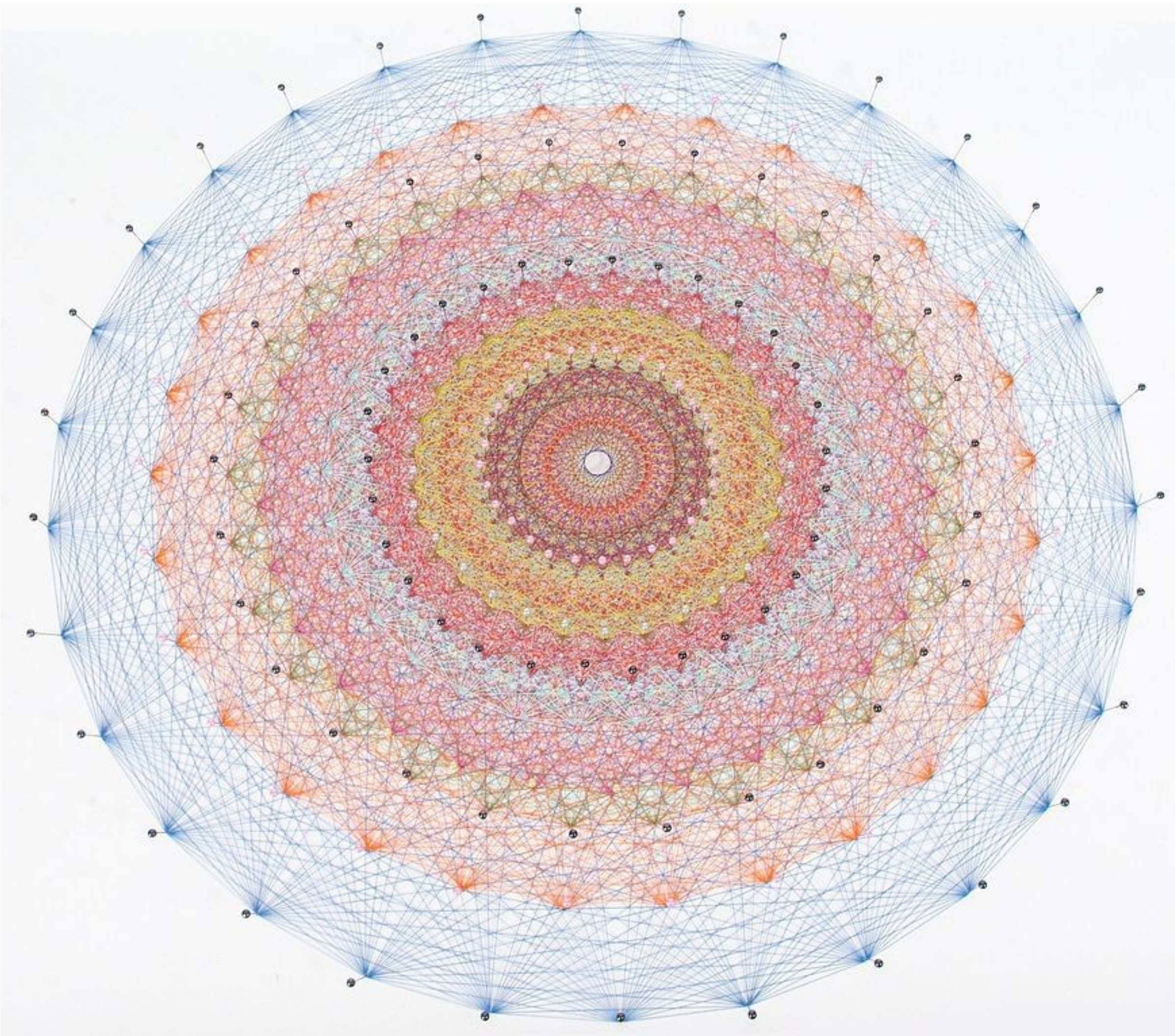
E_8 + E_8 Heterotic String Theory in Vedic Physics

By John Frederic Sweeney



Abstract

S.M. Phillips has articulated a fairly good model of the $E_8 \times E_8$ heterotic superstring, yet nevertheless has missed a few key aspects. This paper informs his model from the perspective of Vedic Nuclear Physics, as derived from the Rig Veda and two of the Upanishads. In addition, the author hypothesizes an extension of the Exceptional Lie Algebra Series beyond E8 to another 12 places or more.

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Introduction

S.M. Phillips has done a great sleuthing job in exploring the Jewish Cabala along with the works of Basant and Leadbetter to formulate a model of the Exceptional Lie Algebra E8 to represent nuclear physics that comes near to the Super String model. The purpose of this paper is to offer minor corrections from the perspective of the science encoded in the Rig Veda and in a few of the Upanishads, to render a complete and perfect model.

