

What Do You Know About Quantum Mechanics? Part III

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Abstract

Mathematics entered physics as a tool, but gradually it turned into the master of physics.

In other words, a lot of people think that math can produce physics, when in fact it's the other way around.

The most striking example is the current incomplete Schrödinger equation describing the complex wave function ψ , treated and handled as part of mathematics, while its square ψ^2 is more realistic and more effective.

In other words replacing the Schrödinger PDE describing the complex wave function Ψ with its square Ψ^2 describing Ψ^2 in the frame of closed control volume, unexpectedly increases the amount of information and generate new quantum physics.

This is the topic of this article.

The real answer to the title question is that most people

know nothing about the true mathematics of a unified four-dimensional spacetime, which is essential for describing classical and quantum physics, including those who have been indoctrinated with Minkowski, Einstein and Schrodinger's ideas about R^4 space and whom we regard as the source of all evil.

In two previous articles titled 'What Do You Know About Quantum Mechanics? – Parts One and Two,' we presented, explained, and answered more than 10 important and pressing questions in the field of modern (or new) physics — sometimes called 'Abbas physics' to set it apart:

In this article, we extend the same techniques of new statistical B transition matrix chains obtained from Cairo's techniques, called new physics, to introduce, explain, and answer the following five complex questions:

- 1-How can statistical B-matrix sequences be applied to rigorously and quantitatively derive the mathematical expression for quantum tunnelling phenomena?
- 2-Is it true that mechanical sound waves have quantum properties like the tunnel effect? If the answer is yes, what experimental setup can detect and measure this remarkable phenomenon?
- 3- What are the names of the forms of the new quantum mechanics that the B matrix chains introduced? Do these

forms help to prove or disprove certain rules of quantum mechanics?

4-Moment of inertia I , is it inherent property of classical physics system?

5- Moment of inertia I , is it inherent property of quantum physics system?

Finally, it is important to note that this article does not aim to diminish the significant contributions of great physicists and mathematicians such as Einstein, Schrödinger, Bohr, Heisenberg, Minkowski, Hilbert, Riemann, and others, but rather to address the most prominent shortcomings and limitations of their theories, where applicable.

Note: If you are not familiar with the universal laws of physics, please stop reading. This article is not intended for you.

I.A comprehensive introduction including theory and numerical results

Mathematics entered physics as a tool, but little by little, became its master.

In other words, many people believe that mathematics is capable of generating physics, while the opposite is true [2,3,4,5,6,7].

The true answer to the question posed in the title lies in the

fact that most people know nothing about the actual mathematics of unified four-dimensional spacetime — including those well-versed in the ideas of Minkowski, Einstein, Bohr, and Schrödinger regarding the space R^4 , whom we regard as the source of all evil.

We have opted for statistical mechanics based on statistical transition matrix chains (B-matrices), which have been precisely defined and efficiently used since 2022 (12,19,8-11).

In other words our choice is statistical mechanics based on the transition B-matrix chains.

Note that today we know only two types of transition matrix chains, namely Markov transition M matrix chains and the proposed B-matrix chains where the superiority of the latter is evident.

Note also that the known Heisenberg quantum transfer matrix is neither transition nor statistical matrix.

In fact the B-matrix chains a product of the statistical theory of Cairo techniques is not entirely new and has been applied efficiently with high precision, stability and speed to solve almost all types of classical and quantum physics in addition to applied mathematics and classical statistics plus quantum and statistical distributions since 2020[12,1-8]

The far success of the B-matrix chains is due to exact definition of time t for the first time in history as satisfying the following physical and geometrical conditions [Note that

geometry is physics in a sense]:

1- Satisfies the generalized Pythagorean theory:

$$X^2 + y^2 + z^2 + C^2t^2 = \text{hypotenuse}^2 = \text{constant... (1)}$$

And not the catastrophic anti-Pythagorean definition of Einstein and Minkowski

$$X^2 + y^2 + z^2 - C^2t^2 = 0... (2)$$

However, since Einstein and Minkowski adopted the false equation 2, it became the standard.

2- Time t as the fourth axis is not separate from the other three geometric axes like a separate controller, but is rather intertwined with the other three geometric axes and at the same time perpendicular to them.

3-Time is discrete, which means it is quantized and not continuous [14-17].

This discretization of time replaces the Bohr quantization of angular momentum :

$$m v 2 \pi r = nh, n = 1, 2, 3, \dots \text{infinity... (3)}$$

4- The discretization of time is performed as,

$t = Ndt$ where N is the number of iterations or time step and dt is the time jump.

This is equivalent to the expression for the transfer matrix D(N) after time Ndt as,

$$D(n) = B + B^2 + B^3 + \dots + B^N \dots (4)$$

Which reduced to,

$D(N) = 1 / (I-B)$ for sufficiently large N .

