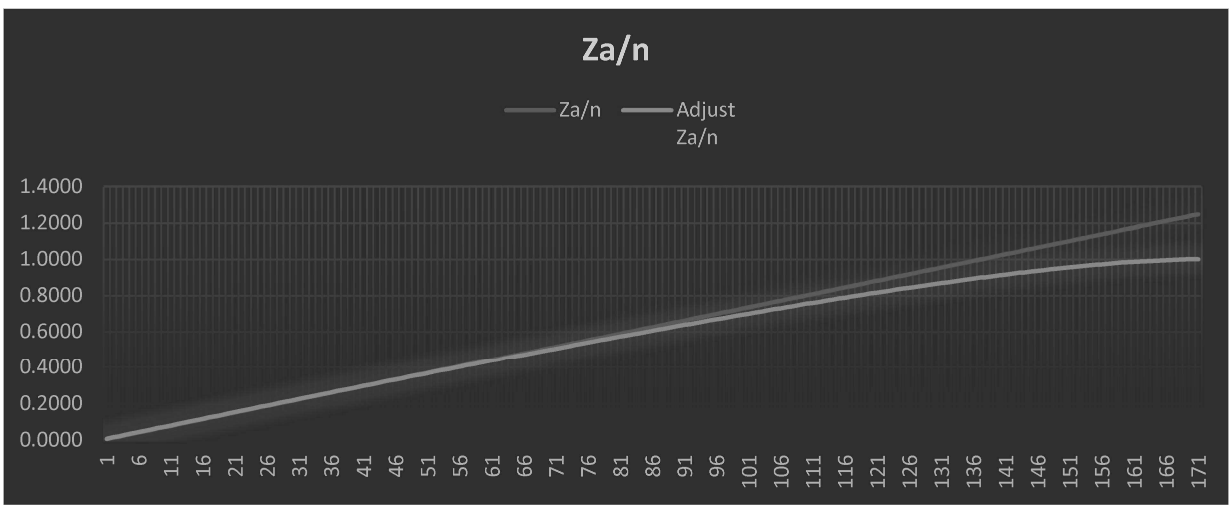
$$H = \left[\frac{Z\alpha}{n_\sigma}\right]^2 mc^2\left[1 + K_{G,EM}\alpha_G^2\right]\left[\sqrt{\frac{1 - \left[\frac{Z\alpha}{n_\sigma}\right]^2 + 4\left[\frac{Z\alpha}{n_\sigma}\right]^{\mathbf{8}}}{\mathbf{4}}} - 1\right]\left(nhf_0 = \left[\frac{Z\alpha}{n_\sigma}\right]^2 mc^2\right)$$

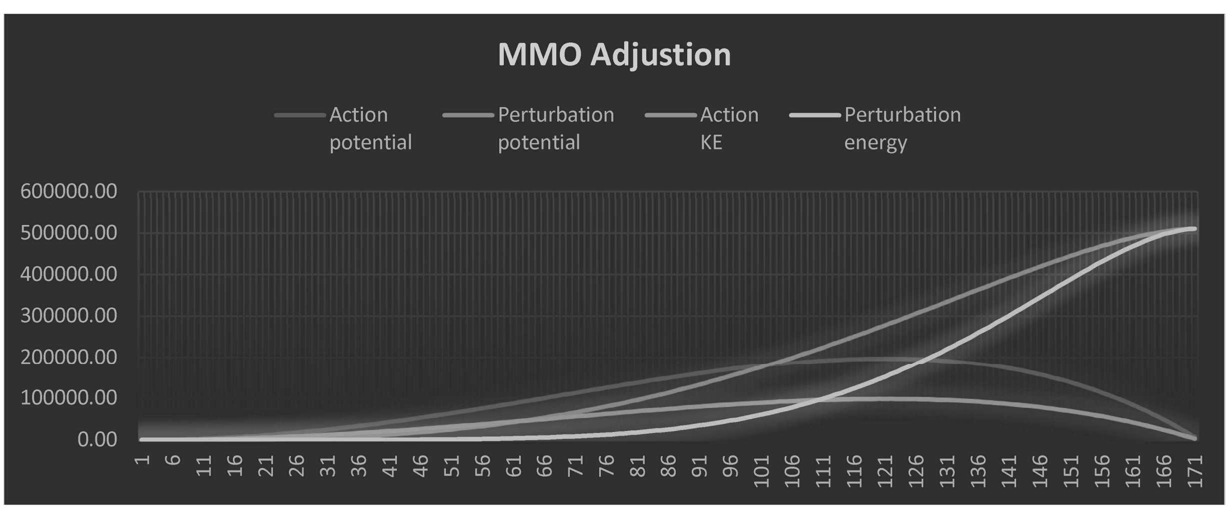
$$H = mc^2\left\{\left[\frac{Z\alpha}{n_\sigma}\right]^2 \times \left[1 + K_{G,EM}\alpha_G^2\right] \times \left[\sqrt{\frac{1 - \left[\frac{Z\alpha}{n_\sigma}\right]^2 + 4\left[\frac{Z\alpha}{n_\sigma}\right]^{\mathbf{8}}}{\mathbf{4}}} - 1\right]\right\}$$

