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Uniqueness on Unified Field Theory and Its Applications

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ABSTRACT

The quest for a Unified field theory is being remained as one among the greatest scientific challenges since the pioneering efforts of Albert Einstein to reconcile gravitation with electromagnetism under a single theoretical framework. Despite of significant developments in Newtonian, Classical, and Quantum mechanics, the fundamental unification of physical forces/fields continues to encounter conceptual, mathematical, and empirical barriers, particularly due to the dual nature of quantum particles and the difficulty in describing antisymmetric energy states. The present work advances an interpretation of Unified field theory grounded in the concept of prime material and the principle that gravitational attractive force (G_F) is equivalent to antisymmetric energy, a central hypothesis drawn from recent findings in material formation and particle interactions. Finally, the unified interpretation demonstrates that, at coherent positions of interacting masses, magnetic suppression by gravitational attractive force, coupled with antisymmetric energy emission, results in a physical bridge connecting relativistic gravity, electromagnetic wave theory, and energy transitions. Unlike earlier tensor based or higher dimensional models, this approach inherently accommodates both symmetric and antisymmetric states of mass-energy conservation systems, and thereby enables compatibility across Newtonian, Classical, and Quantum mechanical regimes. This pedagogy of physical science forum proposes a unique conceptualization of Unified Field Theory in which antisymmetric energy acts as a single fundamental phenomenon connecting gravity-time, temperature based electromagnetic waves, and electromagnetic fields, and offering a pedagogically transparent and physically intuitive route toward unification. Two photon absorption (TPA) is an important nonlinear optical process with applications in bio-imaging, optical data storage, and photonic device.

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In recent years, fungal materials have emerged as promising candidates for bio-electronic and memory based applications due to their unique structural and biochemical properties. In this work, a computational investigation on degenerate and non-degenerate two photon absorption in fungal systems is presented by using MATLAB based modeling. The nonlinear propagation equation incorporating both linear absorption and quadratic intensity dependent absorption is numerically solved to analyze intensity attenuation within a fungal layer. Additionally, a two dimensional Gaussian beam model is implemented to examine spatial absorption characteristics at the micro scale. The results reveal that degenerate TPA produces gradual nonlinear attenuation and broader volumetric excitation, whereas non-degenerate TPA exhibits stronger intensity decay and highly localized absorption confined to the beam intersection region. The optical gating behavior observed in the non-degenerate configuration demonstrates enhanced spatial selectivity and reduced off focus excitation. These findings suggest that non-degenerate two photon absorption provides improved control over excitation localization in fungal materials, supporting their potential use in precision bio-photonic manipulation, nonlinear imaging, and optical memory encoding and decoding systems. The neural network and probability decision making is discussed as active, passive mode.

Keywords: Energy, Prime Material, General Relativity, Memristors, Yeast and Fungal Memory Storage.

1. INTRODUCTION

In the pedagogy of physical science, there are numerous fundamental equations, which are all related to a particular subject called general mechanics. Newtonian mechanics, Classical mechanics, and Quantum mechanics are well known branches of general mechanics. Each mechanics describe a system that contains a body dealing with field, space, and time when force and motion exist inside the system. In Newtonian mechanics, the size of a body is massive and field can be realized in the real world space-time phenomena. In Classical mechanics, the body size can be moderate and a field can be described by constraints in a space-time framework. In Quantum mechanics, the size of a body is considered as a minute one and the field is completely differ from Newtonian and Classical mechanics is because of a dual nature of the body [7]. The field is antisymmetric in nature and has both wave and particle like phenomena, as said by Louis de Broglie in his article [2]. Classical and Newtonian mechanics might represent the symmetric field phenomena for the body. There are fields like electric field, magnetic field, and gravitational field governed by different sets of equations. Fields considered relative to different moving frames are also governed by sets of equations. Finding a common set of equations to describe all these things is the unified field theory.

The Unified field theory research work idea was initiated by Albert Einstein in the year of 1946 [17]. Albert Einstein tried to form a single equation to combine generalization of the relativistic theory (Gravity-Time) and Electromagnetism (Maxwell's equation) through mechanics [4]. In the year of 2005, Felker said that Unified field theory could be concluded on using tensor operation to generalize this Einstein equation ($G_{\mu\nu} = R_{\mu\nu} - \frac{1}{2}g_{\mu\nu}R$) where, $G_{\mu\nu}$ is Einstein tensor, $R_{\mu\nu}$ is Ricci Curvature tensor and $g_{\mu\nu}$ is metric tensor [5]. Later, many people work on Unified field theory by increasing the number of Dimension with respect to symmetric tensor as well as antisymmetric tensor. This is mentioned in the book [6]. A researcher from Turkey [8], used Planck scale for determination of Quantum gravity for a smallest mass body. Here, the geometrical frequency is reduced by Planck scale on relating mass with gravity. All these theories were accepted widely in Newtonian mechanics and Classical mechanics. Yet, researchers of Quantum field theory do not accept the Unified field theory due to a dual nature of particle motions and indetermination in describing an exact state of energy for prime material.

