M-THEORY

SOLVING THE MBRANE UNIVERSE IN M-THEORY

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ABSTRACT

After intensive study of all the known Superstring theories namely, 1,2a,2b, E_8*E_8, and the SO_{32} theories. It was discovered that all these Superstring theories are related by Dualities and so led to the eventual conclusion of one theory that was coined M –theory.

The fundamental conclusion that I have deduced, is that there are basically only two string interaction modes-Open and Closed .I search for both string modes in a naturally feasible and single universal allegorical entity that displays both Geometrical and mathematical coherence, hence ultimately solving the longstanding problem in theoretical physics termed M-theory in a sense presenting a Mathematically musical universe model.

INTRODUCTION

Unification is the first grand step towards solving a problem that itself exists unified in nature. The solution at hand is a simple logical axiomatic statement represented in Geometry, quite elusive. It forms a rather complex absurdity in Calculus, maybe perhaps revealing the Quantum information nature holds intrinsically.

M-theory is a highly complex mathematical physic undertaking, deeply steeped in fundamental mathematical and the finest laws of Physics. The purest of ideas in these diverse fields indeed manifests itself in truth and Reality.

M THEORY ON A HILBERT SPACE.

The Hilbert space used herein takes the form of a circle

THE CIRCLE AS A SUPERSTRING

WORKING M THEORY ON A CIRCLE.

A critical look at a circle reveals two lines

(a) Circumference
(b) Diameter

I have taken these lines as Superstrings.

The only natural string with a constant Universal ratio is a circle-PI (π).At a glance a seemingly paradoxical picture is presented .

The circumference (Looped) is herein considered as the closed string interaction.

The Diameter is the open string mode.

WHAT IS A RATIO?

A ratio can be described as an expression of relative magnitude quantities. The simplest ratio in nature is that between any two quantities. It expresses the relationship of either the two in a single mathematically coherent value, of which if you were to have one quantity it's easy to derive the other.

Example

Take two values of magnitude a and b

(1) a

(2) b

If

a/b=3

a can be expressed in terms of b by the relationship

a=3b.

b can be expressed in terms of a by the relationship

if a =3b

Then b=1/3 a.

In the above if we can assume the 3 is a constant. Note in the above, a second constant 1 appears naturally in the maths.

PERTUBATION OF M-THEORY ON A CIRCLE.

Diameter is taken as open string oscillation mode of Fundamental displacement I unit.

The ratio (operator) **π** maps the Diameter (open string mode) to (Circumference) closed string mode hence giving a value of the inner product space.

The inverse of the ratio- **(1/π)** is also true mapping the circumference (Closed string) to the diameter (Open string).

This satisfies **S** duality and **T** duality, hence self duality in the M-brane in M theory. This perfectly meets the conditions as we have a universal mid term which allows us to safely and effortlessly perturb around the singularity limit 0, In Relativity, thereby overcoming the singularity problem that has dogged our current understanding of cosmology.

CONSTRUCTING THE DIRAC IN M-THEORY

As M-theory incorporates both Quantum mechanics and General relativity. The Dirac remains as the most important tool for formulation of fundamentally complex equations.

The BRA and KET notation construction is used to describe the properties of the M-brane at the heart of M-theory.and the simplest possible no of quantum states.

WORKING THE DIRAC IN M-THEORY

The circle clearly defines the two superstring states naturally. with the implication of S duality and T duality.

The open superstring is assumed to be a Quantum state; likewise the closed superstring is also a Quantum state.

1 Assign the entire self Dual quantum system, a quantum state **α**

Insert the quantum states in a Dirac notation.

Assign

α- Open string state.

α'-Closed string state

Hence in BRA and KET notation. we construct.

‹ α|

As `BRA Vector ´ to represent open string Oscillation state.

| α'›

As `KET Vector ' to represent Closed string Oscillation state.

This can later be Quantified under a single BRA and KET Dirac formalism as

‹ α|| α'›

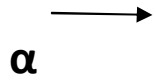
The ratio π expresses the simplest linear relationship of the Open ended string(Diameter)and the closed/looped string (circumference) without breaking any concept in all of superstring theory.ie

ΠD = Circumference

(Open superstring) (Closed superstring)

Thus if **α is Open Superstring quantum state and α' is the closed Superstring quantum state.**

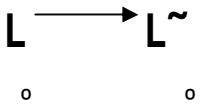
maps to



α α'

An open Superstring thus maps itself into a closed Superstring linearly using mirror symmetry on a 2Dimensional World sheet.