We define the quantum transition matrix Q as, $Q = \text{SQRT}(B) \dots (5)$

And the transfer quantum transfer matrix, $D(Q)$ via the expression,

$D(Q) = Q + Q^2 + Q^3 + \dots + Q^N \dots (6)$

Which reduces to,

$D(Q) = 1 / (I-Q)$ when N is sufficiently large.

And what is even more surprising is that,

$D(Q) = \text{SQRT}(D)$ in all cases [11].

It is worth noting that Equation (3,4,5,6) **unifies—in a sense—classical physics and quantum physics** and surprisingly general relativity as well.

The statistical transition B -matrix in 1D,2D,3D itself is uniquely and well defined inside the closed control volume with Dirichlet boundary conditions(may be called Abbas control volume for distinction) through the following 4 statistical conditions [14,15,18,19].

The entries $B_{i,j}$ comply with or are subject to the following 4 conditions:

$B_{i,j} = 1/4$ for i adjacent to j .. and $B_{i,j} = 0$ otherwise.

Meaning that probability a priori equal.

ii- $B_{ii} = RO$, i.e. the main diagonal is made up of constant inputs RO . For example in the heat diffusion equation, RO can take any value in the closed interval $[0,1]$ while for Laplace and Poisson PDE, $RO = 0$. That is to say that B is a null principal diagonal matrix which corresponds to the assumption of a null residue after each time step for all the free nodes.

iii- $B_{ij} = B_{ji}$, for all i, j . The matrix B is double symmetrical to conform to the physical principle of detailed balance.

iv- The sum of $B_{ij} = 1$ for all the rows far from the borders and the sum $B_{ij} < 1$ for all the rows connected to the borders meaning that the probability of the whole space = 1.

Obviously, the statistical matrix B is very different from the Laplacian mathematical matrix A and from the Markov transition matrix M .

The physical nature of B is clear and briefly explained above through conditions I to iv which support hypothesis 3.

The complexities related to determining the B matrix in classical physics and the Q matrix in quantum physics come from the process of pre-selecting the main diagonal elements (B_{ii} or RO), since this choice determines the nature of the problem and its physical characteristics.

For example:

i- $B_{ii} = 0$ for mathematical and electromagnetic problems.

ii- $B_{ii} = 0.2$ and 0.22 for the partial differential equation (PDE) governing heat diffusion in low-carbon steel and high-quality Egyptian aluminum, respectively(). And so on.

We now return to the properties and theories derived from the statistical mechanics of quantum systems—insights that could not have been reached via the classical Schrödinger equation (the partial differential equation) introduced in 1927.

A simple approach to understand the physics and mathematics inherent in the B-matrix chains is the Cauchy-Riemann stress strain tensor:

the Cauchy Riemann stressstrain tensor in 3D geometric space xyz is expressed as,

$F_{xx} \ F_{xy} \ F_{xz}$

$F_{yx} \ F_{yy} \ F_{yz}$

$F_{zx} \ F_{zy} \ F_{zz}$

We call it matrix/tensor $M1$ and the strain tensor (We call it matrix/tensor $M2$)

Then $M1 \times M2 = \text{modulus of elasticity}$

The first fantastic breakthrough here consists of transforming the Cauchy-Riemann stress tensor into an energy density tensor $U(x,y,z,t)$ $Jm^{-3} \ sec$ in the form of a Laplacian stress matrix:

$\nabla^2_{xx} \ \nabla^2_{xy} \ \nabla^2_{xz} \ \nabla^2_{xt} \]U(x,y,z,t)$

$$\nabla^2_{yx} \nabla^2_{yy} \nabla^2_{yz} \nabla^2_{yt}]U(x,y,z,t)$$

$$\nabla^2_{zx} \nabla^2_{zy} \nabla^2_{zz} \nabla^2_{zt}]U(x,y,z,t)$$

$$\nabla^2_{tx} \nabla^2_{ty} \nabla^2_{tz} \nabla^2_{tt}]U(x,y,z,t)$$

We call it matrix stress tensor M_3 .

Where, $\nabla^2_{xx} = d/d^2$ (partial) and $\nabla^2_{xy} = d/d^2$ (partial) x y.

And the second fantastic breakthrough consists, in the same way, of transforming or generalizing Cauchy's 3D geometric deformation tensor into a 4D xyz t spacetime curvature, namely:

$$\nabla^2_{xx} \nabla^2_{xy} \nabla^2_{xz} \nabla^2_{xt}$$

$$\nabla^2_{yx} \nabla^2_{yy} \nabla^2_{yz} \nabla^2_{yt}$$

$$\nabla^2_{zx} \nabla^2_{zy} \nabla^2_{zz} \nabla^2_{zt}$$

$$\nabla^2_{tx} \nabla^2_{ty} \nabla^2_{tz} \nabla^2_{tt}$$

It's called the M_4 tensor of spacetime.

