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THE STUDY OF ANALYTICAL FOR EVOLUTION OF REAL TIMES IN QUANTUM MECHANIC FOR GAUGE THEORY FOR QUARKS-GLUONS PLASMA WITH SU (3) WITH ANTIPERIODIC CONDITIONS GROUP BY USING PERTURBATION THEORY

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ABSTRACT

We take the effective Hamiltonian operator until the four degree[3] and this operator has enabled us to convert from pure gauge theory with group SU(3)With antiperiodic conditions into the quantum mechanics with the group SU(3) With antiperiodic conditionsand this mean physically we have converted from the study of an infinite number of particles and of freedom degrees (quarks- gluens-plasma) into study of eight particles (Global)independent of space that mainsTwenty-four of freedom degrees and specificallyTwenty-four inharmonic oscillators and after that we apply perturbation theory (that of the depend of creation operator $\widehat{D}^{+a}_{i}$ and annihilation operator $\widehat{D}_{i}^{a}$) on homogenous modes remaining after quantization of the inhomogeneous modes and we have concluded the relations:

1-The time evolution for the ensemble average of global operator square (the color magnetic energy $\widehat{B}_{i}^{a}\widehat{B}_{i}^{a}$).

2-Thetime evolution for the ensemble average of impulse operator square (the color electric energy $\widehat{\Pi}_{i}^{a}\widehat{\Pi}_{i}^{a}$).

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INTRODUCTION

Our perception of the material is that there are two main groups of elementary particles: quarks and leptons [1], with three of the four basic forces: electromagnetism and weak and strong interaction. Gravity will now be left aside. Quarks (which are made up of protons and neutrons) generate these three forces and are affected by them. Leptons, such as electrons, are not affected by strong force. The characteristic of these two groups, which are similar to the electric charge, is that the quarks have colors, whereas the leptons have no color, and the colors and stalagmites are red, green, and blue. Quantum chromo dynamic (QCD) Is the strong interaction theory that describes confinement (stable inclusion) of quarks and gluens at low temperature.The plasma phase of the quarks and gluens are at a sufficiently high temperature. Many researchers have studied quarks and gluons [1-38] .All of theresearches based on QCD theoryand quantum mechanics at zero temperature $T = 0$, And there is research based on the theory$(QCD)_{T}$, which is at high temperatures or temperature extremes zero ($T \neq 0$). In [39], [42] and [43] the evolution of the real times of the quarks and the gluens was studied for the pure gauge theory and gauge theorywith SU (2) and SU (3).

The semi-classicalevolution method was used based on Wagner's representation, but the effective hematonic operator was taken up to the fourth grade only. The time evolution for the average ensemble was calculated by the evolution of the classical averageensemble plus a quantum correction of the order of $\hbar^{2}$.[40,41,45,46,47,48,49,50] The evolution of the real times of quarks and gluonsplasma was studied at non-zero temperatures ($T \neq 0$) for the pure gauge theory with SU (2) and SU (3).

Which used creation operator$\hat{D}^{+}$and annihilation operator$\hat{D}$, but taking the effective Hamilton evolution up to the fourth degree. In this research we will work on the gauge theory (quarks and gluens plasma) with the group SU (3) and with the effective Hamiltonoperator up to the fourth degree and we will use the theory of perturbation, depending on the creation operator$\hat{D}^{+}$ and the annihilation operator$\hat{D}$.[44] The study converts from an infinite number of particles (quarks and gluens plasma) to a study of eight particles, ie twenty-four degrees of freedom, specifically twenty-four inharmonicoscillators.

