ADE Consciousness

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This is an outline of an E8 approach to Saul-Paul Sirag's ideas set out in ADEX and Consciousness: A Hyperspace View (extensively paraphrased in this paper)

Universal Geometric Entity = completion of union of tensor products of Cl(16)
Each Cl(16) contains Lie Algebra E8 corresponding to McKay Group Algebra C[ID]
so E8 x C[ID] is basic Local Geometric Entity

Universal Body Physical World =
= 240 Root Vectors (120 pairs) of E8 Lie Algebra

240 E8 Root Vectors decompose into 112 of D8 and 128 of E7xA1

D8 = Bosonic Part = 8-dim Spacetime + Conformal Gravity + Standard Model

D8 contains two copies of 24 D4 Root Vectors
plus 63-dim SL(8) of unimodular 8-dim spacetime
plus 1-dim Center of a Creation-Annihilation Heisenberg Group

One D4 contains generators of Conformal Gravity plus Standard Model Ghosts
Other D4 contains Standard Model Generators plus Conformal Gravity Ghosts

E7xA1 = Fermionic Part = Fermion Particles + Fermion AntiParticles

The 126+2 = 128 Root Vectors of E7xA1 represent
8 components of 8 first-generation fermion particles = 64
plus
8 components of 8 first-generation fermion antiparticles = 64

WE8 = Weyl Group of E8 = 128x27x5x8! divides Complex 8-dim C8 into C8 / WE8

Universal Mind Mental World =
= 120 elements of C[ID] Group Algebra of ID McKay Group of E8

ID McKay Group of E8 decomposes into McKay Groups of D8 and E7xA1

McKay Group of D8	= Q6	= 24	=	8 x 3 x 1	= vertices of 24-cell
McKay Group of E7xA1	= 2OD	= 96	=	8 x 3 x 4	= edges of 24-cell
McKay Group of E8	= ID	= 120	=	8 x 3 x 5	= vertices of 600-cell

ME8 = ID = McKay Group of E8 divides Complex Plane C2 into C2 / ME8

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120 WE8 mirror planes in C8 are mapped into C8 / WE8
The point where all the mirrors intersect is the origin of C8 / WE8
to which is attached the identity fiber C2 / ME8.
Paths in C8 / WE8 correspond to World-Lines of Observers.
(World-Lines = Bosonic Strings)
Each deformation of C2 / ME8 selects a different path in C8 / WE8 so
C2 / ME8 is the source of Mental Images of the Physical World.

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E8 Dynkin Balance Numbers:
                        3
                        |
            1-2-3-4-5-6-4-2
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E8 Dynkin Representations:

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                                                 147,250
                                                    |
248 - 30,380 - 2,450,240 - 146,325,270 - 6,899,079,264 - 6,696,000 - 3,875
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E8 deformation mapping form:

$$E_8: \quad V = x^3 + y^5 + z^2 + t_1 x + t_2 y + t_3 xy + t_4 y^2 + t_5 y^3 + t_6 xy^2 + t_7 xy^3 + t_8.$$

The 7D separatrix Σ is in C8/ WE8 , since {t1,..., t8} are invariants of the E8 Coxeter group (also called the Weyl group). Since there are 120 mirror hyperplanes in C8, 120 is the maximum number of points in the special orbits making up Σ in C8 / WE8 .

By contrast, the regular orbits have 128 x 27 x 5 × 8! = 696729600 elements, which is the order of WE8 . These regular orbits are the points inside the chambers between the 7D walls of Σ. Note that 128 x 27 x 5 is the product of the E8 balance numbers (1, 2, 3, 4, 5, 6, 4, 2, 3), while 8! is 40320, the order of the Symmetric-8 group which permutes the eight basic mirrors of E8 ... the sum of the squares of the E8 balance numbers is (via the McKay correspondence) the dimension of ID ...

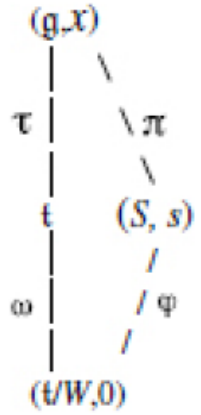
1 - The control parameters of the catastrophe bundle are {t1,..., t8}.
2 - The t8 parameter (always with 1 as coefficient) plays the role of time along the many paths ramifying out from the origin of C8 / WE8, where there is attached the identity fiber C2 / ME8 .
3 - Movement along any of these paths corresponds to the selection of different values of the control parameters, and thus different fibers which entail an unfolding of the singularity structure C2 / ME8 .
4 - The changes in the fiber attached to a path are mild if the movement along the path (while picking out different fibers) remains within a chamber of the separatrix. If movement along the path crosses the separatrix, the change will be drastic.
5 - As fibers farther and farther from the origin in C8 / W are encountered and more separatrix walls are crossed, the fibers become more unfolded.