The present research work is based on recently published article [15]. In that, the gravitational attractive force forms a body in the system. The formation of a material body (living and non-living material) is always due to gravitational attractive force towards centre. In addition on the field of yoga, authors express their theory on formation of gravitational attractive force of a prime material (prakruti) in terms of the suppression of the magnetic nature between the particles at the formation of whole body mass. Thus, it conserves mass-energy relation (gravitational attractive force is equivalent to antisymmetric energy) in the material body. So, authors' interpretation of the Unified field theory is purely based on antisymmetric energy in relation to electromagnetic field, temperature based electromagnetic waves, and gravity-time. The applications are also discussed with MATLAB program model.

2. INTERPRETATION ON ELECTROMAGNETIC FIELD

Rotation of a massive material body in space can describe the existence of magnetic field through right hand palm rule [12]. It is said that every self rotating body mass exhibits the magnetic field existences while on rotational force. Here, the antisymmetric energy takes place at space within the system, and it suppresses the existence of magnetic field by enhanced gravitational attractive force. This simple interpretation helps us in determining the strength of the magnetic field for rotating body through the expression formula $k\rho\left(\frac{D^2}{T}\right)$. Here, ρ is Uniform electron density, D is Diameter and T is fixed time. The strength of the magnetic field is calculated through Newtonian mechanics based on electron density of the material body that acquires rotation through antisymmetric energy [16, 42].

Later, [14] argues the electromagnetic waves are classified into two classes: (1) Electric field dominated waves, (2) Magnetic field dominated waves; which are separated by a specific wavelength boundary constant b. The electric field waves have wavelength shorter than b and magnetic field waves have wavelength larger than b. It justifies the existence of constant b at small mass (molecule level). Similarly, the argument and justification related to electrostatic and magnetic field acting on living (body mass) is described in the article [9]. The work justifies that the very smallest body mass (Hydrogen Atom) also has the magnetic field with respect to electron rays applied in living (material body). The living body contains Iron Atom in blood along with Hydrogen Atom; it forms the gravitational attractive force with respect to electromagnetic field [9, 15, 43].

3. INTERPRETATION ON TEMPERATURE BASED ELECTROMAGNETIC WAVES

Every body mass shall emit energy [13, 44]. The framework of defining temperature for electromagnetic waves through Wien's displacement law provides more accurate and meaningful explanation [10]. Moreover all materials are converted into energy at a fixed, extremely high temperature. Therefore, electromagnetic waves themselves should have a definable temperature. Hence, shorter wavelengths in electric field waves correspond to higher temperature and longer wavelengths magnetic field waves also correspond to higher temperature according to Table 1. The energy, in the form of antisymmetric nature, is exhibited during the static friction [15, 48]; it leads to the formation of gravitational attractive force that affects the magnetic nature of the material.

Table 1. Finite bounds on all possible electromagnetic wavelengths.

Waves	Wavelengths	Reference
Electric field waves	4.20×10^{-20}m $\leq \lambda \leq$ 1.063×10^{-3}m	[11]
Magnetic field waves	1.063×10^{-3}m $\leq \lambda \leq 2.69 \times 10^{13}$m	[11]
Combined form of electromagnetic waves	4.20×10^{-20}m $\leq \lambda \leq 2.69 \times 10^{13}$m	[11]

Therefore, an electromagnetic wave emerges with energy and with a definable temperature [11]. High wavelengths of magnetic field waves are considered "hotter." Such hotter temperatures are capable of disturbing the magnetic field in material body. It seems like gravitational waves at higher wavelengths. Here, the formation of prime material body is mainly occurring by gravitational attractive force [15]. The electric field waves have shorter wavelengths that are like UV, and they can penetrate (Gravity-Time) many material bodies.

4. INTERPRETATION ON GRAVITY-TIME

Classic theory defines the gravity based on acceleration of body towards another surface of the body in a system (at space). The gravity shall be varied with position of the body surface; it could be measured with instrument like gravimeters [1]. In the field of cosmology, a ghost-free theory had been approached by [18]; on their theories, an isotropic metric of mass achieves self acceleration towards centre accordance with time. Albert Einstein's central hypothesis for general relativity was the principle of equivalence and the idea that gravity is a manifestation of the curvature of space time. From the above works, authors continue their research towards the formation of gravitational attractive force (G_F) between the particle surfaces to form a massive body [15]. Here, the time shall be dependent on one particle surface attracted another particle surface; while the magnetic nature of particle is suppressed to get a massive body. This is mainly due to formation of gravitational attractive force phenomena. The antisymmetric energy is emitted when there is a static friction with a temperature [11]. The Gravity-Time is based on particle momentum inside the system that undergoes for the electrostatic friction, which increases the temperature and affects the magnetic field between the particles. This phenomenon lead to the formation of prime material.