The reader might ask how the Jewish Cabala might offer insight into nuclear physics, since the Cabala is generally thought to date from Medieval Spain. The simple fact is that the Cabala does not represent medieval Spanish thought, it is a product of a much older and advanced society – Remotely Ancient Egypt from 15,000 years ago, before the last major flooding of the Earth and the Sphinx.

The Jewish people may very well have left Ancient Egypt in the Exodus, led by Moses. Whatever may be the historical fact, the Jews certainly carried the secrets of remotely Ancient Egypt with them in their sacred books, with nuclear physics (not merely sacred geometry) encoded within the Torah and the Talmud. Wherever Jews have traveled in the world, they have carried their sacred books, which contain nuclear secrets.

This ancient Egyptian nuclear physics is either exactly the same as, or at least the equivalent of the nuclear physics encoded in Vedic literature. The proof of this is that this present paper introduces additional concepts that Phillips lacks in his rendition, yet which fit perfectly into the model he has described.

Perhaps the difference between the models may be slight, such as what one might expect if one were to survey the 600 nuclear warheads presently held by Israel and those built by the Russians or the Americans. At root, the mathematics and the physics must necessarily be the same, if some minor differences exist between them.

The purpose of this paper is to introduce and add on the elements that S.M. Phillips missed, to prove the above points and to demonstrate to the world that the ancient world of the Vedas and of remotely ancient Egypt possessed this superior nuclear physics. Moreover, the paper offers proof that current academic timelines for Vedic Hindu culture and Ancient Egypt are far off the mark, perhaps by as much as ten thousand years or more.

Wikipedia

In mathematics, **E_8** is any of several closely related exceptional simple Lie groups, linear algebraic groups or Lie algebras of dimension 248; the same notation is used for the corresponding root lattice, which has rank 8. The designation E_8 comes from the Cartan–Killing classification of the complex simple Lie algebras, which fall into four infinite series labeled A_n, B_n, C_n, D_n, and five exceptional cases labeled E_6, E_7, E_8, F_4, and G_2. The E_8 algebra is the largest and most complicated of these exceptional cases.

Wilhelm Killing (1888a, 1888b, 1889, 1890) discovered the complex Lie algebra E_8 during his classification of simple compact Lie algebras, though he did not prove its existence, which was first shown by Élie Cartan. Cartan determined that a complex simple Lie algebra of type E_8 admits three real forms. Each of them gives rise to a simple Lie group of dimension 248, exactly one of which is compact. Chevalley (1955) introduced algebraic groups and Lie algebras of type E_8 over other fields: for example, in the case of finite fields they lead to an infinite family of finite simple groups of Lie type.

The Lie group E_8 has dimension 248. Its rank, which is the dimension of its maximal torus, is 8. Therefore the vectors of the root system are in eight-dimensional Euclidean space: they are described explicitly later in this article. The Weyl group of E_8, which is the group of symmetries of the maximal torus which are induced by conjugations in the whole group, has order $2^{14}\ 3^{5}\ 5^{2}\ 7 = 696729600$.

The compact group E_8 is unique among simple compact Lie groups in that its non-trivial representation of smallest dimension is the adjoint representation (of dimension 248) acting on the Lie algebra E_8 itself; it is also the unique one which has the following four properties: trivial center, compact, simply connected, and simply laced (all roots have the same length).

There is a Lie algebra E_n for every integer $n \geqslant 3$, which is infinite dimensional if n is greater than 8.

There is a unique complex Lie algebra of type E_8, corresponding to a complex group of complex dimension 248. The complex Lie group E_8 of complex dimension 248 can be considered as a simple real Lie group of real dimension 496. This is simply connected, has maximal compact subgroup the compact form (see below) of E_8, and has an outer automorphism group of order 2 generated by complex conjugation.

As well as the complex Lie group of type E_8, there are three real forms of the Lie algebra, three real forms of the group with trivial center (two of which have non-algebraic double covers, giving two further real forms), all of real dimension 248, as follows:

- The compact form (which is usually the one meant if no other information is given), which is simply connected and has trivial outer automorphism group.
- The split form, EVIII (or $E_{8(8)}$), which has maximal compact subgroup $\mathrm{Spin}(16)/(\mathbf{Z}/2\mathbf{Z})$, fundamental group of order 2 (implying that it has a double cover, which is a simply connected Lie real group but is not algebraic, see below) and has trivial outer automorphism group.
- EIX (or $E_{8(-24)}$), which has maximal compact subgroup $E_7 \times SU(2)/(-1,-1)$, fundamental group of order 2 (again implying a double cover, which is not algebraic) and has trivial outer automorphism group.

For a complete list of real forms of simple Lie algebras, see the list of simple Lie groups.

By means of a Chevalley basis for the Lie algebra, one can define E_8 as a linear algebraic group over the integers and, consequently, over any commutative ring and in particular over any field: this defines the so-called split (sometimes also known as "untwisted") form of E_8.