The third and greatest fantastic and consistent advance is to

reasonably assume that [2-17]:

$$\text{Stress tensor } M_3 \times \text{Spacetime tensor } M_4 = I \dots (1^*)$$

Where I the identity matrix .

It is worth noting that the "B-matrix" statistical sequences do not rely on the classical Schrödinger equation (SE)

formulated in 1927, as that equation is considered incomplete and sometimes misleading.

Therefore, we proposed replacing the classical Schrödinger equation (SE) with its quadratic form (SES) describing Ψ^2 , where $\Psi^2 = \Psi \cdot \Psi^*$.

It is also worth noting that the SES form aligns with the general physical law:

$$U(x, y, z, t) * \text{Spacetime curvature} = \dots (1^*)$$

Whereas Schrödinger partial differential equation SE itself does not satisfy this condition.

All analyses presented in this research paper—as well as in previous papers dating back to 2022—apply to the SES formulation, not to the conventional Schrödinger equation (SE). Thus, we disregard the conventional Schrödinger equation (SE) as if it never existed, and restrict our selves to the SES formulation.

SES implies,

- 1- Both statistical transition matrices, B and Q, must be simultaneously "double statistical," singular (meaning their determinants are zero), and invertible.
- 2- Both statistical transfer matrices, D and D(Q), must be simultaneously "double statistical," singular, and invertible.

Statement (1) above appears contradictory, yet there is a justification for it, as follows:

The classical SE lives and operates in infinite void, which constitutes 99.99% of our universe.

In fact, the vacuum is not a void in the true sense; rather, it is in reality a substance teeming with energy densities—whether potential or kinetic.

3- It follows that the flow of the energy density distribution in quantum mechanical system must be an inverse flow (negative diffusion); that is, it extends from the system's walls toward its internal centre of mass (CM).

4- It follows from conditions 1 ,2 and 3 that the energy density in quantum mechanical system must be geometrically triangular, as shown in Figures 1 , 2 and 3.

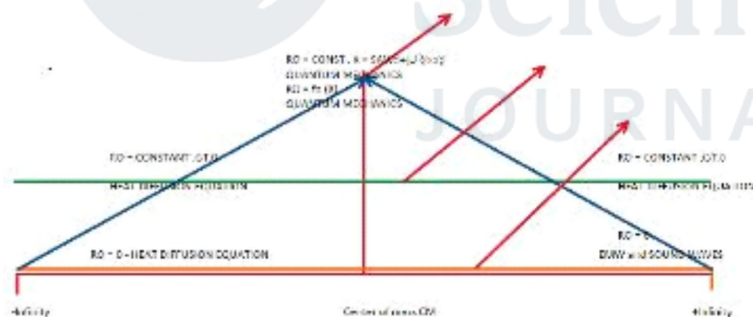


Fig 1.80 of $\hat{Q}$ -transition matrix has triangular shape.

Figure 1: A one-dimensional quantum mechanical model consisting of n free nodes separated by equal distances; the triangulation is obvious.

