THE SPINE MODEL:

Introduction and Basic Structure

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Abstract

The FaTe Model of Hyperspace [1.] was a fairly successful model of string theory which described the properties of multidimensional spacetime based on concepts of string theory, quantum field theory etc. But the FaTe Model had some serious technical errors and so, it had to be discarded. In this paper, we shall use some of the concepts of the FaTe Model of Hyperspace to build a better model of the 11 dimensional spacetime that will allow us to explain particle interactions and other physical phenomena using a novel approach to multi-dimensional dynamics.

The model also predicts a result similar to the unification of the relativity and quantum theories into a single framework using string theoretical backgrounds. This model is still incomplete and under improvement.

This paper will be followed by a number of papers on the spine model which will focus on other parts of the model.

Introduction

The basis of the Spine Model revolves around fibers and grids. Both these constructs will be introduced in this paper. Similar to the FaTe Model, the Spine Model uses a standard dimensional compactification technique. This allows us to visualize and construct multi-dimensional objects in regular 3D spaces.

The Compactification technique will also be used to in **Section 1** define grids in N-dimensional spaces. The Spine Model is also very helpful in the sense that it can be easily implemented using any object oriented programming language. The spine model aims to answer the deepest questions of existence and formation of the universe using relatively simple mathematics. The later sections of this paper will explain fibers, their behavior and geometry.

In this paper we shall introduce the Spine Model in simplest terms and observe some of its main properties.

Section 1:

The Standard Compactification in Spine Model

Studying and even visualizing the geometry of multidimensional objects is difficult. As the Spine Model deals with multidimensional objects, it is better to use some sort of technique that helps visualize such objects normally and also retains their original properties. Such a technique is the Standard Compactification.

Consider a n-dimensional space given as

$$X_n = \{a_1, a_2, \ldots \ldots .\} \qquad (1)$$

And $a_k = (x_1, x_2, x_3, \ldots \ldots, x_n)$, a_k being the general point in the space.

We define a subspace of the above space as

$$X_D = \{a_1, a_2, \ldots \ldots .\}$$

And $a_k = (x, y, z, ct)$ is a general point in that subspace.

A group acting on a set A of axes in a space is defined as

$$[\lambda^X](A, \Delta)$$

Where Δ represents the orthogonal nature of elements in A.

In spine model, we compactify the space in (1) to a 3 dimensional space X_ϕ represented as

$$X_\phi = \{c_1, c_2, \dots \dots .\} \qquad (II)$$

$$c_k = (r_1, r_2, r_3)$$

$$r_1 \in [\lambda^a], r_2 \in [\lambda^b], r_3 \in [\lambda^t]$$

Clearly, X_ϕ is in a 3 dimensional field due to the form of c_k

For n axes $T_1, T_2, \dots ., T_n$

$$[\lambda^a] = \{T_1, T_2, \dots \dots, T_{n-2}\}$$

$$[\lambda^b] = \{T_{n-1}\} \quad , \quad [\lambda^t] = \{T_n\}$$

$$\therefore \{X_\phi\} = \{[\lambda^a] + [\lambda^b] + [\lambda^t]\} \qquad (III)$$

Thus, according to Spine Model, any n-dimensional space can be compactified into a 3D represented by (II) and (III).

In the next section we shall describe grids. Grids are actually simple differential manifolds that are locally Euclidean in the Spine Model. Spine model can be applied specifically only in a grid and then integrated to apply it to the entire space. We will also discuss the concept of fibers in the grids that are supposed to produce the fundamental strings in string theory.

Section 2:

The Grids and Fibers in Spine Model

A grid is an important 3 dimensional construct in Spine Model.

A grid is defined as a subspace to the compactified space in (II)

$$X_G \subset X_\phi$$

$$X_G = \{g_1, g_2, \ldots \ldots .\} \qquad (IV)$$

And $g_k = (r_1, r_2, r_3)$

Grids are very important because to apply spine model to any n-dimensional space, we must define the grids in that space (by the use of the standard Compactification discussed in Section 1).