Over an algebraically closed field, this is the only form; however, over other fields, there are often many other forms, or "twists" of E_8, which are classified in the general framework of Galois cohomology (over a perfect field k) by the set $H^1(k, \mathrm{Aut}(E_8))$ which, because the Dynkin diagram of E_8 (see below) has no automorphisms, coincides with $H^1(k, E_8)$.[1]

Over **R**, the real connected component of the identity of these algebraically twisted forms of E_8 coincide with the three real Lie groups mentioned above, but with a subtlety concerning the fundamental group:

all forms of E_8 are simply connected in the sense of algebraic geometry, meaning that they admit no non-trivial algebraic coverings; the non-compact and simply connected real Lie group forms of E_8 are therefore not algebraic and admit no faithful finite-dimensional representations.

Over finite fields, the Lang–Steinberg theorem implies that $H^1(k, E_8)=0$, meaning that E_8 has no twisted forms: see below.

The 248-dimensional representation is the adjoint representation. There are two non-isomorphic irreducible representations of dimension 8634368000 (it is not unique; however, the next integer with this property is 175898504162692612600853299200000 (sequence A181746 in OEIS)).

The fundamental representations are those with dimensions 3875, 6696000, 6899079264, 146325270, 2450240, 30380, 248 and 147250 (corresponding to the eight nodes in the Dynkin diagram in the order chosen for the Cartan matrix below, i.e., the nodes are read in the seven-node chain first, with the last node being connected to the third).

The coefficients of the character formulas for infinite dimensional irreducible representations of E_8 depend on some large square matrices consisting of polynomials, the Lusztig–Vogan polynomials, an analogue of Kazhdan–Lusztig polynomials introduced for reductive groups in general by George Lusztig and David Kazhdan (1983).

The values at 1 of the Lusztig–Vogan polynomials give the coefficients of the matrices relating the standard representations (whose characters are easy to describe) with the irreducible representations.

These matrices were computed after four years of collaboration by a group of 18 mathematicians and computer scientists, led by Jeffrey Adams, with much of the programming done by Fokko du Cloux. The most difficult case (for exceptional groups) is the split real form of E_8 (see above), where the largest matrix is of size 453060×453060. The Lusztig-Vogan polynomials for all other exceptional simple groups have been known for some time; the calculation for the split form of E_8 is far longer than any other case.

The announcement of the result in March 2007 received extraordinary attention from the media (see the external links), to the surprise of the mathematicians working on it.

The representations of the E_8 groups over finite fields are given by Deligne-Lusztig theory.

One can construct the (compact form of the) E_8 group as the automorphism group of the corresponding $\mathfrak{e}_8$ Lie algebra. This algebra has a 120-dimensional subalgebra $\mathbf{so}(16)$ generated by J_{ij} as well as 128 new generators Q_a that transform as a Weyl-Majorana spinor of $\mathbf{spin}(16)$. These statements determine the commutators

$$[J_{ij}, J_{k\ell}] = \delta_{jk}J_{i\ell} - \delta_{j\ell}J_{ik} - \delta_{ik}J_{j\ell} + \delta_{i\ell}J_{jk}$$

as well as

$$[J_{ij}, Q_a] = \frac{1}{4}(\gamma_i\gamma_j - \gamma_j\gamma_i)_{ab}Q_b,$$

while the remaining commutator (not anti-commutator!) is defined as

$$[Q_a, Q_b] = \gamma^{[i}_{ac}\gamma^{j]}_{cb}J_{ij}.$$

It is then possible to check that the Jacobi identity is satisfied.

Geometry

The compact real form of E_8 is the isometry group of the 128-dimensional exceptional compact Riemannian symmetric space EVIII (in Cartan's classification). It is known informally as the "octooctonionic projective plane" because it can be built using an algebra that is the tensor product of the octonions with themselves, and is also known as a Rosenfeld projective plane, though it does not obey the usual axioms of a projective plane. This can be seen systematically using a construction known as the *magic square*, due to Hans Freudenthal and Jacques Tits (Landsberg & Manivel 2001).

A root system of rank r is a particular finite configuration of vectors, called *roots*, which span an r-dimensional Euclidean space and satisfy certain geometrical properties. In particular, the root system must be invariant under reflection through the hyperplane perpendicular to any root.

The **E_8 root system** is a rank 8 root system containing 240 root vectors spanning $\mathbf{R}^8$. It is irreducible in the sense that it cannot be built from root systems of smaller rank. All the root vectors in E_8 have the same length. It is convenient for a number of purposes to normalize them to have length $\sqrt{2}$. These 240 vectors are the vertices of a semi-regular polytope discovered by Thorold Gosset in 1900, sometimes known as the 4_{21} polytope.

Construction

In the so-called *even coordinate system* E_8 is given as the set of all vectors in $\mathbf{R}^8$ with length squared equal to 2 such that coordinates are either all integers or all half-integers and the sum of the coordinates is even.