RESEARCH METHODOLGY

We will use the theory of perturbation, depending on the impact of Creationoperator:

$$\hat{D}^{+a}_{i} = \sqrt{\frac{\sqrt{\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}}}{2\hbar}}\hat{B}^a_i - \frac{i}{\sqrt{2\hbar\sqrt{\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}}}}\hat{\Pi}^a_i \quad \ldots\ldots(1)$$

and the annihilation operator:

$$\hat{D}^{a}_{i} = \sqrt{\frac{\sqrt{\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}}}{2\hbar}}\hat{B}^a_i + \frac{i}{\sqrt{2\hbar\sqrt{\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}}}}\hat{\Pi}^a_i \quad \ldots\ldots(2)$$

where : $\tilde{\alpha}_0 = \left(\frac{1}{g^2(L)} + \alpha_0 + n_f f_0\right)^{-1}$, $\tilde{\alpha}_1 = 2(\alpha_1 + n_f f_1)$

The operator of the magnetic field is given in the following relation:

$$\hat{B}^a_i = \sqrt{\frac{\hbar}{2\sqrt{\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}}}}\left(\hat{D}^{+a}_{i} + \hat{D}^a_i\right) \quad \ldots\ldots(3)$$

The impulse operator is given as follows:

$$\hat{\Pi}^a_i = i\sqrt{\frac{\hbar\sqrt{\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}}}{2}}\left(\hat{D}^{+a}_{i} - \hat{D}^a_i\right) \quad \ldots\ldots(4)$$

And we have:

$$\left[\hat{D}^a_i, \hat{D}^{+b}_j\right]_- = \delta_{ij}\delta_{ab} \quad \ldots\ldots(5)$$

$$\left[\hat{D}^a_i, \hat{D}^b_j\right]_- = \left[\hat{D}^{+a}_i, \hat{D}^{+b}_j\right]_- = 0 \quad \ldots\ldots(6)$$

We will use the following equations:

$$\hat{D}^a_i\left|\ldots n^a_i \ldots\right\rangle = \sqrt{n^a_i}\left|\ldots n^a_i - 1 \ldots\right\rangle \quad \ldots\ldots(7)$$

$$\hat{D}^{+a}_i\left|\ldots n^a_i \ldots\right\rangle = \sqrt{n^a_i + 1}\left|\ldots n^a_i + 1 \ldots\right\rangle \quad \ldots\ldots(8)$$

$$\hat{N}^a_i = \hat{D}^{+a}_i\hat{D}^a_i$$

$$\hat{N}^a_i\left|\ldots n^a_i \ldots\right\rangle = n^a_i\left|\ldots n^a_i \ldots\right\rangle \quad \ldots\ldots(9)$$

$$\hat{D}^a_i\left|\ldots 0 \ldots\right\rangle = 0 \ , \hat{N}^a_i\left|\ldots 0 \ldots\right\rangle = 0 \quad \ldots\ldots(10)$$

The symmetric tensor S^{abcd} is defined as follows [42, 41, 28]:

$$S^{abcd} = \frac{3}{12}(d^{abe}d^{cde} + d^{ace}d^{bde} + d^{ade}d^{bce}) + \frac{2}{3}(\delta^{ab}\delta^{cd} + \delta^{ac}\delta^{bd} + \delta^{ad}\delta^{bc}) \quad \ldots (11)$$

The values of the symmetric factors $d^{abc}$and values of antisymmetricstructureconstantsf^{abc} are given in terms of Gell-Mann-Matrices:

$$\lambda^1 = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, \lambda^2 = \begin{pmatrix} 0 & -i & 0 \\ i & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, \lambda^3 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 0 \end{pmatrix}, \lambda^4 = \begin{pmatrix} 0 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & 0 \end{pmatrix},$$
$$\lambda^5 = \begin{pmatrix} 0 & 0 & -i \\ 0 & 0 & 0 \\ i & 0 & 0 \end{pmatrix}, \lambda^6 = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}, \lambda^7 = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & -i \\ 0 & i & 0 \end{pmatrix}, \lambda^8 = \frac{1}{\sqrt{3}}\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -2 \end{pmatrix}, \quad \ldots (12)$$