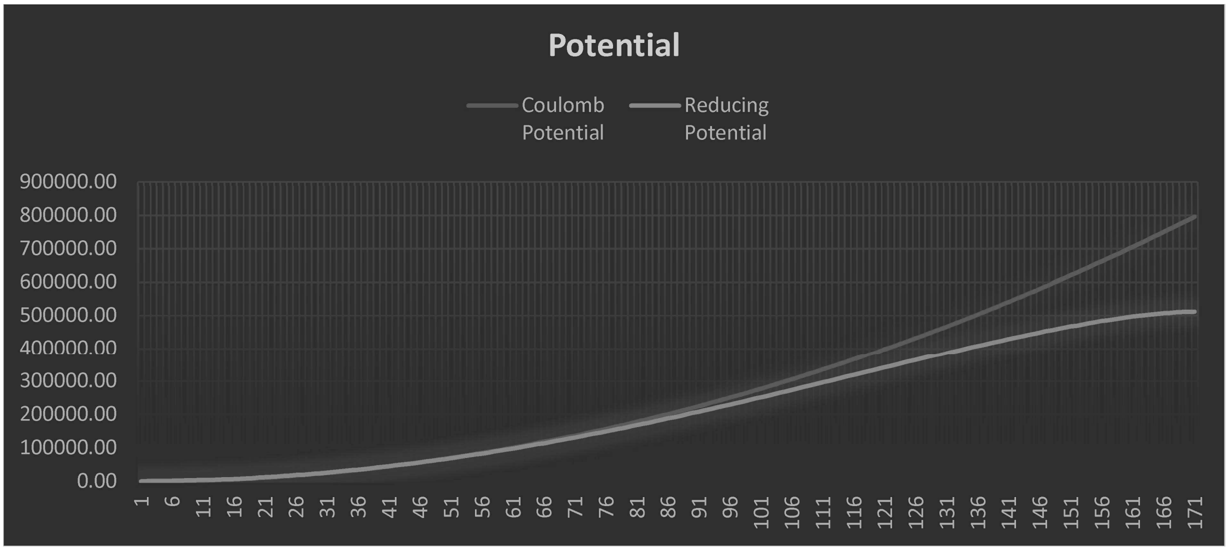
Z	**n**	**Za/n**	**Adjust Za/n**	**Action potential**	**Perturbation potential**	**Action KE**	**Perturbation energy**	**Coulomb Potential**	**Reducing Potential**	**Bohr Binding**	**Dirac Binding**	**MMO Binding**	**Experiment**
1	1	0.007	0.007	27.2	0.2	13.6	0.0000001	27.2	27.2	-13.6	-13.6	-13.6	-13.6
2	1	0.015	0.015	108.8	1.6	54.4	0.0000049	108.8	108.8	-54.4	-54.4	-54.4	-24.6
3	1	0.022	0.022	244.8	5.4	122.4	0.0000562	244.9	244.9	-122.5	-122.5	-122.5	-54.7
4	1	0.029	0.029	435.1	12.7	217.6	0.0003159	435.4	435.3	-217.7	-217.7	-217.8	-111.5
5	1	0.036	0.036	679.7	24.8	339.8	0.0012049	680.3	680.1	-340.1	-340.3	-340.3	-188.0
6	1	0.044	0.044	978.4	42.9	489.2	0.0035967	979.6	979.3	-489.8	-490.0	-490.1	-284.2
7	1	0.051	0.051	1331.0	68.1	665.5	0.0090664	1333.4	1332.8	-666.7	-667.1	-667.3	-409.9
8	1	0.058	0.058	1737.6	101.6	868.8	0.0201935	1741.5	1740.5	-870.8	-871.5	-871.8	-543.1
9	1	0.066	0.066	2197.8	144.6	1098.9	0.0409194	2204.1	2202.5	-1102.1	-1103.2	-1103.6	-696.7
10	1	0.073	0.073	2711.5	198.3	1355.7	0.0769581	2721.1	2718.7	-1360.6	-1362.4	-1363.0	-870.2
11	1	0.080	0.080	3278.4	263.9	1639.2	0.1362596	3292.6	3289.0	-1646.3	-1648.9	-1649.8	-1070.8
12	1	0.088	0.088	3898.4	342.5	1949.2	0.2295259	3918.4	3913.4	-1959.2	-1963.0	-1964.2	-1303.0
13	1	0.095	0.095	4571.1	435.3	2285.6	0.3707783	4598.7	4591.8	-2299.4	-2304.5	-2306.2	-1559.6
14	1	0.102	0.102	5296.3	543.5	2648.2	0.5779750	5333.4	5324.1	-2666.7	-2673.7	-2676.0	-1839.0
15	1	0.109	0.109	6073.7	668.2	3036.8	0.8736782	6122.6	6110.3	-3061.3	-3070.5	-3073.5	-2145.5
16	1	0.117	0.117	6902.8	810.6	3451.4	1.2857708	6966.1	6950.3	-3483.1	-3495.0	-3498.8	-2472.0
17	1	0.124	0.124	7783.4	971.8	3891.7	1.8482187	7864.1	7843.9	-3932.0	-3947.3	-3952.2	-2822.4
18	1	0.131	0.131	8715.1	1153.1	4357.6	2.6018813	8816.5	8791.1	-4408.2	-4427.4	-4433.5	-3205.9
19	1	0.139	0.138	9697.5	1355.4	4848.7	3.5953656	9823.3	9791.8	-4911.7	-4935.4	-4943.0	-3608.4
20	1	0.146	0.146	10730.1	1580.1	5365.0	4.8859247	10884.6	10845.8	-5442.3	-5471.5	-5480.8	-4038.5
21	1	0.153	0.153	11812.5	1828.2	5906.2	6.5403979	12000.2	11953.1	-6000.1	-6035.7	-6046.9	-4492.0
22	1	0.161	0.160	12944.2	2100.7	6472.1	8.6361924	13170.3	13113.6	-6585.2	-6628.1	-6641.5	-4966.0
23	1	0.168	0.167	14124.7	2399.0	7062.4	11.2623029	14394.8	14327.0	-7197.4	-7248.8	-7264.6	-5465.0
24	1	0.175	0.175	15353.6	2723.9	7676.8	14.5203698	15673.8	15593.3	-7836.9	-7897.8	-7916.5	-5989.0
25	1	0.182	0.182	16630.2	3076.8	8315.1	18.5257721	17007.1	16912.4	-8503.6	-8575.4	-8597.3	-6539.0
26	1	0.190	0.189	17954.0	3458.6	8977.0	23.4087551	18394.9	18284.1	-9197.4	-9281.7	-9307.0	-7112.0
27	1	0.197	0.196	19324.4	3870.4	9662.2	29.3155892	19837.1	19708.2	-9918.6	-10016.6	-10045.9	-7709.0
28	1	0.204	0.204	20740.8	4313.4	10370.4	36.4097591	21333.7	21184.6	-10666.9	-10780.5	-10814.1	-8333.0
29	1	0.212	0.211	22202.5	4788.5	11101.3	44.8731809	22884.8	22713.1	-11442.4	-11573.3	-11611.7	-8979.0
30	1	0.219	0.218	23709.0	5296.9	11854.5	54.9074450	24490.2	24293.5	-12245.1	-12395.4	-12438.9	-9659.0
31	1	0.226	0.225	25259.5	5839.7	12629.8	66.7350824	26150.1	25925.8	-13075.1	-13246.7	-13295.8	-10367.0
32	1	0.234	0.232	26853.3	6417.7	13426.7	80.6008524	27864.5	27609.6	-13932.2	-14127.4	-14182.7	-11103.0
33	1	0.241	0.240	28489.8	7032.1	14244.9	96.7730494	29633.2	29344.8	-14816.6	-15037.7	-15099.6	-11867.0
34	1	0.248	0.247	30168.1	7684.0	15084.0	115.5448256	31456.4	31131.3	-15728.2	-15977.8	-16046.8	-12658.0
35	1	0.255	0.254	31887.5	8374.2	15943.7	137.2355285	33333.9	32968.7	-16667.0	-16947.9	-17024.4	-13474.0
36	1	0.263	0.261	33647.1	9103.8	16823.6	162.1920492	35266.0	34857.0	-17633.0	-17948.0	-18032.6	-14326.0
37	1	0.270	0.268	35446.3	9873.9	17723.1	190.7901795	37252.4	36795.8	-18626.2	-18978.5	-19071.7	-15200.0
38	1	0.277	0.276	37284.1	10685.3	18642.1	223.4359756	39293.2	38785.1	-19646.6	-20039.4	-20141.7	-16105.0
39	1	0.285	0.283	39159.7	11539.0	19579.9	260.5671241	41388.5	40824.4	-20694.3	-21131.0	-21242.8	-17038.0
40	1	0.292	0.290	41072.2	12436.1	20536.1	302.6543092	43538.2	42913.7	-21769.1	-22253.5	-22375.3	-17998.0
41	1	0.299	0.297	43020.7	13377.3	21510.4	350.2025770	45742.3	45052.6	-22871.2	-23407.1	-23539.4	-18986.0
42	1	0.306	0.304	45004.3	14363.7	22502.2	403.7526937	48000.9	47240.9	-24000.4	-24592.0	-24735.2	-20000.0
43	1	0.314	0.311	47022.0	15396.2	23511.0	463.8824964	50313.9	49478.4	-25156.9	-25808.4	-25962.8	-21044.0
44	1	0.321	0.318	49072.9	16475.6	24536.5	531.2082308	52681.2	51764.8	-26340.6	-27056.7	-27222.6	-22117.0
45	1	0.328	0.325	51156.0	17602.9	25578.0	606.3858748	55103.1	54099.9	-27551.5	-28337.0	-28514.7	-23220.0
46	1	0.336	0.332	53270.2	18778.9	26635.1	690.1124431	57579.3	56483.3	-28789.6	-29649.6	-29839.2	-24350.0
47	1	0.343	0.340	55414.5	20004.4	27707.3	783.1272710	60110.0	58914.8	-30055.0	-30994.7	-31196.4	-25514.0
48	1	0.350	0.347	57587.9	21280.4	28794.0	886.2132725	62695.0	61394.0	-31347.5	-32372.7	-32586.4	-26711.0
49	1	0.358	0.354	59789.3	22607.5	29894.7	1000.1981700	65334.5	63920.8	-32667.3	-33783.8	-34009.4	-27940.0
50	1	0.365	0.361	62017.6	23986.7	31008.8	1125.9556925	68028.5	66494.7	-34014.2	-35228.2	-35465.5	-29200.0
51	1	0.372	0.368	64271.7	25418.7	32135.8	1264.4067374	70776.8	69115.5	-35388.4	-36706.5	-36954.8	-30491.0
52	1	0.379	0.375	66550.3	26904.3	33275.2	1416.5204935	73579.6	71782.9	-36789.8	-38218.7	-38477.6	-31814.0
53	1	0.387	0.382	68852.4	28444.2	34426.2	1583.3155213	76436.8	74496.5	-38218.4	-39765.3	-40033.9	-33169.0
54	1	0.394	0.389	71176.8	30039.2	35588.4	1765.8607853	79348.4	77256.0	-39674.2	-41346.6	-41623.8	-34561.0
55	1	0.401	0.396	73522.2	31690.0	36761.1	1965.2766372	82314.4	80061.0	-41157.2	-42962.9	-43247.4	-35985.0
56	1	0.409	0.403	75887.5	33397.2	37943.7	2182.7357438	85334.9	82911.3	-42667.5	-44614.7	-44904.8	-37441.0
57	1	0.416	0.410	78271.3	35161.7	39135.6	2419.4639558	88409.8	85806.4	-44204.9	-46302.3	-46596.0	-38925.0
58	1	0.423	0.417	80672.4	36983.9	40336.2	2676.7411159	91539.1	88746.0	-45769.6	-48026.0	-48321.1	-40443.0
59	1	0.431	0.424	83089.6	38864.7	41544.8	2955.9017981	94722.8	91729.7	-47361.4	-49786.3	-50079.9	-41991.0
60	1	0.438	0.431	85521.4	40804.5	42760.7	3258.3359782	97961.0	94757.1	-48980.5	-51583.7	-51872.5	-43569.0
61	1	0.445	0.438	87966.6	42804.0	43983.3	3585.4896284	101253.6	97827.9	-50626.8	-53418.4	-53698.7	-45184.0
62	1	0.452	0.444	90423.8	44863.7	45211.9	3938.8652329	104600.6	100941.6	-52300.3	-55291.1	-55558.5	-46834.0
63	1	0.460	0.451	92891.6	46984.3	46445.8	4320.0222204	108002.0	104097.9	-54001.0	-57202.2	-57451.6	-48519.0
64	1	0.467	0.458	95368.6	49166.2	47684.3	4730.5773085	111457.8	107296.3	-55728.9	-59152.1	-59377.9	-50239.0