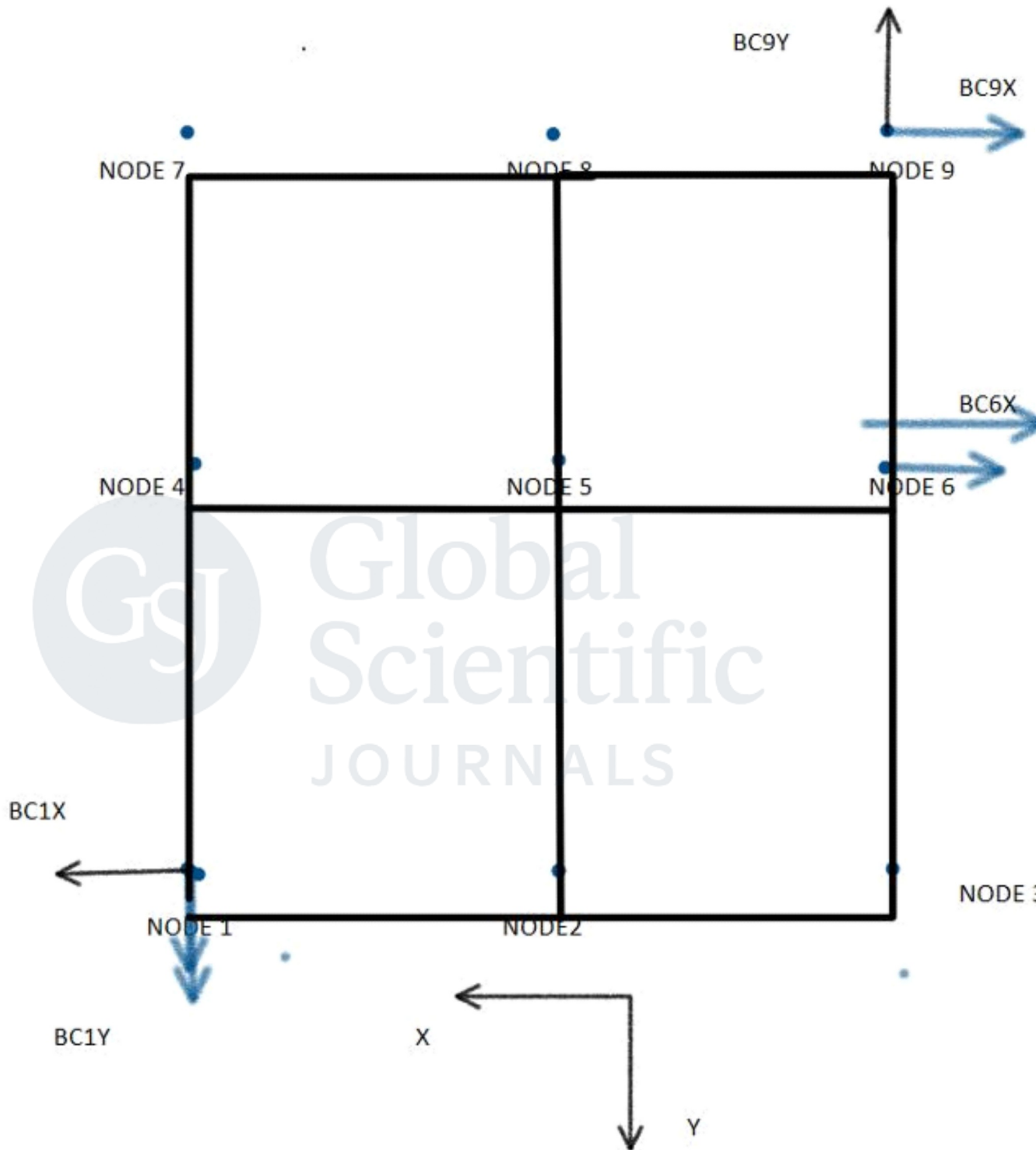


Figure 2: A 2D rectangle composed of equidistant 9 free

nodes spaced at equal intervals in classical physics—
without triangulation.