The following f^{abc}, d^{abc}relationships are achieved:

$$\left.\begin{aligned}
f^{abc} &= \frac{1}{4i} Tr\left(\left[\hat{\lambda}^a, \hat{\lambda}^b\right]_- \hat{\lambda}^c\right) \\
f^{abc} &= -f^{bac} = -f^{acb} = \cdots \cdots \\
f^{ade} f^{bde} &= 3\delta^{ab} \\
d^{abc} &= \frac{1}{4} Tr\left(\left[\hat{\lambda}^a, \hat{\lambda}^b\right]_+ \hat{\lambda}^c\right) \\
d^{abc} &= d^{bac} = d^{acb} = \cdots \cdots \\
d^{ade} d^{bde} &= \frac{5}{3}\delta^{ab}
\end{aligned}\right\} \quad \ldots (13)$$

$g^2(\mathrm{L})$ is a coupling constant represented in the following relation :

$$g^2(\mathrm{L}) = -2\mathrm{b}_0 \ln(\Lambda_{\mathrm{ms}}\mathrm{L}) + \frac{\mathrm{b}_1 \ln[-2\ln(\Lambda_{\mathrm{ms}}\mathrm{L})]}{2\mathrm{b}_0^2}$$

$$b_0 = \frac{1}{(4\pi)^2}\left(\frac{11}{3}\mathrm{N} - \frac{2}{3}n_f\right)$$

$$b_1 = \frac{1}{(4\pi)^4}\left(-\frac{34}{3}\mathrm{N}^2 + \frac{10}{3}N\, n_f + (\mathrm{N}^2 - 1)\frac{n_f}{\mathrm{N}}\right) \quad \ldots (14)$$

$$\Lambda_{\mathrm{ms}} = 74.1705\mathrm{MeV}$$

represents an identified constant by minimum subtraction of dimension organization. N=3Number of dimensions of the group SU(3).

RESULTS AND DISCUSSION

The guage theory (plasma quarks and gluens) with antiperiodic conditions:

Hamilton's operator is given by reference [44] With antiperiodic conditions:

$$\hat{H}_{eff(1)} = \frac{1}{2}\left(\frac{1}{\mathrm{g}^2(L)} + \alpha_0 + n_f f_0\right)^{-1} \hat{\Pi}_i^a \hat{\Pi}_i^a + (\alpha_1 + n_f f_1)\hat{B}_i^a \hat{B}_i^a$$
$$+ \frac{1}{4}\left(\frac{1}{\mathrm{g}^2(L)} + \alpha_2 + n_f f_2\right)\left(f^{abc}\hat{B}_i^b \hat{B}_j^c\right)^2 + n_f f_4 S^{abcd}\hat{B}_i^a \hat{B}_j^b \hat{B}_k^c \hat{B}_m^d \quad \ldots (15)$$

A numerical constants $\alpha_2, \alpha_1, \alpha_0$, f_4, f_3, f_2, f_1, $f_0$take the following values by reference [44]:

f_0=-0.135732564444	α_0=0.03271564399
f_1=0.0425440245	α_1=-0.451569915
f_2=-0.0014692028634	α_2=0.03693735997
f_4=-0.0021133973333	

Calculation of Terms:

$$L\hat{H}^0_{eff} = \sum_{a=1}^{8}\sum_{i=1}^{3}\left[\frac{1}{2}\tilde{\alpha}_0\hat{\Pi}^a_i\hat{\Pi}^a_i + \frac{1}{2}\tilde{\alpha}_1\hat{B}^a_i\hat{B}^a_i\right] \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(17)$$

$$\frac{1}{2}\tilde{\alpha}_0\hat{\Pi}^a_i\hat{\Pi}^a_i = \frac{\hbar}{4}\sqrt{\tilde{\alpha}_0\tilde{\alpha}_1}\left[\hat{D}^{+a}_{i}\hat{D}^a_i - \hat{D}^{+a}_{i}\hat{D}^{+a}_{i} + \hat{D}^a_i\hat{D}^{+a}_{i} - \hat{D}^a_i\hat{D}^a_i\right]$$