5. INTERPRETATION ON UNIFIED FIELD THEORY

A known fact is that Albert Einstein is considered as the Father of general theory of relativity [3]. On imagining the general theory of relativity, let us consider two moving masses M_1 and M_2 in one frame. The M_1-mass is large and M_2-mass is very small; they move in opposite directions and this frame is seen from another frame, which far away from the first frame. The velocities of two masses are same in the first frame. Yet, the mass M_2 moves faster than M_1; when the first frame is observed from the second frame. These things happen in view of relativity of Mass-Gravity-Time phenomena. In particularly, let us consider a situation in which two masses M_1 and M_2 are at coherent position in a frame of reference. The Gravity-Time phenomena happen during such a coherent position and pave way to gravitational attractive force (G_F) between the two masses [15].

At the coherent position, the magnetic field is suppressed by gravitational attractive force, and it emits antisymmetric energy due to temperature based electromagnetic waves [15]. The above factors agree with the Newtonian, Classical and Quantum mechanics on general interpretation to the Uniqueness on Unified Field Theory, because the antisymmetric energy from the prime material is the only phenomena that unites the gravity-time, temperature based electromagnetic waves, and electromagnetic field. The emission of energy is symmetric; when the mass is bigger. Antisymmetric energy and quick transmission of radiation happen when the masses are tiny. Albert Einstein used tensor operator to propose the Unified field theory at symmetric state. The conjunction of generalization of relativistic theory along with electromagnetism was agreed on Newtonian and Classical mechanics at symmetric state [4]. Here, the authors believe that formation of gravitational attractive force equals to antisymmetric energy. This antisymmetric energy material determines the Unified field theory in both symmetric and antisymmetric condition. Hence, this Unified Field Theory shall be accepted in Newtonian, Classical as well as Quantum mechanics.

6. APPLICATION ONE

The recent era of neural networks is inspired by the structure of interconnected neurons in the human brain. The network processes signals in both passive and active modes. In passive mode, stored data is automatically transmitted [27, 60]. In active mode, probability theory is applied to select the best option in the decision making process [61]. Here, General Relativity theory is applicable through unified field theory.

7. APPLICATION TWO

In electronics, semiconductor materials are used to store and retrieve memory data. Such materials can also be synthesized naturally [28, 30-32, 44]. The development of organic chemistry has contributed to functions of memory storage and retrieval through encoding and decoding processes. The initial work in this area began in 1997, and the L2 ribosomal protein growth in yeast was analyzed in that work [26]. The mitochondrion, known as the powerhouse of the cell, plays a significant role in cellular energy transition and metabolic regulation in both yeast and fungal cells. Yeast cells (*Candida albicans*) are a type of fungus cell. The interaction between proteins and yeast cells contributes to data encoding within the cell. Later, the process of encoded memory storage through sequential protein assembly was described by [20]. Subsequently, fungal electronics were developed with numerous applications, including fungal memristors, fungal oscillators, fungal pressure sensors, fungal photo sensors, fungal chemical sensors, and fungal analog computing systems, as discussed in detail by [19]. In their work, sustainable memristors were developed from fungal *mycelium* as resistive switching devices. These devices behave like resistors with memory when electrical power is applied. Sensing and energy transition occur during this process. Furthermore, fungal *mycelium* has been developed as a bio-electronic skin, termed *Myceliotronics*, which helps in sensing and transmitting energy signals. The energy transmission is influenced by frequency and radiation at the skin interface [13, 19, 62, 63].

Based on fungal electronics, memory storage and retrieval have been successfully demonstrated [23]. Data storage in yeast cells as encoded files with the assistance of proteins has also been reported [24]. The transition system resembles a root network like structure [29]. Root network formation commonly occurs in fungi during their growth dynamics [20]. The capability to store data requires organized assembly. The decoding process occurs during energy transmission through quantum tunneling [27, 45-47].

Nonlinear optics plays a crucial role in understanding the interaction between high intensity electromagnetic radiation and matter [25]. Among various nonlinear optical processes, two photon absorption (TPA) has significant attentions due to its applications in optical limiting, bio imaging, photodynamic therapy, and optical data storage [22, 23, 49-59]. In TPA, two photons are simultaneously absorbed to excite a system from a lower energy state to a higher energy state. Depending on the photon energies involved, the process can be classified as degenerate (photons with identical energies), non-degenerate (photons with different energies) two photon absorption.

Biological materials, particularly fungi and yeast cells, have recently gained attention due to their unique structural and biochemical properties [19]. Fungal systems exhibit complex molecular arrangements and chromophoric components that may contribute to nonlinear optical responses. However, the nonlinear optical behaviour of fungal materials, especially under degenerate and non-degenerate excitation conditions, remains largely unexplored [22]. Computational modeling provides an effective approach to investigate such optical phenomena [33-41]. MATLAB based program allows an analysis of absorption coefficients, transition probabilities by the fungi under varying excitation conditions.