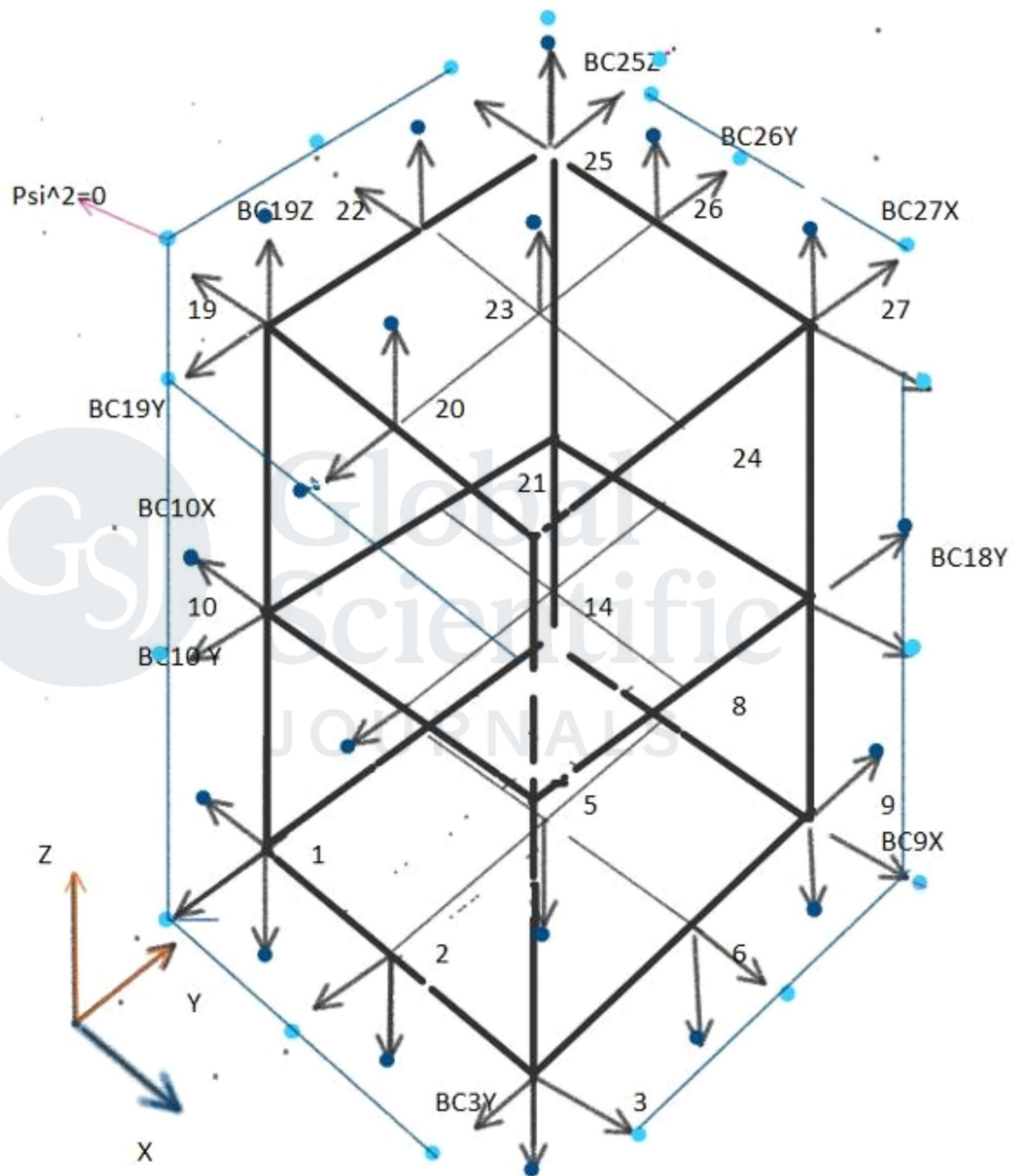


Fig. 3 -3D classical or quantum system-Triangularization

process is shown here.

Triangularization process appears in Quantum mechanical system which lives and operates in infinite vacuum where the boundary conditions at infinity must be bounded to zero.

Furthermore, in Quantum mechanical system which lives and operates in infinite vacuum where the boundary conditions at infinity must be bounded to zero, both Its transition matrix B and transfer matrix D determinents must be equal to zero and meanwhile invertible.

The question arises how and why?

The answer is simple:

The 2D transition matrix represents a solution to the following system of simultaneous homogeneous linear algebraic equations:

$$a_{11} x_1 + a_{12} x_1 + a_{13} x_1 + \dots = 0$$

$$a_{21} x_2 + a_{22} x_2 + a_{23} x_3 + \dots = 0$$

.....

$$a_{n1} x_1 + a_{n2} x_2 + a_{n3} x_3 + \dots = 0$$

It is obvious that the above-mentioned system of homogeneous linear equations has a solution if and only if the determinant of the matrix:

$$a_{11} \ a_{12} \ a_{13}$$

....

$a_1, a_2, a_3, \dots$

equals zero.

This is what was to be proved.,

Another question arises:

What is required to master the statistical theory of B-matrix chains—or any other equivalent statistical theory?

1-Comprehensive knowledge and understanding of universal classical and quantum laws and rules of physics[2-7,21,22].

2-Improved knowledge and understanding of how to construct correct and efficient software algorithms using current programming languages, such as Fortran and C++ [21,22,25,26,27].

3-Mastery of matrix algebra operations, such as calculating eigenvalues and eigenvectors, as well as matrix multiplication, addition, inversion, and others[15,16,19,23,26,27].

We present the following 5 question-and-answer pairs to better illustrate or clarify the nature and properties of QM:

1-How can statistical B-matrix sequences be applied to rigorously and quantitatively derive the mathematical expression for quantum tunnelling phenomena?

2-Is it true that mechanical sound waves have quantum properties like the tunnel effect? If the answer is yes, what

experimental setup can detect and measure this remarkable phenomenon?

3-What are the names of the forms and shapes of the new quantum mechanics that the B matrix chains introduced? Do these forms help to prove or disprove certain rules of quantum mechanics?

4-Moment of inertia I, is it inherent property of classical physics system?

5- Moment of inertia I, is it inherent property of quantum physics system?

To avoid getting bogged down in the introduction, let's move directly to the second section,

II-Theory and Numerical Applications

Q1-

How can statistical B-matrix sequences be applied to rigorously and quantitatively derive the mathematical expression for quantum tunnelling phenomena?

A1-

Another question arises:

Is that time quantization in the statistical theory of B-matrix chains—namely, $t = N\Delta t$ where N goes from 1 to infinity constitutes a more general form of quantization that replaces Bohr or Planck quantization similar to what happened in

calculating the stationary quantum states of H-atom?

The quantum tunnelling phenomena is presented in illustrative fig 4 where the whole one dimensional space is divided into 3 regions or zones:

- $x \leq 0$.
- $0 < x \leq d$
- $d < x < \infty$.