$$\frac{1}{2}\tilde{\alpha}_1\hat{B}^a_i\hat{B}^a_i = \frac{\hbar}{4}\sqrt{\tilde{\alpha}_0\tilde{\alpha}_1}\left[\hat{D}^{+a}_{i}\hat{D}^{+a}_{i} + \hat{D}^{+a}_{i}\hat{D}^a_i + \hat{D}^a_i\hat{D}^{+a}_{i} + \hat{D}^a_i\hat{D}^a_i\right]$$

$$\delta_{ij} = \begin{cases}1 & i = j\\ 0 & i \neq j\end{cases} \quad \delta^{ab} = \begin{cases}1 & a = b\\ 0 & a \neq b\end{cases}$$

$$L\hat{H}^0_{eff} = \sum_{a=1}^{8}\sum_{i=1}^{3}\frac{\hbar}{4}\sqrt{\tilde{\alpha}_0\tilde{\alpha}_1}\left[2\hat{D}^{+a}_{i}\hat{D}^a_i + 2\hat{D}^a_i\hat{D}^{+a}_{i}\right]$$

$$\left[\hat{D}^a_i, \hat{D}^{+a}_{i}\right]_- = 1 \Rightarrow \hat{D}^a_i\hat{D}^{+a}_{i} - \hat{D}^{+a}_{i}\hat{D}^a_i = 1 \Rightarrow \hat{D}^a_i\hat{D}^{+a}_{i} = 1 + \hat{D}^{+a}_{i}\hat{D}^a_i$$

$$L\hat{H}^0_{eff} = \sum_{a=1}^{8}\sum_{i=1}^{3}\hbar\sqrt{\tilde{\alpha}_0\tilde{\alpha}_1}\left[\hat{D}^{+a}_{i}\hat{D}^a_i + \frac{1}{2}\right]$$

$$\hat{N}^a_i = \hat{D}^{+a}_{i}\hat{D}^a_i, \hat{N} = \sum_{a=1}^{8}\sum_{i=1}^{3}\hat{N}^a_i \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(18)$$

$$L\hat{H}^0_{eff} = \hbar\sqrt{\tilde{\alpha}_0\tilde{\alpha}_1}\left(\hat{N} + 12\right) \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..(19)$$

$$L\hat{H}_{eff(1)} = L\hat{H}^0_{eff}$$

$$+\frac{1}{4}\left(\frac{1}{g^2(L)} + \alpha_2 + n_f f_2\right)(f^{abc})^2\frac{\hbar^2}{4\left(\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}\right)}\left[\left[\hat{D}^{+b}_{i} + \hat{D}^b_i\right]\left[\hat{D}^{+c}_{j} + \hat{D}^c_j\right]\left[\hat{D}^{+b}_{i} + \hat{D}^b_i\right]\left[\hat{D}^{+c}_{j} + \hat{D}^c_j\right]\right]$$

$$+ n_f f_4 S^{abcd}\frac{\hbar^2}{4\left(\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}\right)}\left[\left[\hat{D}^{+a}_{i} + \hat{D}^a_i\right]\left[\hat{D}^{+b}_{j} + \hat{D}^b_j\right]\left[\hat{D}^{+c}_{k} + \hat{D}^c_k\right]\left[\hat{D}^{+d}_{m} + \hat{D}^d_m\right]\right]$$

$$L\hat{H}_{eff(1)} = L\hat{H}^0_{eff} + \frac{1}{4}\left(\frac{1}{g^2(L)} + \alpha_2 + n_f f_2\right)$$