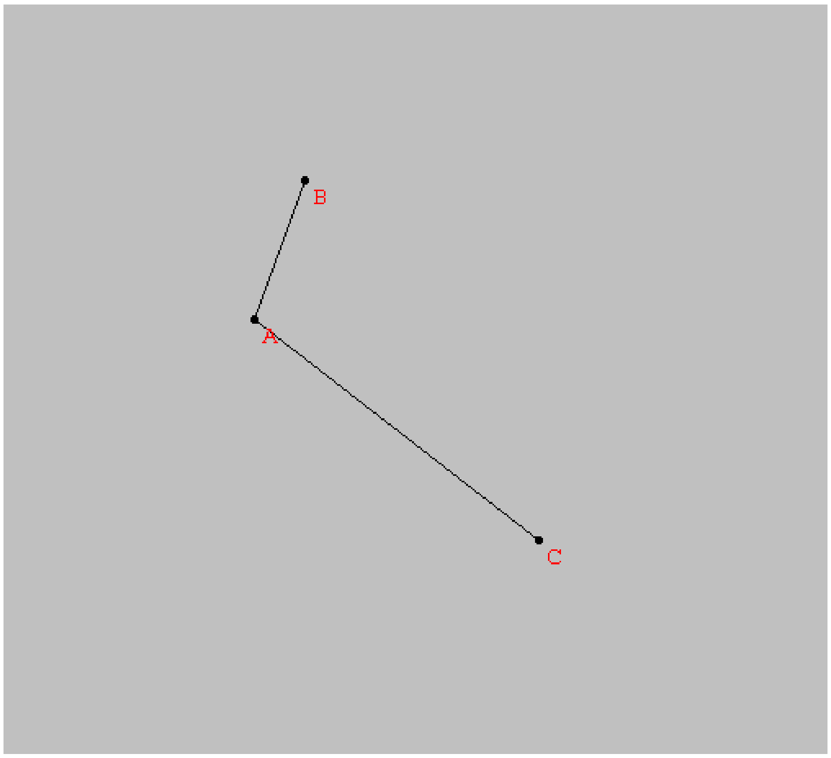
Another important prediction of Spine Model is that

"Grids defined in any m-dimensional compactified space are 3D Spaces composed of fibers. Fibers in the grids are capable of producing fundamental strings that are described in string theory."

Energy of a fiber in a Grid

Fibers are linear 1-dimensional open connection of points in any grid. The connected points are called vertices.

For any 3D grid, a single fiber can have a maximum of 3vertices". That is, a fiber can be defined between any 3 points in the grid.



The above diagram shows a fiber with 3 vertices viz. A, B and C

Note that **FIBERS (SINGLE OR MULTIPLE) CANNOT FORM CLOSED GEOMETRICAL STRUCTURES IN THE GRID.**

Fibers follow the basic Euclidean geometry principles locally. This is acceptable because grids are locally Euclidean.

A fiber in the simplest form is represented by a **Vertex Set**

$$\psi_f = \{g_1, g_2, g_3\} \qquad (V)$$

From above definition,

$\psi_f \subset X_G$ i.e. grids are formed of fibers.

Another form of a fiber is

$$(\psi_f) = \begin{pmatrix} g_1 & E_1 \\ g_2 & E_2 \\ g_3 & E_3 \end{pmatrix} \qquad \text{(VI)}$$

In (VI), E1, E2 and E3 represent the vertex energies.

Total Energy of a fiber is the sum of its vertex energies

$$E_f = E_1 + E_2 + E_3$$

Dynamics of Fibers

According to Spine Model, two fibers are equivalent if and only if they have the same vertex set.

To study the dynamics of fibers, the representations (V) and (VI) are not accurate. So we introduce a more clear and accurate description of a fiber using the simple concept of matrices.

The matrix form of a fiber between points $A(x_1, y_1, z1), B(x_2, y_2, z_2), C(x_3, y_3, z_3)$ is given by

$$\chi_f = \begin{bmatrix} x_1 & y_1 & z_1 \\ x_2 & y_2 & z_2 \\ x_3 & y_3 & z_3 \end{bmatrix} \qquad (VII)$$

The matrix in (VII) is called a **Fiber Matrix**.

Every fiber has a certain orientation in the grid and every orientation is represented by a unique Fiber Matrix. The determinant of any fiber matrix gives the orientation number (o) for that fiber. The orientation number quantitatively determines a fiber's orientation in a 3-dimensional grid.

For a fiber Matrix, the Orientation Number is thus,

$$o = |\chi_f| \qquad (VIII)$$

<u>**Orientation Energy**</u> **is the energy associated with a given orientation of a fiber. A fiber can produce a fundamental string only when its orientation energy is changed (by changing its orientation).**

Orientation Energy of a fiber is directly proportional to its orientation number.

$$\boldsymbol{o_E} \propto |\chi_f|$$

$$\boldsymbol{o_E} = \boldsymbol{k_0}|\chi_f| = k_0 . o \qquad k_0 \in R - \{0\}$$

$$\& \ o_E = E_f$$

$$\therefore E_f = \boldsymbol{k_0}|\chi_f| \qquad (IX)$$

Equation (IX) is the **general equation of a fiber**.

According to Spine Model, the energy of a fundamental string produced by a fiber is directly proportional to the change in orientation energy of that fiber.

$$E_{st} \propto \Delta o_E$$

$$E_{st} = J . \Delta o_E \qquad (X)$$

J is the **String Producer Constant**

$$\therefore \boldsymbol{J} = \frac{\boldsymbol{E_{st}}}{\boldsymbol{k_0}(\boldsymbol{o_2} - \boldsymbol{o_1})}$$

Equation (X) gives energy of the string produced. Hence, the frequency of the fundamental string will be

$$\upsilon_{st} = \frac{E_{st}}{h} = J . \frac{k_0}{h}\left(|\chi_{f2}| - |\chi_{f1}|\right) \qquad (X)$$

References:

[1.] Shreyak Chakraborty, “FaTe model of hyperspace”,
http://www.scribd.com/doc/58359323