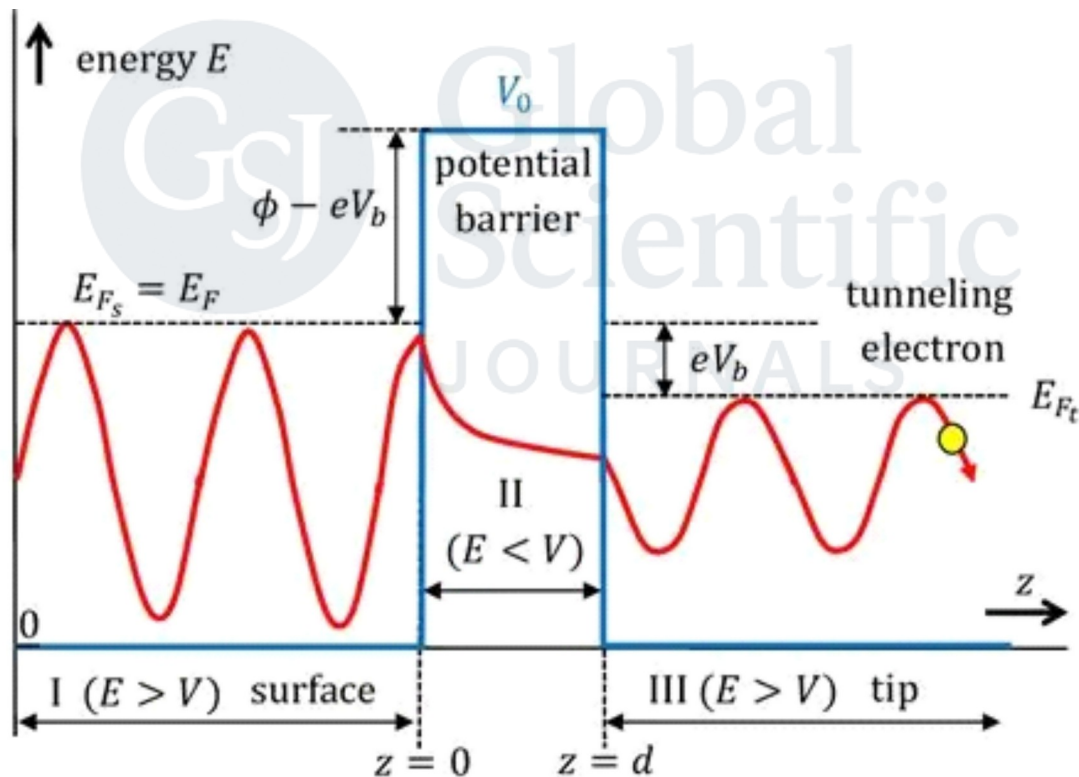


Fig 4- Quantum tunnelling process in x-t space.

A-In the first zone of air normally at NPT the SES is diffusion equation. B-When the SES quantum wave (or sound wave collides with the boundary condition at $x=0$ it

is absorbed partially with max absorption coefficient =1/2 for perpendicular incidence and at the same time transformed from diffusion equation into focused beam equation:

$$Y=A \exp D (wt - 2 \text{ Pie } x/\text{Lambda}) \dots (7)$$

Where D represents the diffusion in vacuum proportional to [(E-V)]in energy notations and proportional to Log [(1+RO)/(1-RO)] in B-matrix chains notaion.

In normal conventions.

eq 7 expresses time decay and x-space decay.

C-When the SES quantum wave collides with the boundary (or sound wave collides with the boundary condition at x=0) it is absorbed partially with max absorption coefficient =1/2 for perpendicular incidence and at the same time transformed from diffusion equation into focused beam equation:

$$Y=A \exp D (wt - 2 \text{ Pie } x/\text{Lambda}) \dots (7)$$

In normal conventions.

eq 7 expresses time decay and x-space decayantum foc

Therefore, at the boundary x=d where d is the thickness of the quantum barrier in meters.

$$U_{out} (x,y,z,t) = 0.5 U_{in}[x,y,z,t)] \text{ Exp } - \lambda^* d \dots (8)$$

Where $\lambda^* = 1 / 2 \text{ Pie } \lambda$.

And the quantum focused beam is transformed again into diffusion wave.

Note that eq 8 is the quantum tunnelling expression for a quantum particle in closed control volume box.

Q2-

Is it true that the phenomenon of quantum tunnelling occurs with sound waves passing through a quantum barrier (a vacuum, in this case) of width d^* ?

If the answer is yes what is the predicted experimental setup required for detecting and measuring this remarkable effect?

A2-

The answer is yes and the procedure is similar to that of quantum tunnelling in quantum mechanical system shown in Fig. 4.