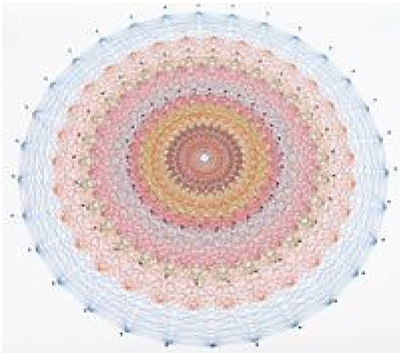
Explicitly, there are 112 roots with integer entries obtained from

$$(\pm 1, \pm 1, 0, 0, 0, 0, 0, 0)$$

by taking an arbitrary combination of signs and an arbitrary permutation of coordinates, and 128 roots with half-integer entries obtained from

$$\left(\pm\tfrac{1}{2}, \pm\tfrac{1}{2}, \pm\tfrac{1}{2}, \pm\tfrac{1}{2}, \pm\tfrac{1}{2}, \pm\tfrac{1}{2}, \pm\tfrac{1}{2}, \pm\tfrac{1}{2}\right)$$

by taking an even number of minus signs (or, equivalently, requiring that the sum of all the eight coordinates be even). There are 240 roots in all.

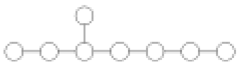


E8 with thread made by hand

The 112 roots with integer entries form a D_8 root system. The E_8 root system also contains a copy of A_8 (which has 72 roots) as well as E_6 and E_7 (in fact, the latter two are usually *defined* as subsets of E_8).

In the *odd coordinate system* E_8 is given by taking the roots in the even coordinate system and changing the sign of any one coordinate. The roots with integer entries are the same while those with half-integer entries have an odd number of minus signs rather than an even number.

Dynkin diagram

The Dynkin diagram for E_8 is given by .

This diagram gives a concise visual summary of the root structure. Each node of this diagram represents a simple root. A line joining two simple roots indicates that they are at an angle of 120° to each other. Two simple roots which are not joined by a line are orthogonal.

Cartan matrix

The Cartan matrix of a rank r root system is an $r \times r$ matrix whose entries are derived from the simple roots. Specifically, the entries of the Cartan matrix are given by

$$A_{ij} = 2\frac{(\alpha_i, \alpha_j)}{(\alpha_i, \alpha_i)}$$

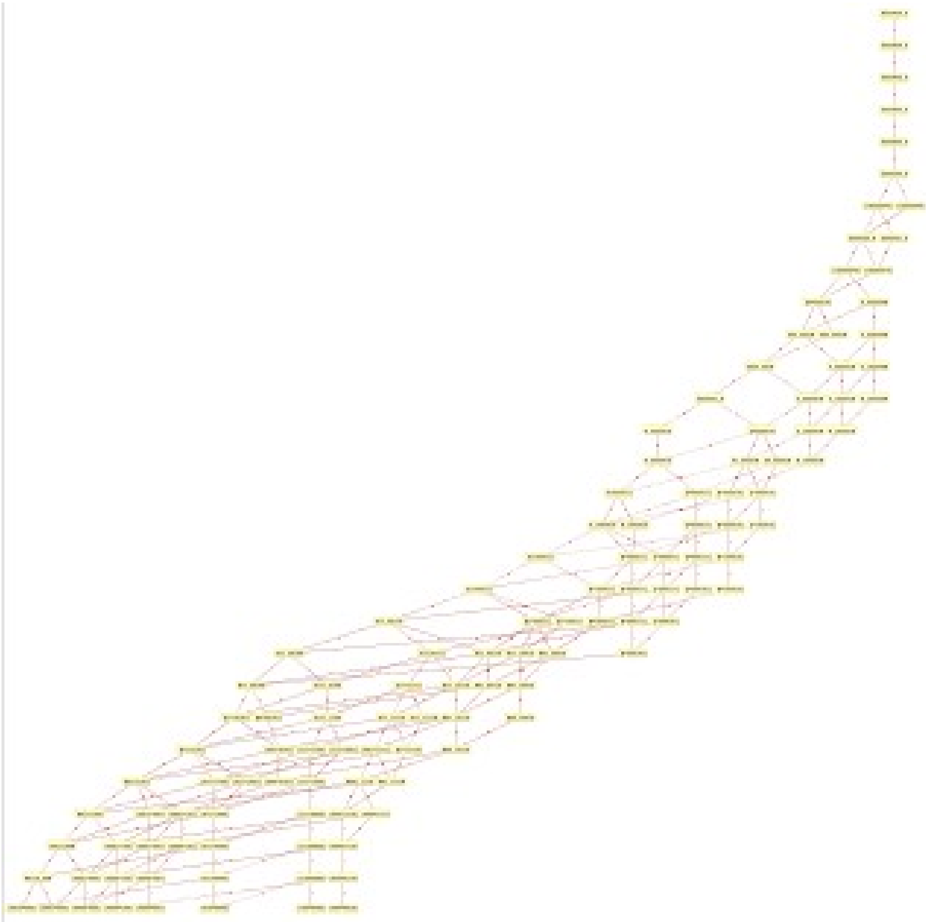
where $(-,-)$ is the Euclidean inner product and α_i are the simple roots. The entries are independent of the choice of simple roots (up to ordering).