$$\sum_{a=1}^{8}\cdot\sum_{b=1}^{8}\cdot\sum_{c=1}^{8}\cdot\sum_{i=1}^{3}\cdot\sum_{j=1}^{3}(f^{abc})^2\frac{\hbar^2}{4\left(\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}\right)}\cdot\Big[\Big[\hat{D}^{+b}_{i}\hat{D}^{+c}_{j}\hat{D}^{+b}_{i}\hat{D}^{+c}_{j} + \hat{D}^{+b}_{i}\hat{D}^{+c}_{j}\hat{D}^{+b}_{i}\hat{D}^c_j + \hat{D}^{+b}_{i}\hat{D}^{+c}_{j}\hat{D}^b_i\hat{D}^{+c}_{j} + \hat{D}^{+b}_{i}\hat{D}^{+c}_{j}\hat{D}^b_i\hat{D}^c_j$$
$$+ \hat{D}^{+b}_{i}\hat{D}^c_j\hat{D}^{+b}_{i}\hat{D}^{+c}_{j} + \hat{D}^{+b}_{i}\hat{D}^c_j\hat{D}^{+b}_{i}\hat{D}^c_j + \hat{D}^{+b}_{i}\hat{D}^c_j\hat{D}^b_i\hat{D}^{+c}_{j} + \hat{D}^{+b}_{i}\hat{D}^c_j\hat{D}^b_i\hat{D}^c_j + \hat{D}^b_i\hat{D}^{+c}_{j}\hat{D}^{+b}_{i}\hat{D}^{+c}_{j} + \hat{D}^b_i\hat{D}^{+c}_{j}\hat{D}^{+b}_{i}\hat{D}^c_j$$
$$+ \hat{D}^b_i\hat{D}^{+c}_{j}\hat{D}^b_i\hat{D}^{+c}_{j} + \hat{D}^b_i\hat{D}^{+c}_{j}\hat{D}^b_i\hat{D}^c_j + \hat{D}^b_i\hat{D}^c_j\hat{D}^{+b}_{i}\hat{D}^{+c}_{j} + \hat{D}^b_i\hat{D}^c_j\hat{D}^{+b}_{i}\hat{D}^c_j + \hat{D}^b_i\hat{D}^c_j\hat{D}^b_i\hat{D}^{+c}_{j} + \hat{D}^b_i\hat{D}^c_j\hat{D}^b_i\hat{D}^c_j\Big]\Big]$$

$$+ n_f f_4 S^{abcd}\sum_{a=1}^{8}\cdot\sum_{b=1}^{8}\cdot\sum_{c=1}^{8}\sum_{d=1}^{8}\sum_{i=1}^{3}\cdot\sum_{j=1}^{3}\cdot\sum_{k=1}^{3}\sum_{m=1}^{3}\frac{\hbar^2}{4\left(\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}\right)}\Big[\Big[\hat{D}^{+a}_{i}\hat{D}^{+b}_{j}\hat{D}^{+c}_{k}\hat{D}^{+d}_{m} + \hat{D}^{+a}_{i}\hat{D}^{+b}_{j}\hat{D}^{+c}_{k}\hat{D}^d_m + \hat{D}^{+a}_{i}\hat{D}^{+b}_{j}\hat{D}^c_k\hat{D}^{+d}_{m}$$
$$+ \hat{D}^{+a}_{i}\hat{D}^{+b}_{j}\hat{D}^c_k\hat{D}^d_m + \hat{D}^{+a}_{i}\hat{D}^b_j\hat{D}^{+c}_{k}\hat{D}^{+d}_{m} + \hat{D}^{+a}_{i}\hat{D}^b_j\hat{D}^{+c}_{k}\hat{D}^d_m + \hat{D}^{+a}_{i}\hat{D}^b_j\hat{D}^c_k\hat{D}^{+d}_{m} + \hat{D}^{+a}_{i}\hat{D}^b_j\hat{D}^c_k\hat{D}^d_m + \hat{D}^a_i\hat{D}^{+b}_{j}\hat{D}^{+c}_{k}\hat{D}^{+d}_{m}$$
$$+ \hat{D}^a_i\hat{D}^{+b}_{j}\hat{D}^{+c}_{k}\hat{D}^d_m + \hat{D}^a_i\hat{D}^{+b}_{j}\hat{D}^c_k\hat{D}^{+d}_{m} + \hat{D}^a_i\hat{D}^{+b}_{j}\hat{D}^c_k\hat{D}^d_m + \hat{D}^a_i\hat{D}^b_j\hat{D}^{+c}_{k}\hat{D}^{+d}_{m} + \hat{D}^a_i\hat{D}^b_j\hat{D}^{+c}_{k}\hat{D}^d_m + \hat{D}^a_i\hat{D}^b_j\hat{D}^c_k\hat{D}^{+d}_{m}$$
$$+ \hat{D}^a_i\hat{D}^b_j\hat{D}^c_k\hat{D}^d_m\Big]\Big] \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.(20)$$