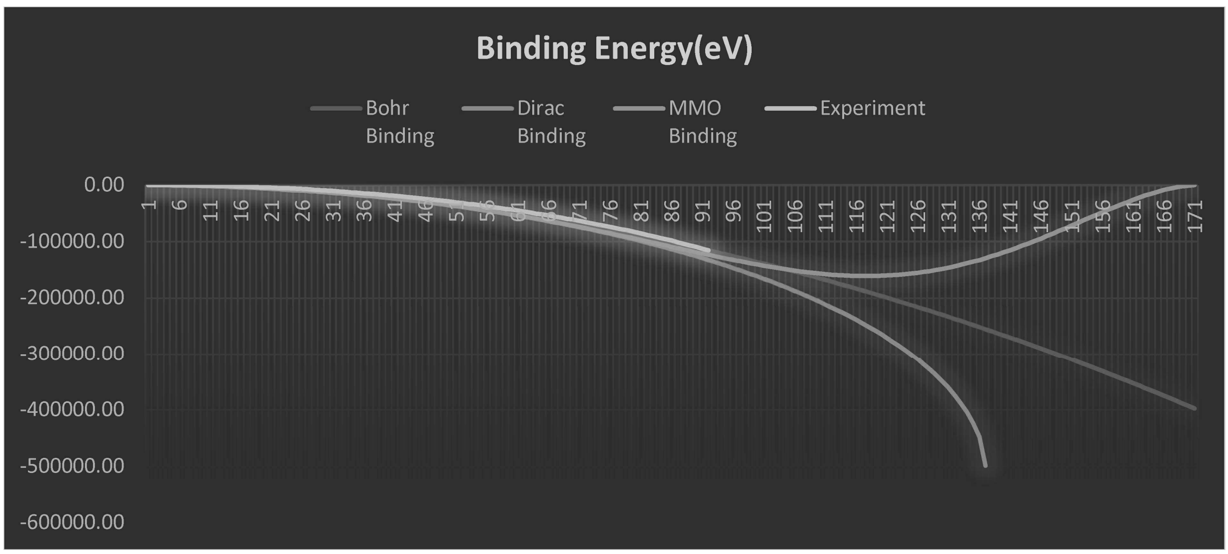
Z	n	Za/n	Adjust Za/n	Action potential	Perturbation potential	Action KE	Perturbation energy	Coulomb Potential	Reducing Potential	Bohr Binding	Dirac Binding	MMO Binding	Experiment
65	1	0.474	0.465	97853.5	51410.0	48926.7	5172.2047562	114968.1	110536.4	-57484.1	-61141.3	-61337.0	-51996.0
66	1	0.482	0.472	100344.7	53716.2	50172.3	5646.6365198	118532.8	113817.7	-59266.4	-63170.5	-63328.7	-53789.0
67	1	0.489	0.479	102840.8	56085.1	51420.4	6155.6623071	122151.9	117139.9	-61076.0	-65240.1	-65352.4	-55618.0
68	1	0.496	0.486	105340.3	58517.3	52670.2	6701.1295272	125825.4	120502.5	-62912.7	-67350.6	-67407.8	-57486.0
69	1	0.504	0.492	107841.8	61013.1	53920.9	7284.9431283	129553.4	123905.0	-64776.7	-69502.8	-69494.2	-59390.0
70	1	0.511	0.499	110343.6	63573.0	55171.8	7909.0653221	133335.8	127346.9	-66667.9	-71697.1	-71611.1	-61332.0
71	1	0.518	0.506	112844.3	66197.3	56422.2	8575.5151879	137172.6	130827.8	-68586.3	-73934.3	-73757.7	-63314.0
72	1	0.525	0.513	115342.3	68886.3	57671.2	9286.3681520	141063.8	134347.2	-70531.9	-76215.0	-75933.2	-65351.0
73	1	0.533	0.519	117836.0	71640.4	58918.0	10043.7553387	145009.5	137904.6	-72504.7	-78539.8	-78136.6	-67416.0
74	1	0.540	0.526	120323.8	74459.8	60161.9	10849.8627860	149009.5	141499.4	-74504.8	-80909.6	-80367.0	-69525.0
75	1	0.547	0.533	122804.1	77344.9	61402.1	11706.9305241	153064.0	145131.3	-76532.0	-83324.9	-82623.1	-71676.0
76	1	0.555	0.540	125275.3	80295.7	62637.7	12617.2515080	157173.0	148799.5	-78586.5	-85786.7	-84903.8	-73871.0
77	1	0.562	0.546	127735.6	83312.6	63867.8	13583.1704024	161336.3	152503.7	-80668.2	-88295.8	-87207.4	-76111.0
78	1	0.569	0.553	130183.5	86395.6	65091.7	14607.0822125	165554.1	156243.2	-82777.0	-90852.9	-89532.6	-78395.0
79	1	0.576	0.560	132617.1	89545.0	66308.6	15691.4307550	169826.3	160017.5	-84913.1	-93458.9	-91877.6	-80725.0
80	1	0.584	0.566	135034.8	92760.8	67517.4	16838.7069654	174152.9	163826.0	-87076.4	-96114.9	-94240.5	-83102.0
81	1	0.591	0.573	137434.9	96043.1	68717.4	18051.4470357	178533.9	167668.2	-89267.0	-98821.7	-96619.3	-85530.0
82	1	0.598	0.579	139815.5	99391.9	69907.8	19332.2303768	182969.4	171543.4	-91484.7	-101580.3	-99011.8	-88005.0
83	1	0.606	0.586	142175.0	102807.3	71087.5	20683.6774017	187459.2	175451.0	-93729.6	-104391.9	-101415.6	-90524.0
84	1	0.613	0.593	144511.4	106289.2	72255.7	22108.4471225	192003.5	179390.5	-96001.8	-107257.5	-103828.1	-93105.0
85	1	0.620	0.599	146823.1	109837.6	73411.5	23609.2345561	196602.3	183361.1	-98301.1	-110178.2	-106246.6	-95730.0
86	1	0.628	0.606	149108.1	113452.3	74554.0	25188.7679347	201255.4	187362.3	-100627.7	-113155.3	-108668.1	-98404.0
87	1	0.635	0.612	151364.5	117133.4	75682.3	26849.8057128	205963.0	191393.4	-102981.5	-116190.1	-111089.5	-101137.0
88	1	0.642	0.618	153590.7	120880.4	76795.3	28595.1333677	210725.0	195453.8	-105362.5	-119283.9	-113507.4	-103922.0
89	1	0.649	0.625	155784.5	124693.4	77892.3	30427.5599856	215541.4	199542.6	-107770.7	-122438.2	-115918.2	-106755.0
90	1	0.657	0.631	157944.2	128572.1	78972.1	32349.9146295	220412.2	203659.4	-110206.1	-125654.3	-118318.2	-109651.0
91	1	0.664	0.638	160067.7	132516.0	80033.9	34365.0424810	225337.5	207803.2	-112668.7	-128933.9	-120703.4	-112601.0
92	1	0.671	0.644	162153.3	136525.1	81076.6	36475.8007521	230317.2	211973.5	-115158.6	-132278.6	-123069.6	-115606.0
93	1	0.679	0.650	164198.7	140598.8	82099.4	38685.0543592	235351.3	216169.5	-117675.6	-135690.1	-125412.5	
94	1	0.686	0.657	166202.2	144736.8	83101.1	40995.6713544	240439.8	220390.4	-120219.9	-139170.3	-127727.3	
95	1	0.693	0.663	168161.7	148938.7	84080.9	43410.5181072	245582.8	224635.5	-122791.4	-142721.2	-130009.5	
96	1	0.701	0.669	170075.2	153203.9	85037.6	45932.4542304	250780.1	228903.9	-125390.1	-146344.8	-132254.1	
97	1	0.708	0.676	171940.6	157532.0	85970.3	48564.3272443	256031.9	233194.9	-128016.0	-150043.2	-134456.0	
98	1	0.715	0.682	173755.9	161922.3	86877.9	51308.9669711	261338.1	237507.7	-130669.1	-153818.9	-136609.8	
99	1	0.722	0.688	175518.9	166374.3	87759.5	54169.1796550	266698.8	241841.5	-133349.4	-157674.3	-138710.4	
100	1	0.730	0.694	177227.7	170887.2	88613.9	57147.7417991	272113.9	246195.3	-136056.9	-161612.0	-140752.0	
101	1	0.737	0.700	178880.1	175460.4	89440.1	60247.3937132	277583.3	250568.3	-138791.7	-165634.8	-142729.2	
102	1	0.744	0.706	180474.0	180093.1	90237.0	63470.8327649	283107.3	254959.6	-141553.6	-169745.8	-144636.2	
103	1	0.752	0.712	182007.3	184784.5	91003.6	66820.7063268	288685.6	259368.4	-144342.8	-173948.2	-146467.2	
104	1	0.759	0.718	183477.7	189533.7	91738.8	70299.6044120	294318.3	263793.6	-147159.2	-178245.5	-148216.6	
105	1	0.766	0.725	184883.1	194339.8	92441.5	73910.0519899	300005.5	268234.4	-150002.8	-182641.3	-149878.5	
106	1	0.774	0.731	186221.3	199201.8	93110.6	77654.5009747	305747.1	272689.8	-152873.6	-187139.6	-151447.0	
107	1	0.781	0.736	187490.0	204118.7	93745.0	81535.3218781	311543.2	277158.8	-155771.6	-191745.0	-152916.5	
108	1	0.788	0.742	188687.2	209089.5	94343.6	85554.7951164	317393.6	281640.3	-158696.8	-196461.9	-154281.2	
109	1	0.795	0.748	189810.4	214112.9	94905.2	89715.1019651	323298.5	286133.4	-161649.2	-201295.5	-155535.5	
110	1	0.803	0.754	190857.5	219187.7	95428.7	94018.3151496	329257.8	290636.9	-164628.9	-206251.4	-156673.9	
111	1	0.810	0.760	191826.1	224312.8	95913.1	98466.3890629	335271.5	295149.9	-167635.7	-211335.7	-157691.0	
112	1	0.817	0.766	192714.0	229486.7	96357.0	103061.1496004	341339.6	299671.2	-170669.8	-216554.9	-158581.6	
113	1	0.825	0.772	193518.8	234708.1	96759.4	107804.2836007	347462.2	304199.6	-173731.1	-221916.5	-159340.6	
114	1	0.832	0.777	194238.3	239975.4	97119.1	112697.3278801	353639.2	308734.1	-176819.6	-227428.4	-159963.0	
115	1	0.839	0.783	194870.0	245287.3	97435.0	117741.6578510	359870.6	313273.3	-179935.3	-233099.6	-160444.4	
116	1	0.846	0.789	195411.5	250642.0	97705.8	122938.4757085	366156.4	317816.1	-183078.2	-238940.1	-160780.2	
117	1	0.854	0.794	195860.6	256038.0	97930.3	128288.7981749	372496.7	322361.3	-186248.3	-244961.0	-160966.3	
118	1	0.861	0.800	196214.8	261473.3	98107.4	133793.4437849	378891.3	326907.5	-189445.7	-251174.8	-160998.7	
119	1	0.868	0.805	196471.6	266946.3	98235.8	139453.0196983	385340.4	331453.5	-192670.2	-257595.9	-160873.9	
120	1	0.876	0.811	196628.7	272455.0	98314.3	145267.9080220	391844.0	335997.9	-195922.0	-264240.3	-160588.4	
121	1	0.883	0.816	196683.5	277997.5	98341.8	151238.2516252	398401.9	340539.3	-199200.9	-271126.5	-160139.4	
122	1	0.890	0.822	196633.7	283571.5	98316.9	157363.9394276	405014.3	345076.3	-202507.1	-278276.2	-159524.1	
123	1	0.898	0.827	196476.7	289175.1	98238.3	163644.5911411	411681.1	349607.3	-205840.5	-285714.2	-158740.1	
124	1	0.905	0.832	196210.0	294805.8	98105.0	170079.5414411	418402.3	354131.1	-209201.1	-293470.3	-157785.4	
125	1	0.912	0.838	195831.0	300461.4	97915.5	176667.8235452	425177.9	358645.9	-212589.0	-301579.8	-156658.3	
126	1	0.919	0.843	195337.3	306139.5	97668.6	183408.1521713	432008.0	363150.1	-216004.0	-310085.4	-155357.7	
127	1	0.927	0.848	194726.2	311837.4	97363.1	190298.9058469	438892.4	367642.3	-219446.2	-319039.7	-153882.5	
128	1	0.934	0.853	193995.2	317552.5	96997.6	197338.1085379	445831.3	372120.6	-222915.7	-328509.0	-152232.3	
129	1	0.941	0.858	193141.7	323282.0	96570.8	204523.4105619	452824.7	376583.3	-226412.3	-338577.8	-150406.9	
130	1	0.949	0.864	192163.0	329023.1	96081.5	211852.0687475	459872.4	381028.6	-229936.2	-349358.4	-148406.7	
131	1	0.956	0.869	191056.5	334772.7	95528.2	219320.9257974	466974.6	385454.7	-233487.3	-361003.9	-146232.4	
132	1	0.963	0.873	189819.5	340527.7	94909.7	226926.3888082	474131.2	389859.7	-237065.6	-373734.5	-143885.2	
133	1	0.971	0.878	188449.3	346284.9	94224.7	234664.4068937	481342.2	394241.6	-240671.1	-387886.2	-141366.8	
134	1	0.978	0.883	186943.3	352040.9	93471.6	242530.4478540	488607.6	398598.3	-244303.8	-404021.6	-138679.1	
135	1	0.985	0.888	185298.6	357792.1	92649.3	250519.4738252	495927.5	402927.7	-247963.8	-423228.0	-135824.9	
136	1	0.992	0.893	183512.6	363534.8	91756.3	258625.9158348	503301.8	407227.7	-251650.9	-448265.3	-132807.3	
137	1	1.000	0.897	181582.3	369265.2	90791.2	266843.6471818	510730.5	411496.0	-255365.3	-499188.5	-129629.8	
138	1	1.007	0.902	179505.1	374979.3	89752.6	275165.9555477	518213.6	415730.2	-259106.8		-126296.6	
139	1	1.014	0.907	177278.0	380673.0	88639.0	283585.5137323	525751.2	419927.9	-262875.6		-122812.4	
140	1	1.022	0.911	174898.3	386341.7	87449.1	292094.3488955	533343.2	424086.4	-266671.6		-119182.4	
141	1	1.029	0.915	172362.9	391981.0	86181.4	300683.8101682	540989.6	428203.3	-270494.8		-115412.7	
142	1	1.036	0.920	169668.9	397586.1	84834.5	309344.5344761	548690.4	432275.7	-274345.2		-111509.5	
143	1	1.044	0.924	166813.4	403152.1	83406.7	318066.4103996	556445.6	436300.7	-278222.8		-107480.2	
144	1	1.051	0.928	163793.4	408673.6	81896.7	326838.5398622	564255.3	440275.4	-282127.6		-103332.5	
145	1	1.058	0.932	160605.8	414145.4	80302.9	335649.1974129	572119.4	444196.6	-286059.7		-99074.9	
146	1	1.065	0.936	157247.4	419561.5	78623.7	344485.7868273	580037.9	448061.0	-290018.9		-94716.7	