8. MATLAB PROGRAM BASED METHOD

```
% Parameters
z_max = 0.01;          % Sample thickness (meters)
dz = 0.0001;           % Step size
z = 0:dz:z_max;        % Depth vector
I0 = 1e12;             % Peak intensity (W/m^2)
alpha = 10;            % Linear absorption (m^-1)
beta_deg = 5e-11;      % Degenerate TPA coefficient (m/W)
beta_nondeg = 8e-11;   % Non-Degenerate TPA coefficient (m/W)
% Define the ODE: dI/dz = -alpha*I - beta*I^2
tpa_ode = @(z, I) -alpha*I - beta_deg*I^2;
[z_out, I_deg] = ode45(tpa_ode, [0 z_max], I0);
% ND-TPA Solver (Simplified for equal initial intensities)
nd_tpa_ode = @(z, I) [(-alpha*I(1) - 2*beta_nondeg*I(1)*I(2)); ...
                      (-alpha*I(2) - 2*beta_nondeg*I(1)*I(2))];
[z_out_nd, I_nd] = ode45(nd_tpa_ode, [0 z_max], [I0; I0]);
figure;
plot(z_out, I_deg/I0, 'b-', 'LineWidth', 2); hold on;
plot(z_out_nd, I_nd(:,1)/I0, 'r--', 'LineWidth', 2);
xlabel('Depth into Fungal Tissue (m)');
ylabel('Normalized Intensity');
legend('Degenerate TPA', 'Non-Degenerate TPA');
title('Two-Photon Absorption Comparison in Fungi');
grid on;
% Grid setup (representing a 10x10 micrometer yeast culture area)
x = linspace(-5, 5, 200);
```

```
[X, Y] = meshgrid(x, x);
sigma = 0.8; % Laser spot size (microns)

% 1. Degenerate TPA (Single Beam - 800nm)
I1 = exp(-(X.^2 + Y.^2) / (2 * sigma^2));
W_deg = I1.^2;

% 2. Non-Degenerate TPA (Two Crossing Beams - 700nm & 1300nm)
% Beam 2 is offset slightly to show intersection logic
I2 = exp(-((X-0.5).^2 + Y.^2) / (2 * sigma^2));
W_nondeg = I1 .* I2;

% --- Visualization ---
figure('Color', 'w');

subplot(1,2,1);
surf(X, Y, W_deg); shading interp;
title('Degenerate TPA (Single Beam Write)');
xlabel('\mu m'); ylabel('\mu m');
zlabel('Abs. Rate');

subplot(1,2,2);
surf(X, Y, W_nondeg); shading interp;
title('Non-Degenerate TPA (Dual Beam Gating)');
xlabel('\mu m'); ylabel('\mu m');

fprintf('Simulation Complete. ND-TPA provides localized "Bit" definition.\n');
```

9. RESULTS AND DISCUSSION

The nonlinear propagation of laser intensity inside fungal tissue was successfully modeled using program based simulation in MATLAB (Figures 1, 2). The depth dependent intensity variation was obtained by solving the differential equation $\frac{dI}{dz} = -\alpha I - \beta I^2$, which accounts for both linear absorption and nonlinear two photon absorption (TPA). For an initial peak intensity of 10^{12} Wm^{-2}, linear absorption coefficient of 10 m^{-1}, and sample thickness of 1 cm, the normalized intensity profiles revealed distinct differences between degenerate and non-degenerate excitation mechanisms [15, 27]. In the degenerate case, where both photons possess identical energy, the intensity decreased smoothly and nonlinearly with depth due to the combined influence of linear and quadratic absorption terms. The attenuation was gradual, indicating moderate nonlinear interaction within the fungal medium [21, 22, 62]. In contrast, the non-degenerate TPA model, incorporating a higher nonlinear coefficient and cross interaction term $2\beta I_1 I_2$, exhibited comparatively faster intensity decay. This behavior suggests stronger nonlinear coupling when two photons of different wavelengths interact simultaneously within the fungal chromophores [23].

Spatial absorption characteristics were further investigated using a two dimensional Gaussian beam model representing a 10 × 10 μm fungal culture region (Figure 1). For degenerate TPA (single-beam excitation), the absorption rate proportional to I^2 produced a symmetric Gaussian distribution with maximum absorption at the beam center and a relatively broader excitation volume [19]. This indicates that degenerate excitation results in volumetric energy deposition within the fungal structure [24, 63]. Conversely, the non-degenerate TPA configuration, simulated using two slightly offset Gaussian beams, generated absorption proportional to $I_1 I_2$. The resulting three dimensional surface profile demonstrated that absorption occurred predominantly at the intersection region of the two beams, producing a sharply confined excitation zone. This optical gating effect significantly enhances spatial selectivity and reduces off focus excitation.