Have π as the linear operator while oscillating in space-time it generates **Right** vectored symmetric states of the System.



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Hence if the new Superstring quantum state is **α' ,It can be expressed in terms of**

α

Thus

(α) (α')

(open string displacement) (Closed string displacement)

The linear Right moving quantum mechanical operator is **π .**

The operator not only maps open Superstrings into Closed Superstrings, but In effect also states in the M brane. Quantum state **α** changes to **α'.**

Being in a Dual Quantum state at the same time, The new state -α',simultaneously commutes back to α

$$(\alpha) \longrightarrow (\alpha')$$

Working on an Isomorphic Hilbert space, whereby the elements of the product spaces are well defined.

If

$$\pi(\alpha) \longrightarrow \alpha'$$

Then

$$\alpha' \longrightarrow \alpha$$

$$\pi$$

The new Dual Operator mapping α' to α, is thus

$$\frac{1}{\pi}$$

i.e.

$$\frac{1}{\pi}(\alpha') \longrightarrow \alpha$$

in this first case the operator 1/π is left vectored generating new Quantum states towards the left Hand side of the System.

Thus if

$$(\alpha) \xrightarrow{\pi} (\alpha')$$

(Open string quantum state) (Closed string quantum state)

$$\longleftarrow$$

Then the following is true ⟷

(α) (α′)

The first natural operator is π,The second is 1/π hence it is a Duality relation

We have a Quantum system,

‹ α|| α′›

Transforming

π | α› = | α′›

1 | α′› = ‹ α|
π

This also allows for

| α′›‹ α|

Being a dual system it has two States ,Its most outstanding property is that it has two Quantum mechanical operators namely **π** and **1/ π .**If one acts on the`Bra', the other works simultaneously on the` Ket.´

π | α› = | α′›

$\frac{\mathbf{1}}{\boldsymbol{\pi}}$ | α′› = ‹ α|

Being Self Dual at unity Then it is possible to have the same quantum system

$$\langle \alpha | \, | \alpha' \rangle$$

Transform under

If

$$\pi | \alpha' \rangle = \langle \alpha | \qquad \text{also} \qquad \frac{1}{\pi} | \alpha' \rangle = \langle \alpha |$$

Then

$$\frac{1}{\pi} \langle \alpha | = | \alpha' \rangle$$

Then

$$\pi \langle \alpha | = | \alpha' \rangle$$

Having Two operators that map states into one another, implying oscillation within itself generating an infinite number of Dual states. This enables us to carry out any Duality perturbation expansion for any of the two strings I have defined herein.

DUALITY TRANSFORMATIONS IN THE MBRANE

If the operation $\xrightarrow{\pi}$

α (Open Superstring state) $\xleftarrow{1/\pi}$ α' (Closed superstring state)

The operator is π, hence a Quantum mechanical duality(Relationship).

Assume this as the Right vectored T-duality procedure for the Open Superstring (diameter).This also implies Left vectored S duality Must by general rule appear for the mathematics to have symmetry.

For example if we have a Self dual quantum mechanical system denoted as a then we have linear transformation series.

$$\infty \xleftarrow{\text{S- duality}} \frac{a}{\pi(\pi)}, \frac{a}{\pi}, \; a \; \pi(a), \; \pi(\pi a) \xrightarrow{\text{T -Duality}} \infty$$

This generates new quantum states out of the system a.

A T duality procedure on the Open Superstring implies a similar S duality on the Closed Superstring in the Mbrane .

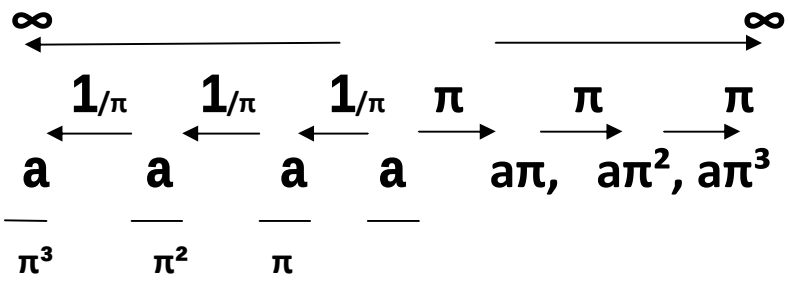
Similarly an S Duality procedure on the Open Superstring implies a similar T duality operation on the Closed Superstring.