Z	n	Za/n	Adjust Za/n	Action potential	Perturb ation potential	Action KE	Perturbation energy	Coulomb Potential	Reducing Potential	Bohr Binding	Dirac Binding	MMO Binding	Experiment
147	1	1.073	0.940	153715.2	424916.1	76857.6	353334.7947090	588010.8	451865.1	-294005.4		-90267.9	
148	1	1.080	0.944	150005.9	430202.8	75003.0	362181.7407212	596038.2	455605.4	-298019.1		-85739.1	
149	1	1.087	0.948	146116.4	435415.1	73058.2	371011.1240112	604120.0	459278.0	-302060.0		-81142.1	
150	1	1.095	0.952	142043.1	440545.9	71021.6	379806.3653187	612256.2	462878.9	-306128.1		-76489.3	
151	1	1.102	0.955	137782.9	445587.8	68891.4	388549.7441619	620446.8	466403.9	-310223.4		-71794.1	
152	1	1.109	0.959	133332.2	450533.2	66666.1	397222.3303847	628691.9	469848.5	-314345.9		-67070.8	
153	1	1.116	0.962	128687.4	455373.9	64343.7	405803.9092097	636991.3	473208.0	-318495.7		-62334.6	
154	1	1.124	0.966	123844.9	460101.1	61922.5	414272.8987716	645345.2	476477.3	-322672.6		-57602.1	
155	1	1.131	0.969	118801.0	464705.7	59400.5	422606.2588947	653753.5	479650.9	-326876.8		-52890.5	
156	1	1.138	0.972	113551.8	469177.8	56775.9	430779.3896163	662216.3	482723.3	-331108.1		-48218.6	
157	1	1.146	0.975	108093.4	473507.1	54046.7	438766.0176270	670733.4	485688.3	-335366.7		-43606.1	
158	1	1.153	0.978	102421.5	477682.4	51210.7	446538.0683825	679305.0	488539.3	-339652.5		-39074.3	
159	1	1.160	0.981	96531.8	481691.8	48265.9	454065.5211109	687931.0	491269.2	-343965.5		-34645.6	
160	1	1.168	0.983	90420.0	485522.5	45210.0	461316.2432532	696611.5	493870.3	-348305.7		-30344.0	
161	1	1.175	0.986	84081.1	489160.7	42040.6	468255.7999891	705346.3	496334.4	-352673.2		-26195.2	
162	1	1.182	0.988	77510.3	492591.5	38755.2	474847.2333385	714135.6	498652.5	-357067.8		-22226.3	
163	1	1.189	0.990	70702.3	495798.8	35351.1	481050.8037856	722979.3	500814.6	-361489.7		-18466.6	
164	1	1.197	0.992	63651.4	498764.9	31825.7	486823.6853132	731877.4	502810.0	-365938.7		-14947.1	
165	1	1.204	0.994	56351.6	501470.4	28175.8	492119.6019317	740830.0	504626.7	-370415.0		-11701.2	
166	1	1.211	0.995	48796.4	503894.3	24398.2	496888.3899403	749836.9	506251.5	-374918.5		-8764.4	
167	1	1.219	0.997	40978.8	506012.9	20489.4	501075.4647863	758898.3	507669.5	-379449.2		-6175.3	
168	1	1.226	0.998	32890.7	507800.0	16445.4	504621.1637641	768014.2	508864.1	-384007.1		-3975.0	
169	1	1.233	0.999	24523.8	509226.4	12261.9	507459.9247949	777184.4	509816.5	-388592.2		-2208.5	
170	1	1.241	1.000	15868.1	510258.6	7934.1	509519.2453098	786409.0	510505.2	-393204.5		-924.2	
171	1	1.248	1.000	6912.8	510858.6	3456.4	510718.3408412	795688.1	510905.4	-397844.1		-175.4	