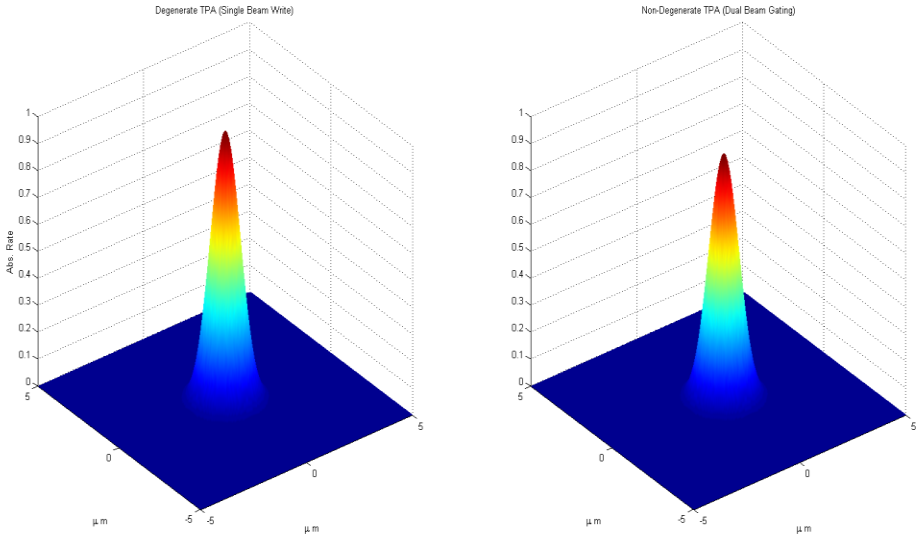

Figure 1. Fungus layer of memristors (degenerate TPA and non-degenerate TPA)

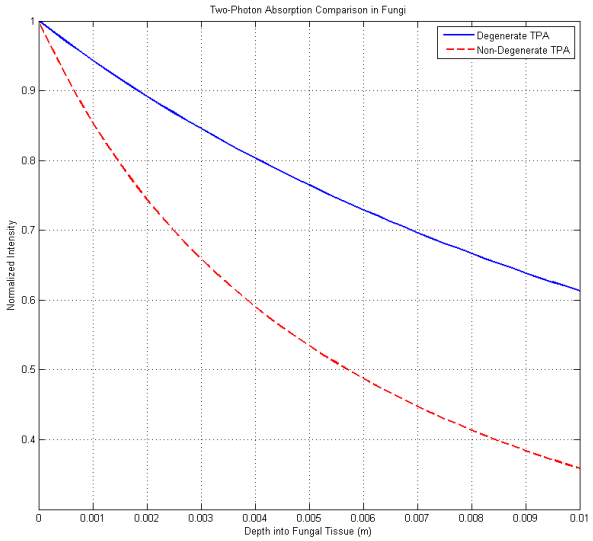

Figure 2. Degenerate and non-degenerate TPA within fungal tissue.

In Figure 2, the modeling results confirm that non-degenerate TPA offers superior spatial confinement and nonlinear interaction strength, while degenerate TPA enables smooth energy deposition and moderate penetration within fungal tissue. The localized excitation observed in the non-degenerate case shows its potential for precision fungal imaging, targeted photonic manipulation, and microscale optical data encoding [19-21]. Therefore, MATLAB based simulation clearly demonstrates that non-degenerate two photon absorption provides enhanced control over excitation compared to degenerate excitation in fungal systems.

10. CONCLUSION

The analysis of electromagnetic fields from rotating bodies substantiates the idea that magnetism is not an isolated manifestation but a consequence of underlying antisymmetric energy dynamics, modulated by electron density, material structure, and rotational force. The classification of electromagnetic waves into electric-field–dominated and magnetic-field–dominated categories, defined by a characteristic wavelength boundary, supports the claim that electromagnetic energy inherently possesses a temperature and thus participates in material formation through thermal processes. This insight reaffirms that both extremely short and extremely long wavelengths correspond to high temperatures, destabilizing pre-existing magnetic states and influencing gravitational interactions within material systems. The present investigation offers a comprehensive reinterpretation of Unified Field Theory by grounding its foundations in the formation of gravitational attractive force and its intrinsic equivalence to antisymmetric energy, in contrast to traditional unification approaches dominated by tensor formulations, higher dimensional models, or quantum corrections. The current theory emphasizes the direct physical processes occurring during the formation and behavior of material bodies. A central point to this perspective is that prime material arises through gravitational attractive force generated when the magnetic nature between particles is suppressed under conditions of temperature driven electrostatic friction. This antisymmetric energy, produced at the particle surface level, serves as the fundamental link between electromagnetic phenomena, thermodynamic expressions of radiation, and gravity-time interactions. Furthermore, the reinterpretation of gravity-time relationships extends general relativity by positing that gravitation originates not merely from curvature of space-time but from particle level momentum exchanges, electrostatic friction, and magnetic suppression within forming matter. This approach aligns gravitational behavior with temperature induced electromagnetic processes, reinforcing the unity of physical interactions at multiple scales. The coherent position phenomenon between interacting masses illustrates that gravitational attraction, antisymmetric energy emission, and electromagnetic field suppression occur simultaneously, forming the core mechanism that binds diverse physical laws into a unified theoretical structure. Ultimately, the theory developed here demonstrates that antisymmetric energy/field is the fundamental phenomenon capable of bridging the conceptual division between Newtonian mechanics, Classical mechanics, and Quantum mechanics. Symmetric energy emission characterizes large scale bodies, while antisymmetric radiation dominates at quantum scales. Yet, both of them emerge from the same gravitational electromagnetic thermal interactions. This yields a unified framework that is universally applicable, irrespective of system size, mass distribution, or dynamical regime. Hence, the uniqueness of this Unified Field Theory lies in its ability to transcend traditional disciplinary boundaries and provide a continuous, physically meaningful explanation of how matter forms, evolves, and interacts through the intertwined mechanisms of gravity-time, temperature based electromagnetic waves, and electromagnetic fields.