This implies that S Duality and T Duality occurs simultaneously-one inversely in terms of the other.

CONSTRUCTING A SERIES EXPANSION IN TERMS OF THE MBRANE UNIVERSE

Take π as **3.142857**

Let the Mbrane assume a Quantum mechanical system term a



Naturally in string theory, at the first glance we are interested in what appears towards the right hand in the symmetry.

DERIVING THE FRACTAL FOR THE ENTIRE MBRANE AND THE UNIVERSE

Arrange the terms we had above we obtain.

$$\frac{a}{\pi^3}, \frac{a}{\pi^2}, \frac{a}{\pi}, a, a\pi, a\pi^2, a\pi^3$$

please note that the previous term of each expansion, becomes the first term of the next,ie

If a is the first term after using the generator π,we get aπ as the second term towards the right hand side,aπ multiplied by π yields the third term-aπ²,and so on to infinity

Note also being symmetric

if a is the first term, being an operation on a dual space, the generator 1/π also yields the terms on the left moving side of the equation.ie

if a is the first term, after using the generator 1/π

a(1/π)

we get a/π,as the second term in the next, multiply the second term by 1/π, this gives us 1/π² as the third term this continues to infinity.

Substitute the terms

π -3.142857, a **=**unity 1

from

$$\infty \qquad\qquad \infty$$

$$\frac{a}{\pi^3}, \quad \frac{a}{\pi^2}, \quad \frac{a}{\pi}, \quad a, \quad a\pi, \quad a\pi^2, a\pi^3$$

For the right vectored part of the symmetric equation we get

a from a

3.142857a from **aπ.**

3.142857²(a) from **aπ²**

An infinite number of terms can be obtained from the above series expansion, Working we are take the three terms of the equation,-a.aπ,aπ².

This will enable us to get the fractal solution of the field enclosed from the area of the propagating 2 Dimensional worldsheet.

For normalization we use a percentage thus we obtain possible values from 0 to 100.

Hence

$$\mathbf{a + a\pi + a\pi^2 = 100}$$

substitute π for 3.142857

hence we have

a,3.142857a,9.877550

Add the terms

$$\mathbf{a+3.142857a+ 9.87755a=100}$$

3.142857 at unity a=1

+ 9.877550

13.020407 a hence add 1 to 13.020407.

$$\mathbf{13.020407\ a+a=100}$$

where a=1.

13.020407a+1=14.020407a

14.020407a=100

a=100

14.020407

a=7.132460

a commutes to 7.1132460

have the terms

a,aπ,an²

from the above terms we got.

a,3.142857a,9.877550a

Having obtained a as 7.132460,we then substitute for a to obtain the fractal

First term a is 7.132460

=**7.132460**

Second term =**3.142857(multiply by) 7.132460**

=**22.416302**

Third term **=9.877550(multiply by)7.132460**

=70.45123027

Hence from

a,aπ,aπ² We get **a,3.142857a,9.877550a.**

The terms numerically take the form in the fractal derived I have herein as

7.132460,22.41630184,70.451230

When we add the fractal values they don't quite add up to100,we have a`missing' mass .Being a Superstring this is regarded as the Superstring tension.

DERIVING SUPERSTRING TENSION

100 - sum of fractal values =Tension mass value in the fractal

sum of Fractal values

7.132460

+22.416301 99.999991 is the sum of values in the

The known universe has a fractal composition ratio of 22% Dark matter, 70% Dark energy and around 4.6 % ordinary matter.In the Mbrane universe figures are 7% ordinary matter,22.416301% `Cold 'Dark matter, 70.451230 %`Cold 'Dark Energy a `missing' mass of 0.000009% attributed to string Tension

fractal

70.451230

99.999991

100 - sum of fractal values =Tension mass value in the fractal

100-999991=0.000009

The lower the mass per cross section area the higher the Tension hence the higher the frequency.

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