1.11 **Mass Extension**

For an isolated cluster of particles, the **total mass** is the sum of the total masses of all constituent fermions and the **energetical mass** corresponding to the energy in motion within that isolation.

$$m_n = \sum m_f + \frac{\sum E_t}{c^2}$$

$m_n = net\ mass$

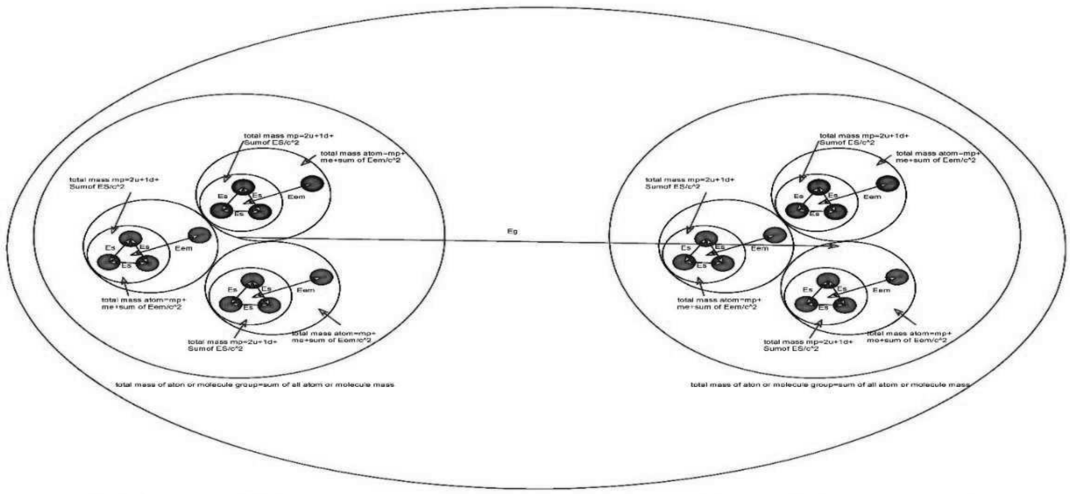
$\sum m_f = sum\ of\ all\ inclucved\ fermions\ mass$

$\sum E_t = sum\ of\ all\ inclucved\ active\ energy$

$$\sum E_t = \sum E_{strong} + \sum E_{EM}\ (without\ gravity\ eg.\, earth\ moon\ system)$$

$$\sum E_t = \sum E_{strong} + \sum E_{EM} + \sum E_G\ (with\ gravity\ eg.\, sum\ earth\ system)$$

Total mass calculation



Total mass of this group=sum of all incluve fermions+(sum of strong energy+ sum of electromagnetic energy+sum of gravitational energy)/c^2

Example

The **total mass** of an isolated system containing only a photon, with no fermions present.

$$m_{total} = \frac{\sum E_{EM}}{c^2}$$

The **total mass of a proton**

$$m_{proton} = 2m_{up\ quark} + m_{down\ quark} + \frac{\sum E_{strong\ energy}}{c^2}$$

The **mass of hydrogen (H-1)**

$$m_{H_1} = m_{proton} + m_{electron} + \frac{\sum E_{EM}}{c^2}$$

The **mass of the Earth–Moon system**

$$m_{Earth\ moon\ isolation} = m_{Earth} + m_{moon} + \frac{\sum E_{Gravity}}{c^2}$$

2 Drived Formula

2.1 Deviation Angle

If the angle of deviation is nonzero (**v > 0**), the path of the energy-carrying particle exhibits a **deviation**.

$$\theta = \sin^{-1}\frac{v}{c}$$

$$\theta = \frac{v}{c}(for\ small\ angle)$$

θ = Deviation Angle (in radian)

v=relative tangental velocity

2.2 Path Distance of the Carrier Particle

$$s = r(too\ small\ angle)$$

$$s = \frac{c\sin^{-1}\frac{v}{c}r}{v} = r(1 + \frac{v^2}{6c^2} + \frac{3v^4}{40c^4} + \cdots)(approximation\ with\ Taylor\ expension)$$

s= Path Distance of the Carrier Particle

v=relative vertical velocity

r= Straight-Line Distance

2.3 Perihelion shift

$$\Delta\varphi = \frac{6\pi GM}{c^2r[1-e^2]}(rad\ per\ orbit)$$

2.4 Light bending

$$\Delta\varphi = 4\frac{GM}{c^2b}$$

2.5 Shaprio delay

$$\Delta t = 2\frac{GM}{c^3}\ln(\frac{4r_1r_2}{b^2})$$

3 Equation Derivation

s= energy particle curve path distance

r=stranght line distance two object

b= The path length covered by the orbital object during the time interval between the emission of the energy particle from the center object and its arrival at the orbital object.

θ = deflection angle

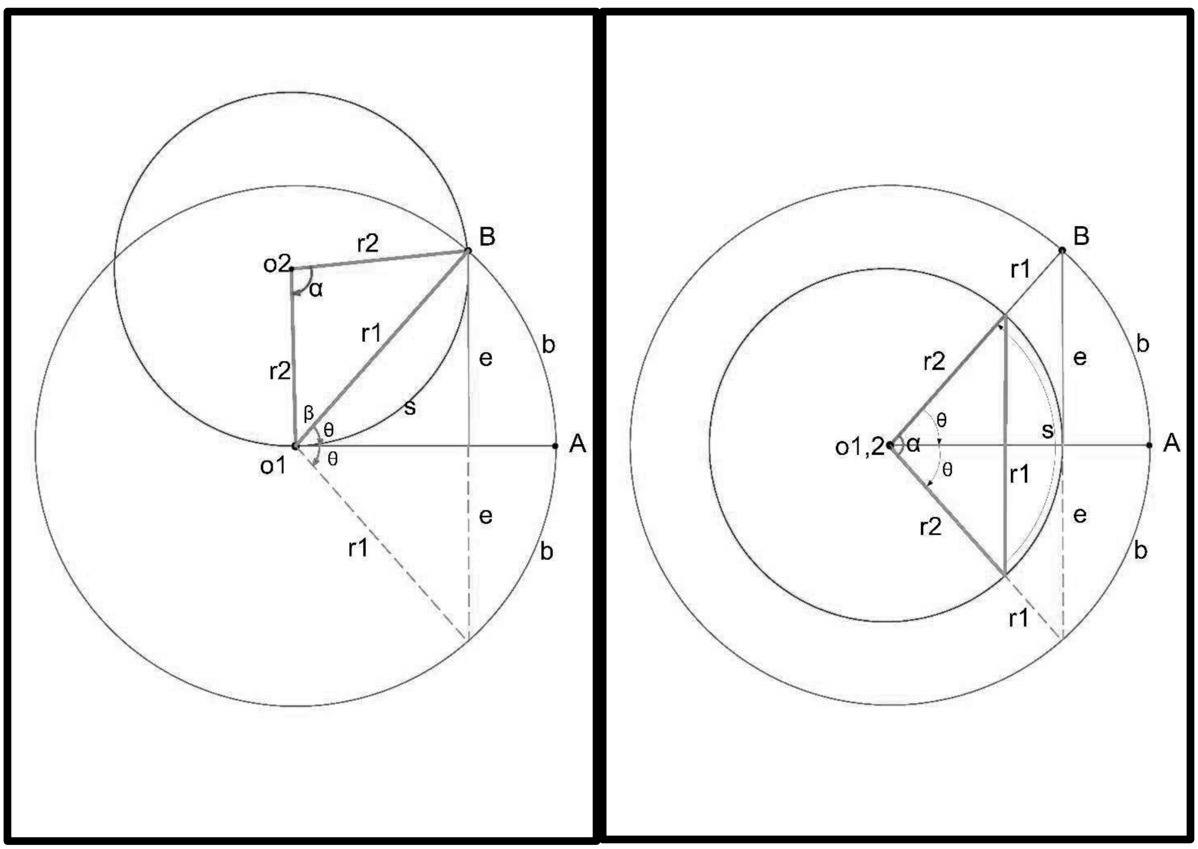
v=relative tangental velocity

3.1 Deviation Angle Calculation

Arcs ratio angle theorm

$\infty \geq r2 \geq \frac{1}{2} r1$

This theory is accurate within the specified range.