The only difference is that the potential barrier is replaced by two thin metallic plates separated by distance d^* and containing complete vacuum.

The square of the classical Shrodinger equation in vacuum SES has

λ^* for absorptivity or diffusivity in vacuum equals,

$\text{Log} [(1+RO)/(1-RO)]$ in B-matrix notation

Note that $RO(\text{max})=0,5$ for perpendicular incince on wall boundaries.

The system is diThe square of the classical Shrodinger equation in vacuum SES has

λ^* for absorptivity or diffusivity in vacuum equals,

Log [(1+RO)/(1-RO)] in B-matrix notation

Note that RO(max)=0,5 for perpendicular incince on wall boundaries

The diffusivity or absorptivity in vacuum = $E-V / E$ with $E=KE+PE$.

Then,

The transmission coefficient I_{out}/I_{in} is propotional to $\sqrt{E-V}$

Q2-

Is it true that the phenomenon of quantum tunnelling occurs with sound waves passing through a quantum barrier of width $*d*$ meters? If the answer is yes , how it can be explained via B-matrix chains?

A2-

The answer is yes and it can be explained via B-matrix chains, but what are the experimental setups capable of detecting and measuring this remarkable phenomenon?

The experimental setup is analogous to that used for quantum tunneling through a barrier of thickness $*d*$.

The only difference lies in replacing the potential barrier

with a vacuum gap situated between two thin metallic parallel walls separated by a distance of d meters.

Statistical B-matrix chain theory predicts the following approximate relationship between the incident sound intensity I_{in} —in watts per square meter—and the transmitted sound intensity I_{out} —in watts per square meter:

$$I_{out} = I_{in} \exp(-2100 d \text{ meters}) \dots (9)$$

Note that the exponent 2100 comes roughly from Sabine's formula,

$$2 \pi V_s, \text{ where } V_s \text{ is the speed of sound} = 330 \text{ m s}^{-1}.$$

Q3-

Moment of inertia I , is it inherent property of classical physics B-matrix chains system?

Q4-

Moment of inertia I , is it inherent property of quantum physics system?

The answer for questions 3 and 4 is yes.

In previous articles titled [How to Generate New Mathematics - Parts 1, 2, 3, and 4; Can We Think Outside the Box?; How to Integrate

The correctness and accuracy of the generated mathematical problem results—extending to six decimal places—indicate that applied mathematics is merely a branch of physics.

Q5-

What are the names of the forms of the new quantum mechanics that the B matrix

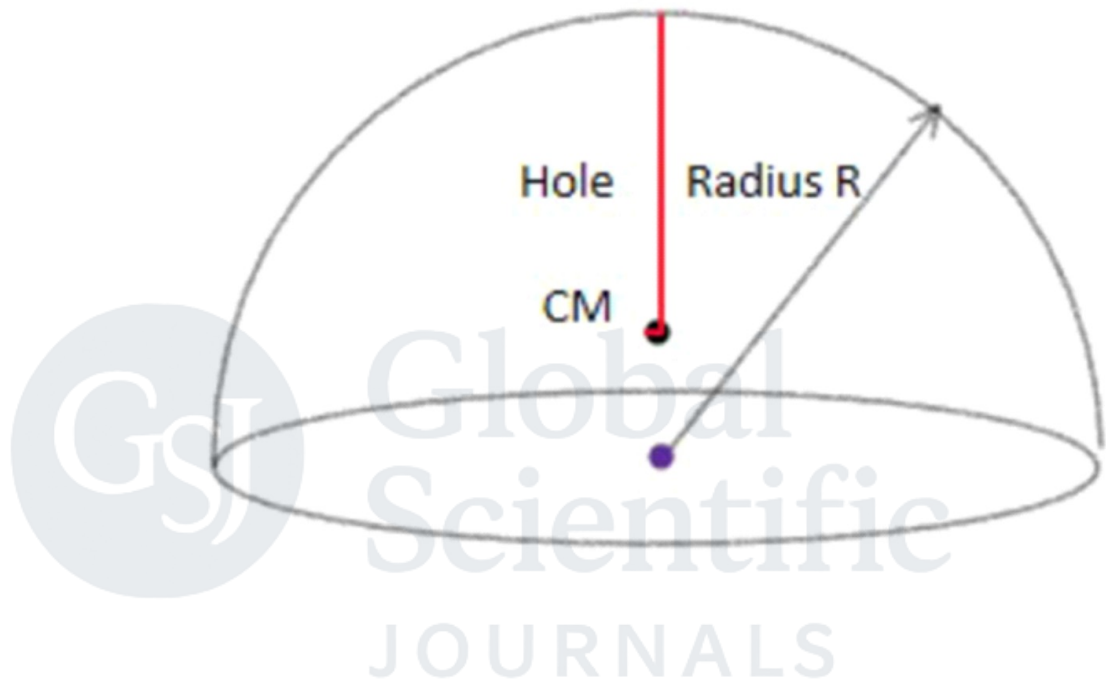
chains introduced? Do these forms help to prove or disprove certain rules of classical and or quantum mechanics?