The study systematically investigated degenerate and non-degenerate two photon absorption in fungal tissue through MATLAB based computational modeling. By solving the nonlinear intensity propagation equation and simulating Gaussian beam interactions, clear distinctions between the two excitation mechanisms were established. Degenerate TPA demonstrated smooth and moderate nonlinear attenuation with broader spatial energy distribution inside the fungal layer. In non-degenerate TPA exhibited enhanced nonlinear interaction strength, faster intensity decay, and strong spatial confinement restricted to the intersection of two excitation beams. This localized optical gating effect minimizes off focus absorption and enables precise excitation control within fungal structures. The modeling outcomes indicate that non-degenerate two photon absorption is particularly suitable for applications requiring high spatial selectivity, such as targeted bio-imaging, fungal based photonic devices, and optical data storage systems. The computational results provide theoretical insight into nonlinear optical behavior in fungal materials and their potential role in next generation bio-electronic and optically controlled memory technologies.

The conclusions derived from this research not only provide a new direction in the ongoing pursuit of Unified Field Theory but also contribute substantially to the pedagogy of physical science. By presenting a clear, intuitive, and physically grounded interpretation, this work sets a stage for further mathematical formalization, experimental verification, and theoretical refinement. In this way, it reaffirms the possible long envisioned but never fully realized that diverse forces of nature can indeed be traced back to a single, unifying phenomenon: the antisymmetric energy that shapes both the microcosmic and macrocosmic fabric of the universe.

Conflicts of Interests

The authors declared no conflicts of interests.

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References

[1] Crossley, David, Jacques Hinderer, and Umberto Riccardi. "The measurement of surface gravity." *Reports on Progress in physics* 76.4 (2013): 046101.

[2] De Broglie, Louis. "The reinterpretation of wave mechanics." *Foundations of physics* 1.1 (1970): 5-15.

[3] Einstein, Albert. "A generalization of the relativistic theory of gravitation." *Annals of Mathematics* 46.4 (1945): 578-584.

[4] Einstein, Albert, and Ernst Gabor Straus. "A generalization of the relativistic theory of gravitation, II." *Annals of Mathematics* 47.4 (1946): 731-741.

[5] Felker, Laurence G. *"The Evans Equations of Unified Field Theory*." *Arima Publishing,* (2005): 1-373.

[6] Goenner, Hubert FM. "On the history of unified field theories. Part II.(ca. 1930–ca. 1965)." *Living reviews in relativity* 17.1 (2014): 5.

[7] Hill, James M. "A review of de Broglie particle–wave mechanical systems." *Mathematics and Mechanics of Solids* 25.10 (2020): 1763-1777.

[8] Kuşçu, B. "Mass= Planck Frequency Towards Quantum Gravity and a Unified Field Theory with a New Scalar-Soliton Paradigm." *Preprint*, (2025): 1- 5.

[9] Moorthy, Chinnadurai Ganesa, and Ganesamoorthy Udhaya Sankar. "Analysis on electromagnetic waves of ct scanners and mri scanners for applications." *World Scientific News* 188 (2024): 1-14.

[10] Moorthy, Chinnadurai Ganesa, and Ganesamoorthy Udhaya Sankar. "Planck's distribution and definition for temperature of electromagnetic waves." *World Scientific News* 181 (2023): 18-31.

[11] Moorthy, Chinnadurai Ganesa, and Ganesamoorthy Udhaya Sankar. "The temperature of electromagnetic waves and bounds for wavelengths of electromagnetic waves." *World Scientific News* 183 (2023): 90-103.

[12] Moorthy, C. Ganesa, G. Udhaya Sankar, and G. Rajkumar. "Rotating bodies do have magnetic field." *International Journal of Scientific Research in Science, Engineering and Technology* 2.6 (2016): 155-156.

[13] Moorthy, C. Ganesa, G. Sankar, and G. Rajkumar. "Simplified Interpretation for Einstein's Energy Mass Relation." *Imperial Journal of Interdisciplinary Research* 3.9 (2017): 538-539.

[14] Moorthy, C. Ganesa, G. Udhaya Sankar, and G. Rajkumar. "Two Expressions for Electrostatic Forces and For Magnetic Forces to Classify Electromagnetic Waves." *Imperial Journal of Interdisciplinary Research* 3.10 (2017): 706-709.