This theory is valid within the specified range.

The center O_1 of a circle with radius r_1 is intersected by the circumference of another circle with radius r_2. The tangent drawn from O_1 to r_2 intersects r_1 at point A. Let B be the point where the two circles intersect. The angle formed at $AOB = \theta$ along the line connecting these points. The value of this angle is given by the inverse sine of the ratio of the arc length $AB(b)$ on r_1 and the arc length $OB(s)$ on r_2

Proof

$$\beta + \theta = 90(\because o_1A \; is \; tangent \; of \; o_2, angle \; o_2o_1A \; is \; right \; angle)$$

$$\frac{180 - \alpha}{2} + \theta = 90(\because \beta = \frac{180 - \alpha}{2})$$

$$\frac{180 - \alpha + 2\theta}{2} = 90$$

$$180 - \alpha + 2\theta = 180$$

$$\alpha = 2\theta$$

Due to the equality of the above angles, the chord ratio and the arc ratio are equal

$$\frac{f}{2e} = \frac{s}{2b}(\because \alpha = 2\theta)$$

$$\frac{f}{s} = \frac{2e}{2b}$$

$$\frac{f}{s} = \frac{e}{b}$$

$$\frac{b}{s} = \frac{e}{f}$$

$$\frac{e}{f} = \frac{b}{s}$$

$$\sin\theta = \frac{e}{f}$$

$$\sin\theta = \frac{b}{s}(\because \frac{e}{f} = \frac{b}{s})$$

$$\theta = \sin^{-1}\frac{b}{s}$$

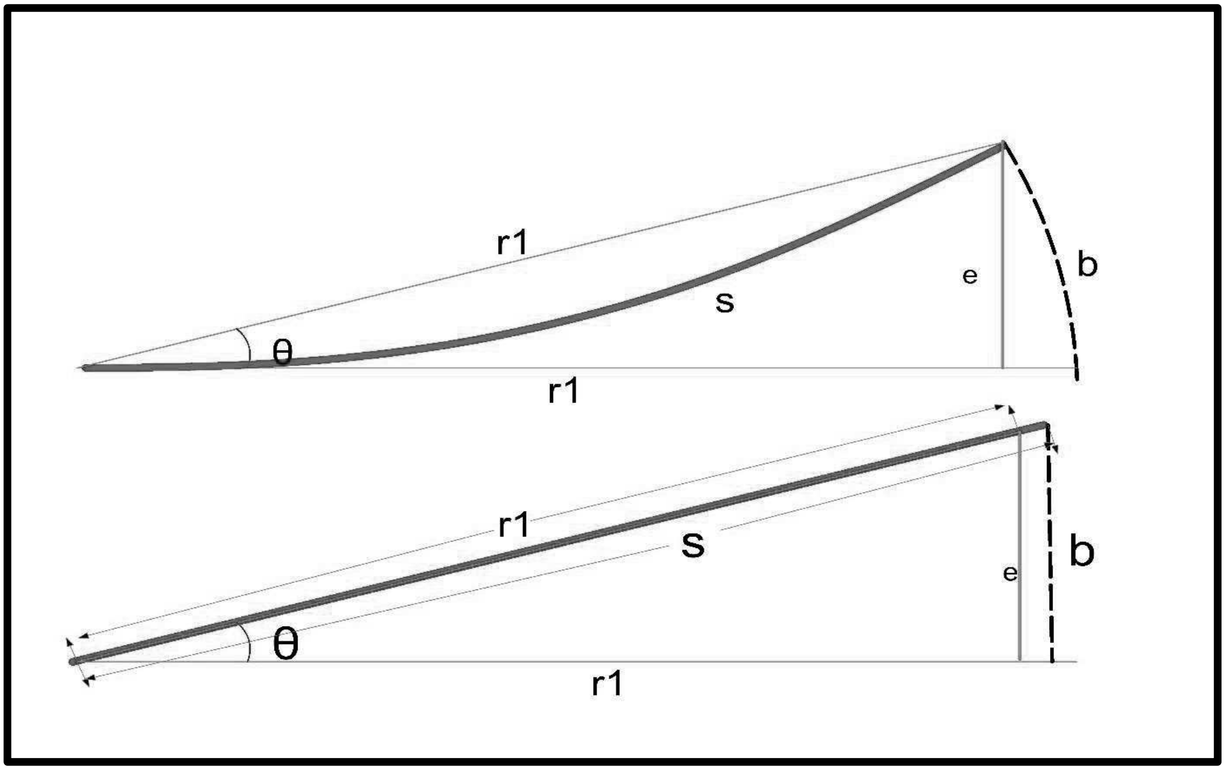
The flight time of the virtual carrier particle from its origin to the orbital object is equal to the flight time of the orbital object from its initial induction point to the position where it encounters the virtual carrier particle.

$$\frac{s}{c} = \frac{b}{v}$$

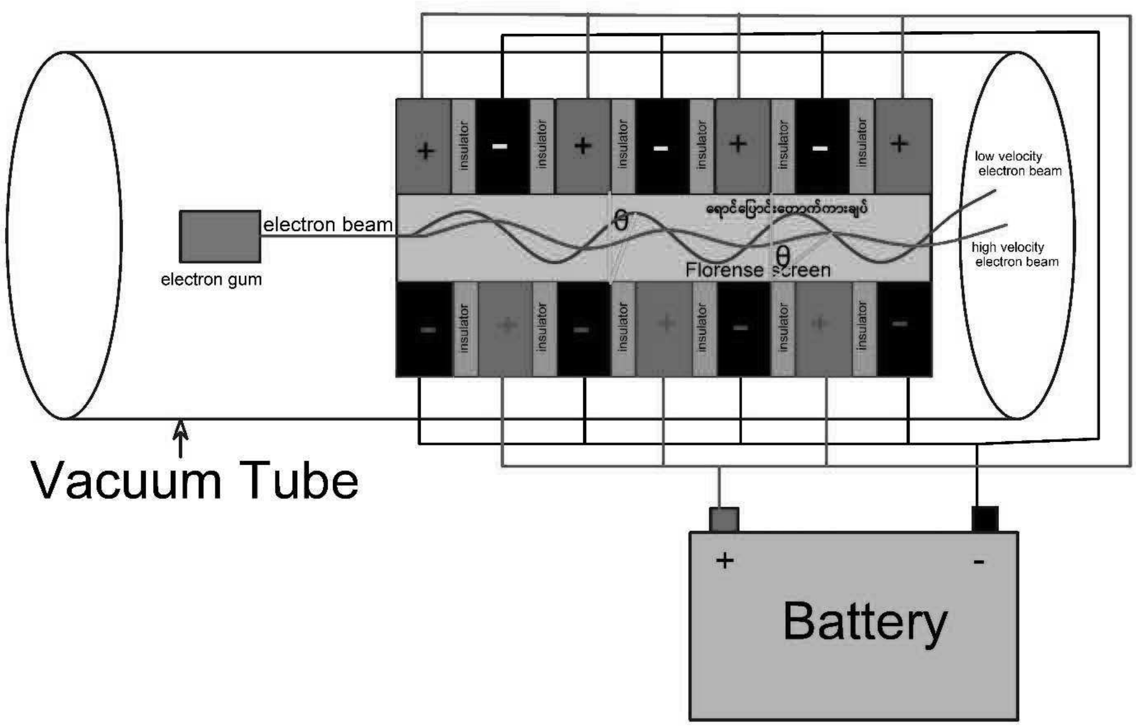
$$\frac{v}{c} = \frac{b}{s}$$

$$\theta = \sin^{-1}\frac{v}{c}(\frac{v}{c} = \frac{b}{s})$$

$$\theta = \sin^{-1}\left[\frac{v}{c} \, or \, \sqrt{\frac{GM}{rc^2}} \, or \, \frac{Z\alpha}{n_\sigma}\right]$$



Test Diagram of deflection Angle



The above picture is a conceptual illustration based on my own idea. I do not have the equipment or materials to conduct an experiment. Therefore, I respectfully request that, if it is possible to create the apparatus and perform the experiment, it be tested accordingly