Beyond the unfoldings of the fibers as described above, the E8 Lie algebra itself provides the structures for the resolution of the deformed (unfolded) fibers, including most importantly the identity fiber C2 / ME8 .

The Unfolding of the Mental Images of the Physical World based on the Bosonic String World-Line Paths in C8 / WE8 corresponds to the Unfolding of the Bohm Implicate Order

Unfolding of the Implicate Order of Bohm Quantum Theory

The Unfolding can be clarified by the projection diagram:



where g is E8 and X is a subregular nilpotent element within the nilpotent variety in E8.
The Lie Group version of this projection diagram takes G(E8) to its maximal torus T and then to T / WE8 .
The projection tau is from E8 onto its Cartan subalgebra t.
The projection w is from t to the orbit space t / WE8, where 0 is the origin in t / WE8 .
The projection pi is from E8 to S which is
the 10-dim slice transverse to the nilpotent variety in E8
and s is a subregular (i.e., singular) element in this variety.
The nilpotent variety n in E8 is the identity fiber in the fiber bundle with projection

X: (E8,X) -> (t / WE8, 0)

so the dimensionality of n is dim(E8) - dim(t /WE8) = (Coxeter #)(Rank) = 30x8 = 240
The projection phi maps the Kleinian singularity C2 / ME8 onto the origin of t / WE8
and as a universal deformation maps
unfolded versions of C2 /ME8 onto the parameters {t1, ... , t8} which are
homogeneous polynomial invariants of WE8.
phi provides for the deformation (or unfolding) of the Kleinian singularities.

(**THIS IS CONVENTIONAL BOHM PILOT ACTION**)

the lifting of the slice S into the nilpotent variety n that provides for the simultaneous resolution (or desingularization) of all the fibers in S.

(**THIS IS JACK SARFATTI'S UNCONVENTIONAL BACKREACTION**)

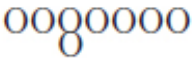
the most singular fiber is the identity fiber in S , the singularity structure C2 / ME8.
In the process of desingularization,
the singular point evolves into a series of exceptional curves,
which are 1D complex projective lines P1 ,
which geometrically are a "bouquet" of 2D spheres which takes the form
of a dual structure to the E8 Coxeter graph. For E8, the Kleinian singularity C2 / ME8
has its singular point resolved into a bouquet of 8 (2D)-spheres

The Unfolding of the Implicate Order originates at the Origin Singularity C2 / ME8 which has structure C2 / ID of the 600-cell

The resolution of the ADE singularity structure C2 / ME8 at the origin of C8 /WE8 where ME8 is a finite subgroup of SU(2) corresponding to the 600-cell is accomplished by the lifting of C2 / ME8 to a higher dimensional space C8. This lifting is a key part of the universal resolution of the unfolding of C2 / ME8 .

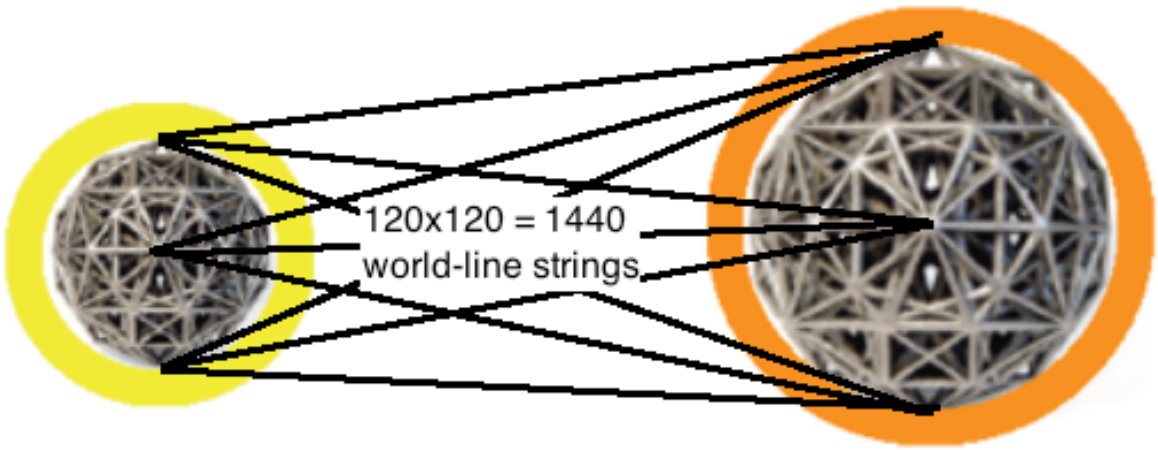
Lifting goes from Origin to an ALE (Asymptotically Locally Euclidean) space at Infinity. The E8 ALE space is the E8 McKay group ID . ALE means that this 4D space looks like a Euclidean space, except that the boundary at infinity is not the 3-sphere S3 (which is the boundary at infinity of R4) but is S3 / ID = 600-cell