A5-

Figures 5 and 6 below present two simple shapes or figures in the unitary 4D xyz-t space result in from B-matrix chains.

These Figures are characterized by having constant volume in the x-t spacetime over time passage.

Fig 5-A regular hemisphere.



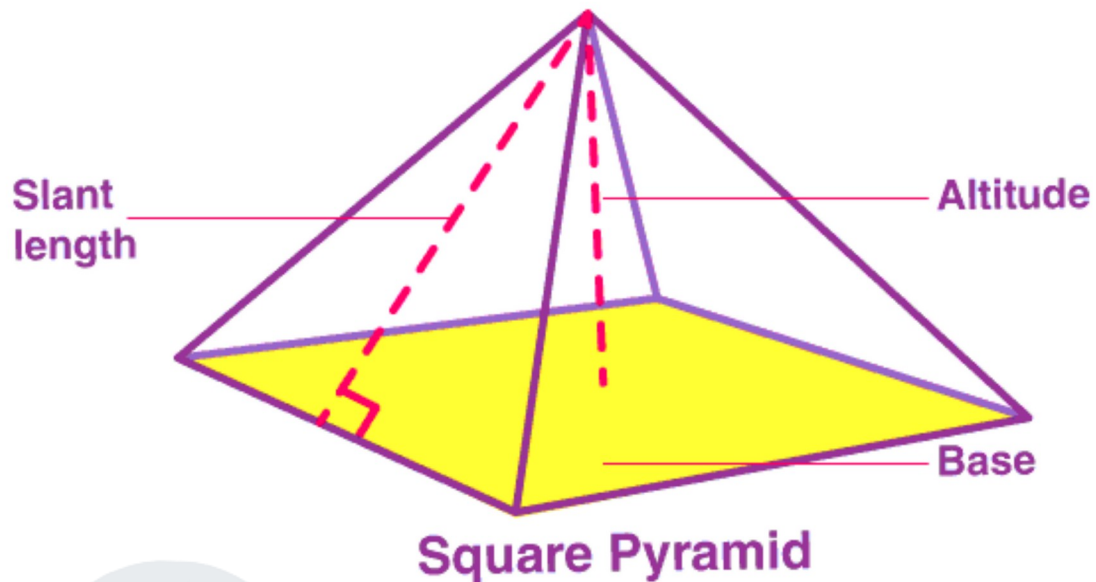


Fig 6 –A regular pyramid with square base.

What is magic here is that these 3D objects can work as Light wave amplifier and or sound wave amplifier.

The only requirement is drilling big hole say two mm diameter at the middle and another tyny hole say 0.1 mm diameter at the vertex.

Prediction is that a ray of light wave(or sound wave) entering at the big hole will emerge from the tiny hole amplified approximately 400 times.

ConclusionIn

In this article, we presented, analyzed, and answered 5 important and urgent questions:

1-How can statistical B-matrix sequences be applied to rigorously and quantitatively derive the mathematical expression for quantum tunnelling phenomena?

2-Is it true that mechanical sound waves have quantum properties like the tunnel effect? If the answer is yes, what experimental setup can detect and measure this remarkable phenomenon?

3-Moment of inertia I , is it inherent property of classical physics system?

4-Moment of inertia I , is it inherent property of quantum physics system?

5-What are the names of the forms of the new quantum mechanics that the B matrix chains introduced? Do these forms help to prove or disprove certain rules of quantum mechanics?

The numerical results of generating new mathematical formulas and theorems are remarkably accurate to six digits which suggests that mathematics is merely a branch of physics.

Finally, it is important to note that this article does not aim to diminish the significant contributions of great physicists and mathematicians such as Einstein, Schrödinger, Heisenberg, Minkowski, Hilbert, Riemann, and others, but rather to address the most prominent shortcomings and limitations of their theories, where

applicable.

Aknowledgement

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An experience that was both enjoyable and rewarding until he later became a professor and head of the Department of Basic Sciences, which comprises experimental and theoretical physics aswell as pure mathematics.

During this long experience. He went to the Atomic and Nuclear Physics Center in Toulouse, France, where he earned his doctorate and worked as a professor at ULP and UPS Universitas, as well as a research director at CNRS in France.

The last experience, as with the first, was an opportunity to collaborate with the best leaders and the latest scientific knowledge.

It is worth noting that the authors use their own Fortran language Algorithm similar to those in references 31-34.

No Python or MATLAB is needed.

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