The Cartan matrix for E_8 is given by

$$\begin{bmatrix} 2 & -1 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 2 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 2 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 2 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 2 & -1 & 0 & -1 \\ 0 & 0 & 0 & 0 & -1 & 2 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 & 2 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 & 0 & 2 \end{bmatrix}.$$

The determinant of this matrix is equal to 1.

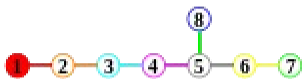
Simple roots



Hasse diagram of E8 root poset with edge labels identifying added simple root position

A set of simple roots for a root system Φ is a set of roots that form a basis for the Euclidean space spanned by Φ with the special property that each root has components with respect to this basis that are either all nonnegative or all nonpositive.

Given the E_8 Cartan matrix (above) and a Dynkin diagram node ordering of:



one choice of simple roots is given by the rows of the following matrix:

$$\begin{bmatrix} 1 & -1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 \\ -\frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 1 & -1 & 0 \end{bmatrix}.$$

Weyl group

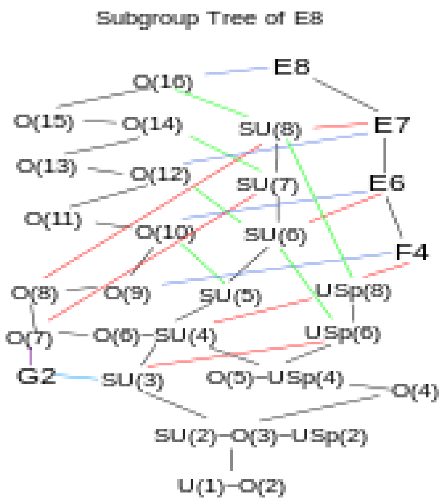
The Weyl group of E_8 is of order 696729600, and can be described as
0+
8(2): it is of the form 2.*G*.2 (that is, a stem extension by the cyclic group of order 2 of an extension of the cyclic group of order 2 by a group *G*) where *G* is the unique simple group of order 174182400 (which can be described as $PS\Omega_8^+(2)$).[2]

E_8 root lattice

Main article: E_8 lattice

The integral span of the E_8 root system forms a lattice in $\mathbf{R}^8$ naturally called the **E_8 root lattice**. This lattice is rather remarkable in that it is the only (nontrivial) even, unimodular lattice with rank less than 16.

Simple subalgebras of E_8



An incomplete simple subgroup tree of E_8

The Lie algebra E8 contains as subalgebras all the exceptional Lie algebras as well as many other important Lie algebras in mathematics and physics. The height of the Lie algebra on the diagram approximately corresponds to the rank of the algebra. A line from an algebra down to a lower algebra indicates that the lower algebra is a subalgebra of the higher algebra.

Chevalley groups of type E_8

Chevalley (1955) showed that the points of the (split) algebraic group E_8 (see above) over a finite field with q elements form a finite Chevalley group, generally written $E_8(q)$, which is simple for any q,[3][4] and constitutes one of the infinite families addressed by the classification of finite simple groups. Its number of elements is given by the formula (sequence A008868 in OEIS):

$$q^{120}(q^{30}-1)(q^{24}-1)(q^{20}-1)(q^{18}-1)(q^{14}-1)(q^{12}-1)(q^{8}-1)(q^{2}-1)$$

The first term in this sequence, the order of $E_8(2)$, namely 337804753143634806261388190614085595079991692242467651576160 ≈ 3.38×10^{74}, is already larger than the size of the Monster group. This group $E_8(2)$ is the last one described (but without its character table) in the ATLAS of Finite Groups.[5]

The Schur multiplier of $E_8(q)$ is trivial, and its outer automorphism group is that of field automorphisms (i.e., cyclic of order f if $q=p^f$ where p is prime).

Lusztig (1979) described the unipotent representations of finite groups of type E_8.

Subgroups

The smaller exceptional groups E_7 and E_6 sit inside E_8. In the compact group, both $E_7\times SU(2)/(-1,-1)$ and $E_6\times SU(3)/(\mathbf{Z}/3\mathbf{Z})$ are maximal subgroups of E_8.

The 248-dimensional adjoint representation of E_8 may be considered in terms of its restricted representation to the first of these subgroups. It transforms under $E_7\times SU(2)$ as a sum of tensor product representations, which may be labelled as a pair of dimensions as (3,1) + (1,133) + (2,56) (since there is a quotient in the product, these notations may strictly be taken as indicating the infinitesimal (Lie algebra) representations).