The Hamaltonian matrix is calculated as follows:

$$LH_{n_i^a,m_i^a} = \langle n_i^a | L\hat{H} | m_i^a \rangle = \hbar\sqrt{\tilde{\alpha}_0\tilde{\alpha}_1}\left[\sum_{a=1}^{8}\sum_{i=1}^{3} m_i^a \delta_{n_i^a,m_i^a} + 12\right] + \frac{1}{4}\left(\frac{1}{g^2(L)} + \alpha_2 + n_f f_2\right)$$

$$\sum_{a=1}^{8}.\sum_{b=1}^{8}.\sum_{c=1}^{8}.\sum_{i=1}^{3}.\sum_{j=1}^{3}(f^{abc})^2\frac{\hbar^2}{4\left(\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}\right)}.\Big[\Big[\sqrt{m_i^a+1}\sqrt{m_i^a+2}\sqrt{m_i^a+3}\sqrt{m_i^a+4}\delta_{n_i^a,m_i^a+4}\,\delta_{i,j}\delta^{ac}\delta^{ab}$$
$$+ m_i^a\sqrt{m_i^a+1}\sqrt{m_i^a+2}\delta_{n_i^a,m_i^a+2}\,\delta_{i,j}\delta^{ac}\delta^{ab} + (m_i^a+1)^{\frac{3}{2}}\sqrt{m_i^a+2}\delta_{n_i^a,m_i^a+2}\,\delta_{i,j}\delta^{ac}\delta^{ab}$$
$$+ m_i^a(m_i^a-1)\,\delta_{n_i^a,m_i^a}\,\delta_{i,j}\delta^{ac}\delta^{ab} + \sqrt{m_i^a+1}(m_i^a+2)^{\frac{3}{2}}\delta_{n_i^a,m_i^a+2}\,\delta_{i,j}\delta^{ac}\delta^{ab} + (m_i^a)^2\delta_{n_i^a,m_i^a}\,\delta_{i,j}\delta^{ac}\delta^{ab}$$
$$+ (m_i^a)(m_i^a+1)\,\delta_{n_i^a,m_i^a}\,\delta_{i,j}\delta^{ac}\delta^{ab} + \sqrt{m_i^a}\sqrt{m_i^a-1}\,(m_i^a-2)\,\delta_{n_i^a,m_i^a-2}\,\delta_{i,j}\delta^{ac}\delta^{ab}$$
$$+ \sqrt{m_i^a+1}\sqrt{m_i^a+2}(m_i^a+3)\delta_{n_i^a,m_i^a+2}\,\delta_{i,j}\delta^{ac}\delta^{ab} + m_i^a(m_i^a+1)\delta_{n_i^a,m_i^a}\,\delta_{i,j}\delta^{ac}\delta^{ab}$$
$$+ (m_i^a+1)^2\delta_{n_i^a,m_i^a}\,\delta_{i,j}\delta^{ac}\delta^{ab} + \sqrt{m_i^a}(m_i^a-1)^{\frac{3}{2}}\delta_{n_i^a,m_i^a-2}\,\delta_{i,j}\delta^{ac}\delta^{ab}$$
$$+ (m_i^a+1)(m_i^a+2)\delta_{n_i^a,m_i^a}\,\delta_{i,j}\delta^{ac}\delta^{ab} + \sqrt{m_i^a}\sqrt{m_i^a-1}(m_i^a+1)\delta_{n_i^a,m_i^a-2}\,\delta_{i,j}\delta^{ac}\delta^{ab}$$
$$+ (m_i^a)^{\frac{3}{2}}(m_i^a-1)\delta_{n_i^a,m_i^a-2}\,\delta_{i,j}\delta^{ac}\delta^{ab} + \sqrt{m_i^a}\sqrt{m_i^a-1}\sqrt{m_i^a-2}\sqrt{m_i^a-3}\delta_{n_i^a,m_i^a-4}\,\delta_{i,j}\delta^{ac}\delta^{ab}\Big]\Big]$$