3.2 By substituting the energy-carrying particle's exchange path with the above formulas, it can be expressed as follows:

$$\theta = \frac{b}{r}\text{(in Radian)}$$

$$b = \theta r$$

$$s = \frac{cb}{v}$$

$$s = \frac{c\theta r}{v}$$

$$s = \frac{c\theta r}{v}$$

$$s = \frac{c \sin^{-1}\frac{v}{c} r}{v}$$

$$s = \frac{cr}{v}\sin^{-1}\frac{v}{c}$$

$$let\ \sin^{-1}\frac{v}{c} = \sin^{-1} x$$

$$\sin^{-1} x = x + \frac{1}{6}x^3 + \frac{3}{40}x^5 + \cdots (Taylor\ series\ of\ \sin^{-1} x)$$

$$\sin^{-1}\frac{v}{c} = \frac{v}{c} + \frac{1}{6}(\frac{v}{c})^3 + \frac{3}{40}(\frac{v}{c})^5 + \cdots$$

$$\sin^{-1}\frac{v}{c} = \frac{v}{c}(1 + \frac{v^2}{6c^2} + \frac{3v^4}{40c^4} + \cdots)$$

$$s = \frac{cr}{v}\sin^{-1}\frac{v}{c}$$

$$s = \frac{cr}{v} \times \frac{v}{c}(1 + \frac{v^2}{6c^2} + \frac{3v^4}{40c^4} + \cdots)$$

$$s = r(1 + \frac{v^2}{6c^2} + \frac{3v^4}{40c^4} + \cdots)(approximation\ with\ Taylor\ expension)$$

3.3 Occurrence of Path Deviation

3.3.1 If the relative velocity (**v > 0**) of an object or particle is nonzero, the path of the carrier particle exhibits a **deviation**.

3.3.2 Due to the **path deviation** of carrier particles, the potential energy acting on an object or particle undergoes **decomposition**. The **perturbation potential** gives rise to a **perihelion shift angle**, resulting in a **deviation of the orbital path**.

3.3.3 Perihelium shift angle(Θ)

Perihelion shift Drivation

Specific angular momentum

$$h = rv$$

Orbital angular rate

$$\frac{d\phi}{dt} = \frac{v}{r} = \frac{h}{r^2}$$

Aberration-induced angular deviation

$$v_p = \frac{GM}{c^2}\frac{v}{r}$$

Convert to angular perturbation rate

Angular velocity perturbation:

$$\frac{d\theta_{pert}}{dt} = \frac{v_{pert}}{r}$$

Substitute Step-2:

$$\frac{d\theta_{pert}}{dt} = \frac{GM}{c^2}\frac{v}{r^2}$$

Use $v = h/r$:

$$\boxed{\frac{d\theta_{pert}}{dt} = \frac{GMh}{c^2 r^3}}$$

Change variable: $r \to u = 1/r$

$$\frac{d\theta_{pert}}{dt} = \frac{GMh}{c^2}u^3$$

Differentiate w.r.t u:

$$\frac{d}{du}\left(\frac{d\theta_{pert}}{dt}\right) = \frac{3GMh}{c^2}u^2$$

Return to r:

$$= \frac{3GMh}{c^2 r^2}$$

Time → orbital angle transformation

From Step-1:

$$dt = \frac{r}{v}d\phi \Rightarrow \frac{d}{dt} = \frac{v}{r}\frac{d}{d\phi}$$

Thus:

$$\frac{d}{du}\left(\frac{d\theta_{pert}}{dt}\right)\frac{1}{v}=\frac{3GM}{c^2r}$$

Substituting with v corresponds to the coordinate Jacobian.

Integrate over one orbit

$$\Delta\theta_{pert}=\int_0^{2\pi}\frac{3GM}{c^2r}\,d\phi$$

Assume average circular radius:

$$=\frac{3GM}{c^2r}(2\pi)$$

$$=\frac{6\pi GM}{c^2r}$$

$$=\frac{6\pi GM}{c^2r(1-e^2)}(Match\ GR)$$

3.4 Definition of the Virtual Carrier Frequency Constant Ť

$$f_{vcf}=Ť\frac{a_E}{c}(where\ E^{\rightarrow}=\frac{GM}{r^2}(for\ gravity)=\frac{kq_1q_2}{r^2m_e}(for\ EM)=\frac{v^2}{cr})$$

The energy associated with the electron orbit in a hydrogen atom is calculated using **Fyemen's one-electron, one-photon concept**, and the value of the constant **Ť** is determined accordingly.

$$E_f=hf_{vcf}(,h=Plank'sconstant)$$

$$E_f=h\times Ť\frac{E^{\rightarrow}}{c}$$

$$E_f=h\times Ť\frac{e^2}{4\pi\varepsilon_0r^2m_e\times c}$$

$$E_c=\frac{e^2}{4\pi\varepsilon_0r}$$

$$\frac{E_c}{E_f}=\frac{e^2}{4\pi\varepsilon_0r}\times\frac{4\pi\varepsilon_0r^2m_e\times c}{Ťhe^2}$$

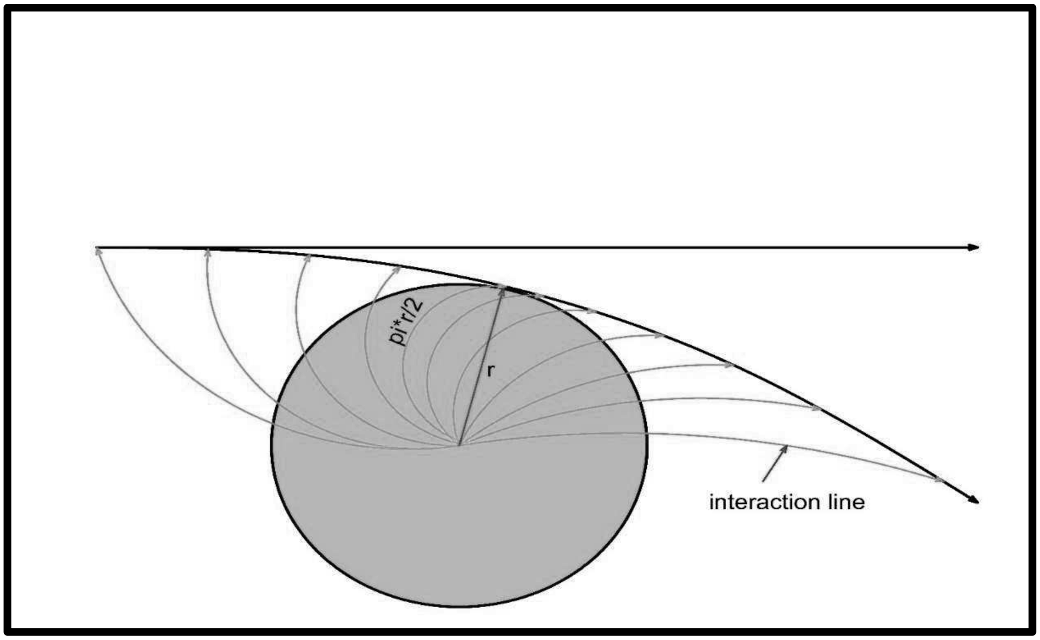
$$Ť=\frac{1}{2\pi\alpha}=\frac{rcm_e}{h}(r=Bohr\ radius,c=speed\ of\ light,h=Plank\ constant)$$

$$Ť=21.80995629$$

$$f_{vcf}=21.80995629\frac{a_E}{c}=\frac{1}{2\pi\alpha c}a_E$$

3.5 Light bending due to perturbation

The **bending of light** is not caused by gravity but by the effect of the **perturbation potential**. Therefore, the **perturbation or drift-rate formula** will be used for integration.



Light bending

◆ — **Geometry setup**

- Central mass = M
- Impact parameter = b
- Assume that the **light path** propagates along the **x–axis**.
- The **center of mass** is at the **origin**.

$$v_{pert} = \frac{GM}{c^2}\frac{v}{r}(orbital\ case)$$
$$v_{pert} = \frac{GM}{c^2}\frac{v\sin\theta}{r}(radial\ case, \theta = radial\ angle\ of\ light\ path\ and\ center\ mass)$$
$$v_{pert} = \frac{GM}{c}\frac{\sin\theta}{r}(radial\ case, for\ photon)$$

$$\sin\ \theta = \frac{b}{r}$$
$$v_{\text{pert}} = \frac{GM}{c}\frac{\sin\theta}{r}$$
$$v_{\text{pert}} = \frac{GM}{c}\frac{b}{r^2} = \frac{GMb}{c}u^2(u = \frac{1}{r})$$
$$\frac{dv_{\text{pert}}}{du} = \frac{GM}{c}\frac{b}{r^2} = 2\frac{GMb}{c}\text{u}$$

$$\frac{dv_{\text{pert}}}{du} = 2\frac{GM}{c}\frac{b}{\text{r}}$$

$$\frac{d\phi}{dt} = \frac{\frac{dv_{\text{pert}}}{du}}{r^2}$$

$$\frac{d\phi}{dt} = 2\frac{GM}{c}\frac{b}{r^3}$$

$$v = c \Rightarrow dx = c\,dt$$

$$dt = \frac{dx}{c}$$

$$d\phi = 2\frac{GM}{c}\frac{b}{r^3}\frac{dx}{c}$$

$$\boxed{d\phi = 2\frac{GM\,b}{c^2}\frac{dx}{r^3}}$$

$$r^2 = x^2 + b^2 \Rightarrow r^3 = (x^2 + b^2)^{3/2}$$

$$d\phi = 2\frac{GM\,b}{c^2}\frac{dx}{(x^2+b^2)^{3/2}}$$

$$\Delta\phi = 2\frac{GM\,b}{c^2}\int_{-\infty}^{+\infty}\frac{dx}{(x^2+b^2)^{3/2}}$$