Since the adjoint representation can be described by the roots together with the generators in the Cartan subalgebra, we may see that decomposition by looking at these. In this description:

- (3,1) consists of the roots $(0,0,0,0,0,0,1,-1)$, $(0,0,0,0,0,0,-1,1)$ and the Cartan generator corresponding to the last dimension.
- (1,133) consists of all roots with $(1,1)$, $(-1,-1)$, $(0,0)$, $(-\frac12,-\frac12)$ or $(\frac12,\frac12)$ in the last two dimensions, together with the Cartan generators corresponding to the first 7 dimensions.
- (2,56) consists of all roots with permutations of $(1,0)$, $(-1,0)$ or $(\frac12,-\frac12)$ in the last two dimensions.

The 248-dimensional adjoint representation of E_8, when similarly restricted, transforms under $E_6\times SU(3)$ as: (8,1) + (1,78) + (3,27) + $(\underline{3},\underline{27})$. We may again see the decomposition by looking at the roots together with the generators in the Cartan subalgebra. In this description:

- (8,1) consists of the roots with permutations of (1,−1, 0) in the last three dimensions, together with the Cartan generator corresponding to the last two dimensions.
- (1,78) consists of all roots with (0,0,0), (−½, −½, −½) or (½, ½, ½) in the last three dimensions, together with the Cartan generators corresponding to the first 6 dimensions.
- (3,27) consists of all roots with permutations of (1,0,0), (1,1,0) or (−½, ½, ½) in the last three dimensions.
- (3,27) consists of all roots with permutations of (−1, 0, 0), (−1, −1, 0) or (½, −½, −½) in the last three dimensions.

The finite quasisimple groups that can embed in (the compact form of) E_8 were found by Griess & Ryba (1999).

The Dempwolff group is a subgroup of (the compact form of) E_8. It is contained in the Thompson sporadic group, which acts on the underlying vector space of the Lie group E_8 but does not preserve the Lie bracket. The Thompson group fixes a lattice and does preserve the Lie bracket of this lattice mod 3, giving an embedding of the Thompson group into $E_8(\mathbf{F}_3)$.

Applications

The E_8 Lie group has applications in theoretical physics, in particular in string theory and supergravity. $E_8 \times E_8$ is the gauge group of one of the two types of heterotic string and is one of two anomaly-free gauge groups that can be coupled to the $N = 1$ supergravity in 10 dimensions. E_8 is the U-duality group of supergravity on an eight-torus (in its split form).

One way to incorporate the standard model of particle physics into heterotic string theory is the symmetry breaking of E_8 to its maximal subalgebra $SU(3) \times E_6$.

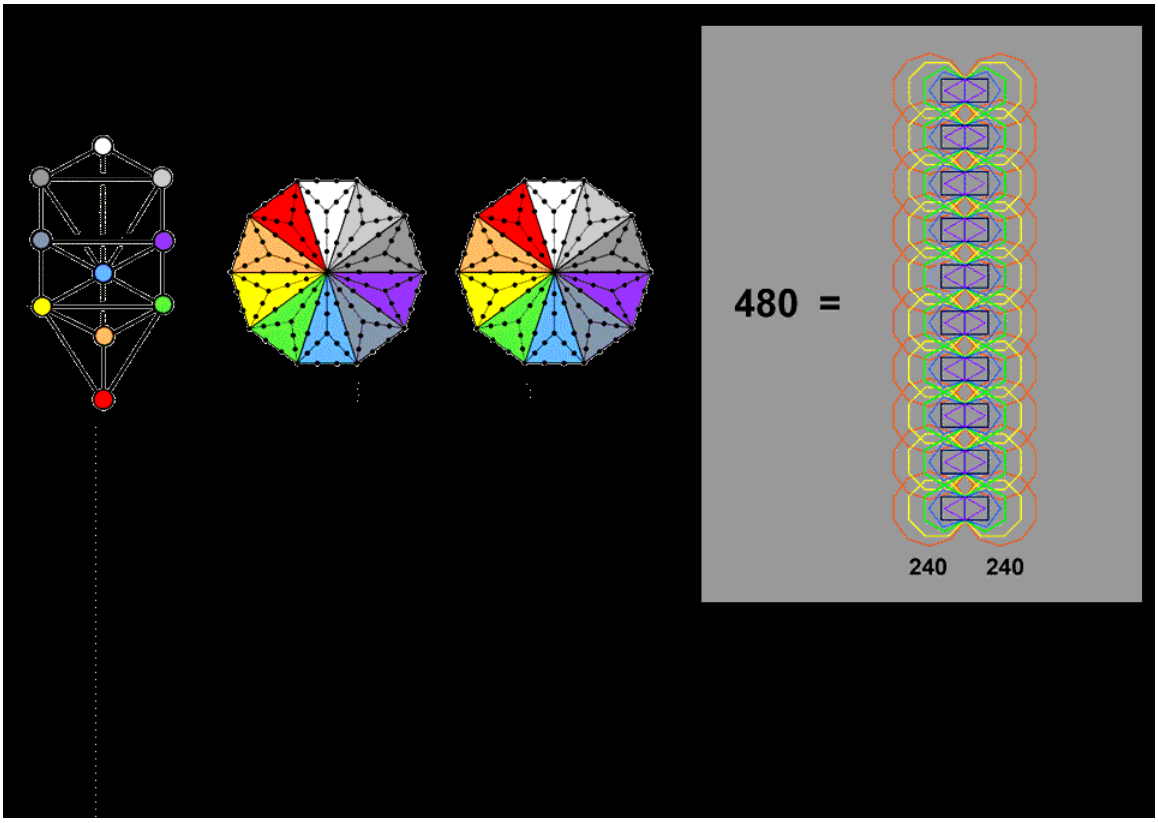
In 1982, Michael Freedman used the E_8 lattice to construct an example of a topological 4-manifold, the E_8 manifold, which has no smooth structure.