$$+n_f f_4\sum_{a=1}^{8}.\sum_{b=1}^{8}.\sum_{c=1}^{8}.\sum_{d=1}^{8}.\sum_{i=1}^{3}.\sum_{j=1}^{3}.\sum_{k=1}^{3}.\sum_{m=1}^{3}S^{abcd}.\frac{\hbar^2}{4\left(\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}\right)}$$

$$\Big[\sqrt{m_i^a+1}\sqrt{m_i^a+2}\sqrt{m_i^a+3}\sqrt{m_i^a+4}\delta_{n_i^a,m_i^a+4}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} +$$
$$m_i^a\sqrt{m_i^a+1}\sqrt{m_i^a+2}\delta_{n_i^a,m_i^a+2}\,\delta_{i,m}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} + (m_i^a+1)^{\frac{3}{2}}\sqrt{m_i^a+2}\delta_{n_i^a,m_i^a+2}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} +$$
$$m_i^a(m_i^a-1)\,\delta_{n_i^a,m_i^a}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} + \sqrt{m_i^a+1}(m_i^a+2)^{\frac{3}{2}}\delta_{n_i^a,m_i^a+2}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} +$$
$$(m_i^a)^2\delta_{n_i^a,m_i^a}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} + (m_i^a)(m_i^a+1)\,\delta_{n_i^a,m_i^a}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} + \sqrt{m_i^a}\sqrt{m_i^a-1}\,(m_i^a-$$
$$2)\,\delta_{n_i^a,m_i^a-2}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} + \sqrt{m_i^a+1}\sqrt{m_i^a+2}\,(m_i^a+3)\,\delta_{n_i^a,m_i^a+2}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} + m_i^a(m_i^a+$$
$$1)\delta_{n_i^a,m_i^a}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} + (m_i^a+1)^2\delta_{n_i^a,m_i^a}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} +$$
$$\sqrt{m_i^a}(m_i^a-1)^{\frac{3}{2}}\delta_{n_i^a,m_i^a-2}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} + (m_i^a+1)(m_i^a+2)\delta_{n_i^a,m_i^a}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} +$$
$$\sqrt{m_i^a}\sqrt{m_i^a-1}(m_i^a+1)\delta_{n_i^a,m_i^a-2}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} + (m_i^a)^{\frac{3}{2}}(m_i^a-1)\delta_{n_i^a,m_i^a-2}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab} +$$
$$\sqrt{m_i^a}\sqrt{m_i^a-1}\sqrt{m_i^a-2}\sqrt{m_i^a-3}\delta_{n_i^a,m_i^a-4}\,\delta_{i,m}\,\delta_{i,k}\,\delta_{i,j}\delta^{ad}\delta^{ac}\delta^{ab}\Big] \qquad \ldots\ldots(21)$$

To calculate the evolution of time for the averaqe values for colored magnetic energy $\sum_{a=1}^{8}\sum_{i=1}^{3}\hat{B}_i^a\hat{B}_i^a$

$$\sum_{a=1}^{8}\sum_{i=1}^{3}\hat{B}_i^a\hat{B}_i^a = \sum_{a=1}^{8}\sum_{i=1}^{3}\frac{\hbar}{2\sqrt{\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}}}\left(\hat{D}^{+a}_{\ i}\hat{D}^{+a}_{\ i} + \hat{D}^{+a}_{\ i}\hat{D}_i^a + \hat{D}_i^a\hat{D}^{+a}_{\ i} + \hat{D}_i^a\hat{D}_i^a\right)$$