[15] Sankar, G. Udhaya, and C. Ganesa Moorthy. "Assumption Related to Formation of Gravitational Attractive Force." *World Scientific News* 210 (2025): 11-20.

[16] UdhayaSankar, G., C. GanesaMoorthy, and G. RajKumar. "Global Magnetic Field Strengths of Planets From A Formula." *International Journal of Scientific Research in Science, Engineering and Technology* 2.6 (2016): 366-367.

[17] Wyman, Max. "Unified field theory." *Canadian Journal of Mathematics* 2 (1950): 427-439.

[18] Wyman, Mark, Wayne Hu, and Pierre Gratia. "Self-accelerating massive gravity: time for field fluctuations." *Physical Review D - Particles, Fields, Gravitation, and Cosmology* 87.8 (2013): 084046.

[19] Adamatzky, Andrew, et al. "Fungal electronics." *Biosystems* 212 (2022): 104588.

[20] Caudron, Fabrice, and Yves Barral. "A super-assembly of Whi3 encodes memory of deceptive encounters by single cells during yeast courtship." *Cell* 155.6 (2013): 1244-1257.

[21] Danninger, Doris, et al. "MycelioTronics: Fungal mycelium skin for sustainable electronics." *Science Advances* 8.45 (2022): eadd7118.

[22] Elayan, Ismael A., et al. "Beyond explored functionals: A computational journey of two-photon absorption." *Journal of Chemical Theory and Computation* 20.9 (2024): 3879-3893.

[23] LaRocco, John, et al. "Sustainable memristors from shiitake mycelium for high-frequency bioelectronics." *Plos one* 20.10 (2025): e0328965.

[24] Lee, Magdelene N., et al. "Yeast Surface Display of Protein Addresses Confers Robust Storage and Access of DNA-Based Data." *DNA* 5.3 (2025): 34.

[25] Moorthy CG, Sankar GU. “Mean displacement law for black body radiations and temperature of electromagnetic waves.” *Discovery* 59.331 (2023): e85d1279

[26] Pan, Chin, and Thomas L. Mason. "Functional analysis of ribosomal protein L2 in yeast mitochondria." *Journal of Biological Chemistry* 272.13 (1997): 8165-8171.

[27] Sankar, G. Udhaya, and C. Ganesa Moorthy. "Analysis of Quantum Wave Packet Dynamics Using the Split Operator Fourier Method." *International Journal of Scientific Research in Physics and Applied Sciences* 14.1 (2026): 01-07.

[28] Udhaya Sankar, G., C. Ganesa Moorthy, and G. RajKumar. "A suggestion for a good anode material synthesized and characterized." *Discovery* 54 (2018): 249-253.

[29] Vallikkodi, M., G. Udhaya Sankar, and P. Vishnukumar. "An Innovative Interpretation for Parallel Universe." *Imperial Journal of Interdisciplinary Research* 3.5 (2017): 1422-1424.

[30] Udhaya Sankar, G., C. Ganesa Moorthy, and G. J. E. S. RajKumar. "Synthesizing graphene from waste mosquito repellent graphite rod by using electrochemical exfoliation for battery/supercapacitor applications." *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects* 40.10 (2018): 1209-1214.

[31] Udhaya Sankar, G., C. Ganesa Moorthy, and G. RajKumar. "Smart storage systems for electric vehicles–a review." *Smart Science* 7.1 (2019): 1-15.

[32] Sankar, G. U., & Moorthy, C. G. “Investigate the Thermoelectric Model of Antimony Telluride and Bismuth Telluride Using MATLAB.” *World Scientific News* 213 (2026):.

[33] Moorthy, C. Ganesa, G. Udhaya Sankar, and G. RajKumar. "A Design for Charging Section of Electrostatic Precipitators by Applying a Law for Electric Field Waves." *Imperial Journal of Interdisciplinary Research* 3.6 (2017): 842-844.

[34] Moorthy, C. Ganesa, G. Udhaya Sankar, and Graj Kumar. "What Is The Polarity Of An Electromagnetic Wave?." *Indian J. Sci. Res* 13.1 (2017): 255-256.

[35] Moorthy, C. Ganesa, and G. Udhaya Sankar. "Planck’s constant and equation for magnetic field waves." *Natural and Engineering Sciences* 4.2 (2019): 107-113.

[36] Moorthy, C. Ganesa, G. Udhaya Sankar, and G. RajKumar. "Temperature of Black Holes and Minimum Wavelength of Radio Waves." *International Journal of Scientific Research in Science, Engineering and Technology* 4.4 (2018): 1104-1107.

[37] Sankar, G. Udhaya. "Climate change challenge–photosynthesis vs. hydro-electrolysis principle." *Climate Change* 3 (2016): 128-131.

[38] Udhaya Sankar, G., et al. "Preparation of CuO1-x-Mnx (x= 0.03, 0.05, 0.07) and MATLAB modelling for sustainable energy harvesting applications." *Journal of Physics: Conference Series*. Vol. 1850. No. 1. IOP Publishing, 2021.