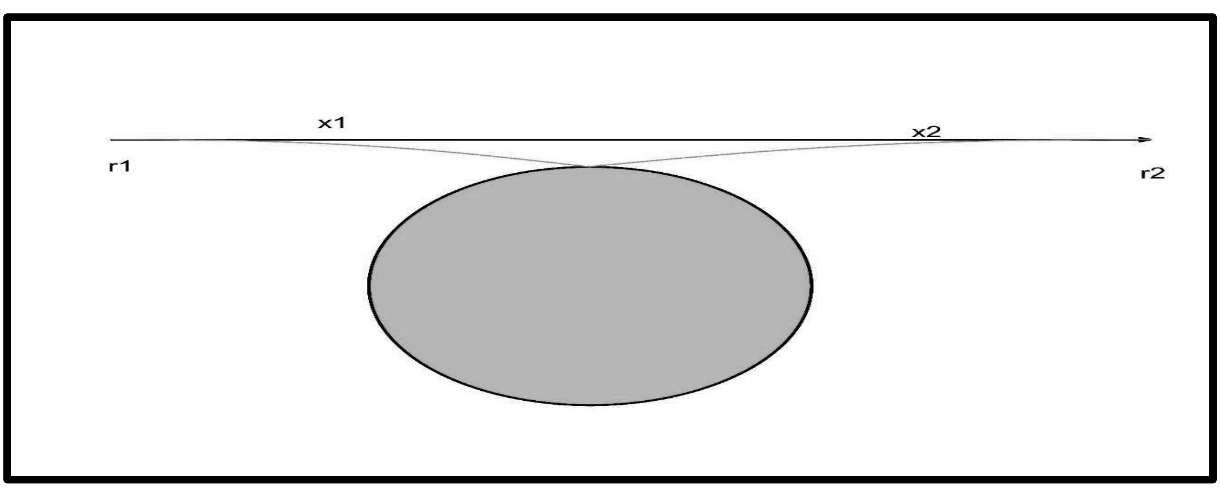
$$\int_{-\infty}^{+\infty}\frac{dx}{(x^2+b^2)^{3/2}} = \frac{2}{b^2}$$

$$\Delta\phi = 2\frac{GM\,b}{c^2}\times\frac{2}{b^2}$$

$$\boxed{\Delta\phi = \frac{4GM}{c^2 b}\,(Match\ GR)}$$

3.6 Shaprio Delay

The **Shapiro delay** occurs because an electromagnetic (EM) signal experiences **path deviation** due to the **perturbation potential**, resulting in a **delay in arrival time**. Therefore, the **perturbation or drift-rate formula** will be used for integration.



Shapiro Delay — Step-by-Step Derivation

Central mass : M
Light ray passes with impact parameter : b

Coordinate choice:

- x= light propagation direction
- Closest approach at $x = 0$

$$r(x) = \sqrt{x^2 + b^2}$$

Photon speed

$$v = c$$
$$v_{\text{pert}} = \frac{GM}{c}\frac{\sin\theta}{r}$$

Geometry:

$$\sin\ \theta = \frac{b}{r}$$

Therefore:

$$\boxed{v_{\text{pert}} = \frac{GM\,b}{c\,r^2}}$$

Change variable $u = 1/r$

$$v_{\text{pert}} = \frac{GM\,b}{c}u^2$$

Differentiate:

$$\frac{dv_{\text{pert}}}{du} = 2\frac{GM\,b}{c}u$$

Angular drift rate

Angular drift arises from transverse velocity gradient:

$$\frac{d\phi}{dt} = \frac{1}{r^2}\frac{dv_{\text{pert}}}{du}$$

Substitute:

$$\frac{d\phi}{dt} = \frac{2GM\,b}{c}\frac{1}{r^3}$$

Replace time by path coordinate

Photon motion:

$$dx = c\,dt \Rightarrow dt = \frac{dx}{c}$$

$$d\phi = \frac{2GM\,b}{c^2}\frac{dx}{r^3}$$

Angular → Longitudinal delay (key physics)

Angular deviation causes **extra path time**

Project angular drift onto propagation direction:

Geometry:

$$\sin\,\theta = \frac{b}{r}$$

Effective gravitational delay:

$$dt_{\text{grav}} = \frac{r}{c}\frac{d\phi}{\sin\theta} = \frac{r^2}{b\,c}d\phi$$

Substitute $d\phi$

$$dt_{\text{grav}} = \frac{r^2}{b\,c}\left(\frac{2GM\,b}{c^2}\frac{dx}{r^3}\right)$$

Simplify:

$$\boxed{dt_{\text{grav}} = \frac{2GM}{c^3}\frac{dx}{r}}$$

Integrate along light path

$$\Delta t = \frac{2GM}{c^3}\int_{-\infty}^{+\infty}\frac{dx}{\sqrt{x^2+b^2}}$$

Standard integral:

$$\int \frac{dx}{\sqrt{x^2+b^2}} = \ln\,(x + \sqrt{x^2+b^2})$$

Evaluate limits:

$$\boxed{\Delta t_{\text{Shapiro}} = \frac{2G}{c^3}\ln\;\left(\frac{4r_1r_2}{b^2}\right)}$$

4 Differences from the Mainstream

4.1 No matter how intense the field is, if **v = 0**, the effects on **mass energy** and **electromagnetic energy** follow the **classical laws** as described by **Newton's law** and **Coulomb's law**, respectively.

4.2 Even for an electron orbiting a nucleus, a **deviation angle** arises due to the **relative velocity**.

4.3 What occurs at the **event horizon** is not due to an intense central curvature, but rather to an extremely high **perturbation or drift rate**.

4.4 Since the **virtual carrier** travels slightly faster than the speed of light, measurements by **LIGO** depend on distance: the **time difference** near the detector is small, while it becomes larger over greater distances.

5 Calculation of the Deviation Angle for Hydrogen

$$\theta = \frac{v}{c}\text{(in Radian)}$$

$$\theta = \alpha(fine\ structure\ constant)$$

$$\theta\text{=0.007297352566417(in radian)}$$

The **fine-structure constant** represents the **curvature value** for electromagnetic energy.

Summary

The present theoretical framework is based on the Quanta Exchange Theory (QET), which describes natural forces through the mutual emission and absorption of virtual carrier particles (VCPs). The key concepts are as follows:

1. **Isolation Principle of Quanta (IPQ) –When a particle exists in complete isolation, it does not emit virtual carrier particles.**
2. **Virtual Carrier Travelling & Velocity –VCPs propagate toward the location of the interacting object, with velocities slightly greater than *c* (expressed as *c* + *δ_vcv*), remaining consistent with cosmic-scale observations such as GW170817.**
3. **Virtual Energy & Frequency –The potential energy of carrier particles can be expressed as$V_{(ve)}$ = n h $f_{(vcf)}$,where the frequency is directly related to the acceleration of the object.**
4. **Spin-Mediated Modulation –Frequency modulation arises based on the spin of the carrier particles, and this governs the interaction's coupling strength.**
5. **Potential Decomposition –Depending on the relative velocity, the total potential can be decomposed into**
   - **action potential (binding state), and**
   - **perturbation potential (path deviation).**
6. **Kinetic & Total Energy –The kinetic energy of an object can be precisely computed usingKE_total = $\sqrt{}$(KE_action^2 + E_perturbation^2),and the total system energy H is given as the sum of kinetic and potential components.**

Under this framework, classical, quantum, and cosmic-scale phenomena can be connected through a unified formalism, providing foundational principles for analyzing particle interactions, orbital systems, and binding energies.

Conclusion

In this paper, interactions between particles and objects are described using the principles of Virtual Carrier Particles (VCPs). It is shown that, by considering carrier spin, frequency modulation, and action/perturbation potentials, one can accurately compute system-level kinetic and total energies. Agreement with cosmic-scale measurements (e.g., GW170817) demonstrates that the concepts of virtual carrier velocity and quantized virtual energy are consistent with practical observations and timing measurements.

As a mathematically rigorous formalism, this framework provides a unified approach that connects classical, quantum, and cosmic-scale interactions. In the future, it can serve as a foundational tool for analyzing particle binding energies, orbital systems, and field interactions.