Depending on (7),(8) we find :

$$\langle n_i^a|\hat{B}_i^a\hat{B}_i^a|m_i^a\rangle = \sum_{a=1}^{8}\sum_{i=1}^{3}\frac{\hbar}{2\sqrt{\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}}}\Big(\sqrt{m_i^a+1}\sqrt{m_i^a+2}\delta_{n_i^a,m_i^a+2} + m_i^a\delta_{n_i^a,m_i^a} + (m_i^a+1)\delta_{n_i^a-1,m_i^a}$$
$$+ \sqrt{m_i^a}\sqrt{m_i^a-1}\,\delta_{n_i^a,m_i^a-2}\Big)$$

$$\langle n_i^a|\hat{B}_i^a\hat{B}_i^a|m_i^a\rangle = \frac{\hbar}{2\sqrt{\frac{\tilde{\alpha}_1}{\tilde{\alpha}_0}}}\left[\sum_{a=1}^{8}\Big(\sqrt{m_i^a+1}\sqrt{m_i^a+2}\,\delta_{n_i^a,m_i^a+2} + 2m_i^a\delta_{n_i^a,m_i^a} + \sqrt{m_i^a}\sqrt{m_i^a-1}\,\delta_{n_i^a,m_i^a-2}\right.$$
$$\left. + 24\Big)\right] \qquad \ldots\ldots\ldots\ldots(22)$$

Check the magnetic energy matrix equation:

$$\frac{\mathrm{d}}{\mathrm{dt}}\hat{B}_i^a\hat{B}_i^a = \frac{i}{\hbar}\left(\hat{H}(\hat{B}_i^a\hat{B}_i^a) - (\hat{B}_i^a\hat{B}_i^a)\hat{H}\right)$$

$$\frac{d}{dt}\langle \ldots . n_i^a \ldots .. |\hat{B}_i^a \hat{B}_i^a| \ldots \ldots m_i^a \ldots ..\rangle = \frac{i}{\hbar}[\langle \ldots . n_i^a \ldots .. |\hat{H}\hat{B}_i^a \hat{B}_i^a| \ldots \ldots m_i^a \ldots ..\rangle - \langle \ldots . n_i^a \ldots .. |\hat{B}_i^a \hat{B}_i^a \hat{H}| \ldots \ldots m_i^a \ldots ..\rangle]$$

$$= \frac{i}{\hbar}\left[\sum_{\acute{n}_i^a}[\langle \ldots . n_i^a \ldots .. |\hat{H}| \ldots \ldots \acute{m}_i^a \ldots ..\rangle\langle \ldots . \acute{n}_i^a \ldots .. |\hat{B}_i^a \hat{B}_i^a| \ldots \ldots m_i^a \ldots ..\rangle - \langle \ldots . n_i^a \ldots .. |\hat{B}_i^a \hat{B}_i^a| \ldots \ldots \acute{n}_i^a \ldots ..\rangle\langle \ldots . \acute{n}_i^a \ldots .. |\hat{H}| \ldots \ldots m_i^a \ldots ..\rangle]\right]$$

$$\frac{d}{dt}(\hat{B}_i^a \hat{B}_i^a)_{n_i^a m_i^a} = \frac{i}{\hbar}\left[\sum_{\acute{n}_i^a}\left[\langle H_{n_i^a \acute{m}_i^a}(\hat{B}_i^a \hat{B}_i^a)_{\acute{n}_i^a m_i^a} - (\hat{B}_i^a \hat{B}_i^a)_{n_i^a \acute{n}_i^a} H_{\acute{n}_i^a m_i^a}\rangle\right]\right] \quad \ldots\ldots\ldots\ldots (23)$$

We can calculate the evolution of time for the expected value of magnetic energy by solving this differential equation numerically by MATLAB program after calculating the numerical values of matrix (21) ,(22) by Fortran (77) language program.

Conclusions and Recommendations: This study is the first in quantum mechanics which takes a numerical study of the evolution of the real time for gauge theory with group SU(3) i.e. twenty four freedom dgree.

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