As a hyper-Kahler (H-K) space it has a metric which respects three complex structures I, J, K that obey the quaternion group formula I2 = J2 = K2 = IJK = -1
As a 4D H-K space an ALE space is not compact but at infinity looks like R4 / ME8 with boundary S3 / ME8 in the sense that the singular point becomes desingularized as a “bouquet” of S2-spheres idual of the ADE Coxeter graph for E8 .



The Unfolding of the Origin C2 /ME8 onto the parameters {t1, ... , t8} in the space C8 is along World-Line Strings emanating from the 120 vertices of the Origin 600-cell and forms a Bosonic String Theory with 2D worldsheets swept out by World-Line Strings and embedded in 26D spacetime reduced by orbifolding of fermions to 10D spacetime which produces Standard Bohm Qantum Potential without Back-Reaction.

When the 120 basic World-Line Strings leading from the C2 / ID Origin 600-cell connect up with the 120 vertices of the ALE S3 / ID 600-cell at Infinity

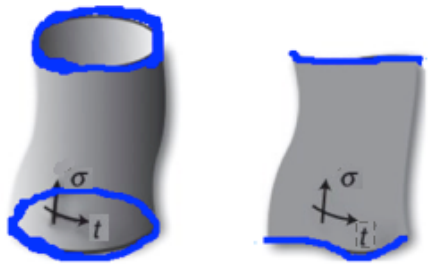


and
the corresponding 120 basic World-Line Strings back to the Origin C2 / ID 600-cell are taken into account, you get Sarfatti-Bohm Quantum Potential with Back-Reaction.

Sarfatti-Bohm Quantum Theory from Bosonic String World-Lines

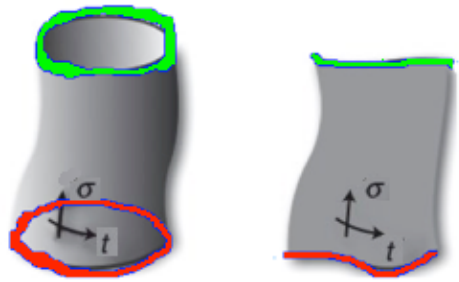
Paths in C8 / WE8 correspond to World-Lines of Observers acting as Bosonic Strings.
Andrew Gray in arXiv quant-ph/9712037 said:
"... probabilites are ... assigned to entire fine-grained histories ...
base[d] ... on the Feynman path integral formulation ...
The formulation is fully relativistic and applicable to multi-particle systems.
It ... makes the same experimental predictions as quantum field theory …".
Luis E. Ibanez and Angel M. Uranga in "String Theory and Particle Physics" said:
"... String theory proposes ... small one-dimensional extended objects, strings,
of typical size Ls = 1/ Ms, with Ms known as the string scale ...
As a string evolves in time, it sweeps out a two-dimensional surface in spacetime,
known as the worldsheet, which is the analog of the ... worldline of a point particle ...
for the bosonic string theory ... the classical string action is the total area spanned by
the worldsheet ... This is the ... Nambu– Goto action ...".

In the conventional view the Nambu-Goto action is the area of a world-sheet
that is defined by a string and the area the string sweeps out over time:



The blue strings are the same strings at different times.

In my different unconventional view



the red line and the green line are different strings/worldlines/histories and
the world-sheet is the minimal surface connecting them,
carrying the Bohm Potential,
as Standard Model gauge bosons carry Force Potential between Point Particles.
The t world-sheet coordinate is for Time of the string-world-line history.
The sigma world-sheet coordinate is for Bohm Potential Gauge Boson at a given Time.