Antony Garrett Lisi's incomplete theory "An Exceptionally Simple Theory of Everything" attempts to describe all known fundamental interactions in physics as part of the E_8 Lie algebra.[6][7]

R. Coldea, D. A. Tennant, and E. M. Wheeler et al. (2010) reported that in an experiment with a cobalt-niobium crystal, under certain physical conditions the electron spins in it exhibited two of the 8 peaks related to E_8 predicted by Zamolodchikov (1989).[8][9]

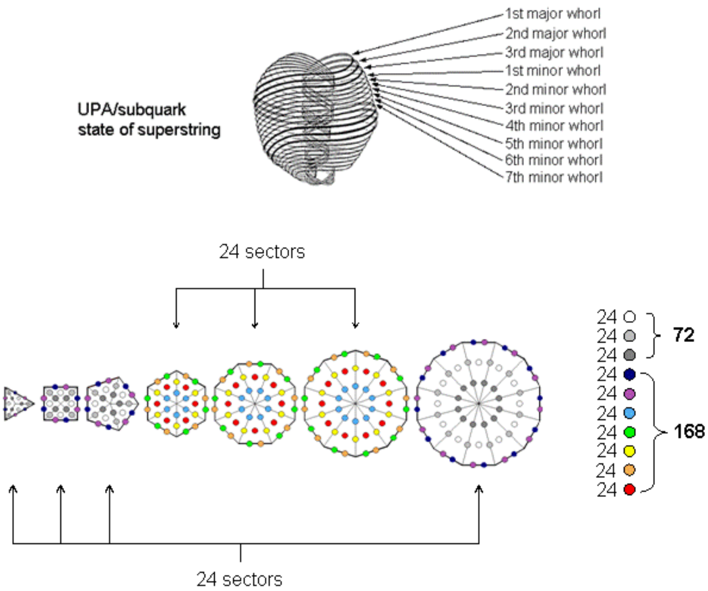
S.M. Phillips Model

Five sacred geometries , — the inner form of the Tree of Life, the first three Platonic solids, the 2-dimensional Sri Yantra, the disdyakis triacontahedron and the 1-tree — are shown to possess 240 structural components or geometrical elements. They correspond to the 240 roots of the rank-8 Lie group E_8. because in each case they divide into 72 components or elements of one kind and 168 of another kind, in analogy to the 72 roots of E_6, the rank-6 exceptional subgroup of E_8, and to the remaining 168 roots of E_8.



Furthermore, the 72 components form three sets of 24 and the 168 components are shown to form seven sets of 24, so that all 240 components form ten sets of 24.

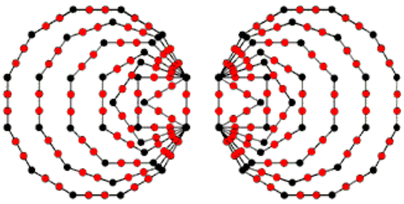
This is one reason why the number 24 is important, but the rest of the explanation is that the 24 Hurwitz Quarternions (Hurwitz Integers or Hurwitz Numbers) provide this control mechanism over the development. The UPA that Phillips describes probably corresponds to the Hopf Fibration or S3. (John Sweeney). Fibres are known in Vedic Physics.



The **48** sectors of the seven separate polygons making up the inner Tree of Life consist of the 24 sectors of the triangle, square, pentagon & dodecagon and the 24 sectors of the hexagon, octagon & decagon. There are five hexagonal yods per sector. Each set of 24 sectors contains 120 hexagonal yods. The triangle, square, pentagon & dodecagon have 24 white hexagonal yods at centres of sectors, 24 light grey hexagonal yods and 24 dark grey hexagonal yods on internal sides of tetractyses, leaving **168** hexagonal yods coloured the seven colours of the rainbow as seven sets of 24. This **72**:**168** division corresponds to the **72** roots of E_6 and the remaining **168** roots of E_8. It manifests in the UPA/subquark state of the $E_8 \times E_8$ heterotic subquark as its three major whorls, which carry **72** E_8 gauge charges, and as its seven minor whorls, which carry **168** E_8 gauge charges.