[39] Udhaya Sankar, G., C. Ganesa Moorthy, and C. T. Ramasamy. "Mathematical Analysis on Power Generation—Part I." *Artificial Intelligence for Renewable Energy and Climate Change* (2022): 53-86.

[40] Udhaya Sankar, G., C. Ganesa Moorthy, and C. T. Ramasamy. "Mathematical Analysis on Power Generation—Part II." *Artificial Intelligence for Renewable Energy and Climate Change* (2022): 87-115.

[41] Sankar, G. Udhaya, and C. Ganesa Moorthy. "Network Modelling on Tropical Diseases vs. Climate Change." *Climate Change and Anthropogenic Impacts on Health in Tropical and Subtropical Regions*. IGI Global Scientific Publishing, 2020. 64-92.

[42] Sankar, G. Udhaya, and C. Ganesa Moorthy. *Planets and Electromagnetic waves*. IDEA PUBLISHING, 2018.

[43] Sankar, G. Udhaya, and C. Ganesa Moorthy. *Numerical Methods for Calculus Student*. LAP LAMBERT Academic Publishing, 2021.

[44] Udhaya Sankar, G. "Sustainable Energy Materials." *Artificial Intelligence for Renewable Energy and Climate Change* (2022): 117-136.

[45] Moorthy, C. Ganesa, G. Udhaya Sankar, and G raj Kumar. " A Velocity Index for Existence of Atmosphere in A Planet. *Indian J. Sci. Res* 13.1 (2017): 09-10.

[46] RajKumar, G., et al. "Portable Network Graphics Approach to the Authentication of Halftone Images with Henon Map Encryption." *Smart Science* 8.2 (2020): 50-60.

[47] Sankar, G. Udhaya, and C. Ganesa Moorthy. "Analysis of P-Type Bi2Te3 Thermoelectric Cooler Device Performance Using Embedded model." *Selcuk University Journal of Engineering Sciences* 24.3 (2025): 58-63.

[48] Sankar, G. Udhaya, and C. Ganesa Moorthy. "Investigation on Thermoelectric Device Performance by modeling and simulations." *Journal of Energy Trends* 2.2 (2026): 40-48.

[49] Sankar, G. Udhaya, and C. Ganesa Moorthy. *Mathematics in Material Science: For Classroom Studies*. LAP LAMBERT Academic Publishing, 2019.

[50] Ganesamoorthy, Udhaya Sankar, and Chinnadurai Ganesa Moorthy. "A brief study on history and evolution of time." *Indian Journal of History of Science* 58.2 (2023): 103-110.

[51] Ganesamoorthy, Udhaya Sankar. "Generalized Programming Idea for Making the Thermoelectric Device Using MATLAB Software for Cu2Bi2Te3 and Cu2Sb2Te3." *International Journal of Engineering and Applied Sciences* 15.2 (2023): 52-59.

[52] Moorthy, C. Ganesa, G. Udhaya Sankar, and G. RajKumar. "LIGOs Detected Magnetic Field Waves; not Gravitational Waves." *Imperial Journal of Interdisciplinary Research* 3.8 (2017): 268-269.

[53] Sankar, G. Udhaya, Ganesa Moorthy, and C. T. Ramasamy. "A review on recent opportunities in MATLAB software based modelling for thermoelectric applications." *International Journal of Energy Applications and Technologies* 8.2 (2021): 70-79.

[54] Sankar, G. U., & Moorthy, C. G. "Optimization of materials for thermoelectric leg model device." *World Scientific News* 211 (2026):190-199.

[55] Sankar, G. Udhaya. "A Survey on Wavelength Based Application of Ultraviolet LED." *International Journal of Scientific Research in Science, Engineering and Technology* 2.6 (2016): 23-24.

[56] Chinnadurai Ganesa Moorthy, Ganesamoorthy Udhaya Sankar. "Envelopes of Moving Electric Fields Create Gravitational Field." *World Scientific News* 212 (2026): 159-169.

[57] Sankar, G. Udhaya, and C. Ganesa Moorthy. "General Concepts in Physics." *ResearchGate Preprint* (2026): 1-17.

[58] Sankar, G. Udhaya, and C. Ganesa Moorthy. "Review on Scopes of Some Software Tools for Energy Based Applications." *ResearchGate Preprint* (2026): 1-37.

[59] Sankar, G. Udhaya, and C. Ganesa Moorthy. "The Book of Physics Formula." *ResearchGate Preprint* (2025): 1-18.

[60] Taherdoost, Hamed. "Deep learning and neural networks: Decision-making implications." *Symmetry* 15.9 (2023): 1723.

[61] Crapse, Trinity B., and Michele A. Basso. "Insights into decision making using choice probability." *Journal of Neurophysiology* 114.6 (2015): 3039-3049.

[62] Gandia, Antoni, and Andrew Adamatzky. "Fungal skin for robots." *BioSystems* 235 (2024): 105106.

[63] Grasso, Gerardo. "Fungal Frontiers in (Bio) sensing." *Biosensors* 16.2 (2026): 131.