Each sacred geometry has a ten-fold division, indicating a similar division in the holistic systems that they represent. The best-known example is the Kabbalistic Tree of Life with ten Sephiroth that comprise the Supernal Triad and the seven Sephiroth of Construction. A less well-known example is the "ultimate physical atom," or UPA, the basic unit of matter paranormally described over a century ago by the Theosophists Annie Besant and C.W. Leadbeater.

This has been identified by the author as the $E_8 \times E_8$ heterotic superstring constituent of up and down quarks. Its ten whorls (three major, seven minor) correspond to the ten sets of structural components of sacred geometry. The analogy suggests that 24 E_8 gauge charges are spread along each whorl as the counterpart of each set of 24 components. The ten-fold composition of the $E_8 \times E_8$ heterotic superstring predicted by this analogy with sacred geometries is a consequence of the ten-fold nature of God, or Vishnu.



72 ●
168 ●
240

The 72 roots of E_6 and the 168 extra roots of E_8

In terms of the eight orthonormal unit vectors $\{u_i\}$, the 240 roots of E_8 are:

$$\pm u_i \pm u_j \qquad (i, j = 1, 2, \ldots 8)$$

and

$$\tfrac{1}{2}(\pm u_1, \pm u_2, \ldots \pm u_8) \qquad \text{(even number of +'s)}$$

Their explicit forms as 8-tuples and their numbers are listed below:

$$\left.\begin{array}{l}
(1, 1, 0, 0, 0, 0, 0, 0) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\
(-1, -1, 0, 0, 0, 0, 0, 0) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\
(1, -1, 0, 0, 0, 0, 0, 0) \text{ and all permutations. Number} = 2\times\binom{8}{2} = 56; \\
(-\tfrac{1}{2}, -\tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\
(-\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}) \text{ and all permutations. Number} = \binom{8}{2} = 28;
\end{array}\right\} 168$$

$$\left.\begin{array}{l}
(-\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}) \text{ and all permutations. Number} = \binom{8}{4} = 70; \\
(\tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}, \tfrac{1}{2}). \text{ Number} = 1; \\
(-\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}, -\tfrac{1}{2}). \text{ Number} = 1.
\end{array}\right\} 72$$

H series of Hypercircles

Vedic Physics posits a series of hyper – circles or specific sizes in Vedic Nuclear Physics:

			Isomorphic to	**Exceptional Lie Algebra**
H0		0		A1
H1	R	Pi 3.1415927		A2
H2	R2	6.283185307		G2 + G2
H3	R3	12.56637061		D4 + D4
H4	R4	19.7392088		F4 + F4
H5	R5	26.318945		E6 + E6
H6	R6	31.00627668		E7 + E7
H7	R7	33.073362	Sapta	E8 + E8
H8	R	32.469697		E8 - ?
H9	R	29.68658		E8 - ?
H10	R	25.50164		E8 - ?
H11	R	20.725143		E8 - ?
H12	R	16.023153		E8 - ?
H13	R	11.838174		E8 - ?
H14	R	8.3897034		E8 - ?
H15	R	5.7216492		E8 - ?
H16	R	3.765290		E8 - ?
H17	R	2.3966788		E8 - ?
H18	R	1.478626		E8 - ?
H19	R	0.44290823		E8 - ?
H20	R	0.258		E8 - ?

Conclusion

In a paper published on Vixra in 2013, the author wrote that the emergence of visible matter occurs at Pi. This is confirmed with the chart above. Prior to this, matter takes the form of Brahma or Dark Matter, invisible to humans. It does form part of functioning Brahma, as opposed to Thaamic matter, which lies without function, beyond detection.

The author hypothesizes that the Hyper – Circles described in Vedic Nuclear Physics, the values for which are given above, prove isomorphic to the series of Exceptional Lie Algebras which formulate the Magic Square.

Note that S.M. Phillips shows a multiplication sign in his formulation. Vedic Physics clearly states that one H7 hyper – circle is added to another H7, and the author hypothesizes that H7 has an isomorphic relationship to E8.

The author hypothesizes that the series of hyper – circles forms isomorphic relationships with the series of Exceptional Lie Algebras which comprise the Freudenthal – Tits Magic Square. The author has here given values for the series of hyper – circles, yet the known series of Exceptional Lie Algebras reaches only to E8.

For this reason, the author suggests that the series of Exceptional Lie Algebras extends beyond those known today, and enjoy isomorphic relationships to the complete series of hyper – circles, the values of which are given in a chart within this paper on page 19. In other words, it makes little sense that E8 would correspond to two H7 hyper – circles while the remaining hyper – circles do not enjoy such isomorphic relationships.

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http://www.smphillips.8m.com/

Contact

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Some men see things as they are and say *why?* I dream things that never were and say *why not?*

Let's dedicate ourselves to what the Greeks wrote so many years ago:

to tame the savageness of man and make gentle the life of this world.

Robert Francis Kennedy