(images adapted from "String Theory and Particle Physics" by Ibanez and Uranga)

Further, Ibanez and Uranga also said:
"... The string groundstate corresponds to a 26d spacetime tachyonic scalar field T(x).
This **tachyon** ... is ... unstable
...
The massless two-index tensor splits into irreducible representations of SO(24) ...
Its **trace** corresponds to a scalar field, the **dilaton** ϕ, whose vev fixes the string interaction coupling constant gs
...
the **antisymmetric** part is the 26d 2-form field BMN
...
The **symmetric traceless** part is the 26d graviton GMN ...".

Closed string **tachyons** localized at orbifolds of fermions produce virtual clouds of particles / antiparticles that dress fermions.

Dilatons are Goldstone bosons of spontaneously broken scale invariance that (analagous to Higgs) go from mediating a long-range scalar gravity-type force to the nonlocality of the Bohm-Sarfatti Quantum Potential.

The **antisymmetric** SO(24) little group is related to the Monster automorphism group that is the symmetry of each cell of Planck-scale local lattice structure.

Joe Polchinski in "String Theory, Volume 1, An Introduction to the Bosonic String" said:
"... we find at m^2 = - 4 / alpha' the tachyon,
and at m^2 = 0 the 24 x 24 states of the graviton, dilaton, and antisymmetric tensor ...".

Must the 24x24 symmetric matrices be interpreted as the graviton ? - !!! NO !!!

The 24x24 Real Symmetric Matrices form the Jordan Algebra J(24,R).

Jordan algebras correspond to the matrix algebra of quantum mechanical states,
that is, from a particle physics point of view,
the configuration of particles in spacetime upon which the gauge groups act.

24-Real-dim space has a natural Octonionic structure of 3-Octonionic-dim space.

The corresponding Jordan Algebra is J(3,O) = 3x3 Hermitian Octonion matrices.

Their 26-dim traceless part J(3,O)o describes the 26-dim of Bosonic String Theory
and
the algebra of its Quantum States,
so that
the 24x24 traceless symmetric spin-2 particle is the Quantum Bohmion.

The Lagrangian for the Quantum Bohmion Potential is analogous to that for a Graviton of General Relativity in that it contains the BackReaction proposed by Jack Sarfatti.

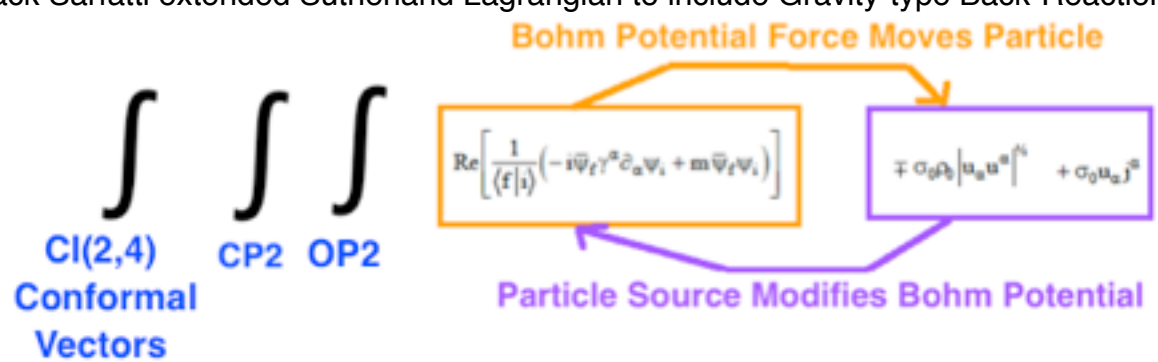
Roderick Sutherland (arXiv 1509.02442) gave a Lagrangian for the Bohm Potential saying: "... This paper focuses on interpretations of QM in which the underlying reality is taken to consist of particles have definite trajectories at all times ... An example ... is the Bohm model ... This paper ... provid[es]... a Lagrangian ...[for]... the unfolding events ...
... describing more than one particle while maintaining a relativistic description requires the introduction of final boundary conditions as well as initial,
thereby entailing retrocausality ...
In addition ... the Lagrangian approach pursued here ... also entails the natural inclusion of an accompanying field to influence the particle'snmotion away from classical mechanics and reproduce the correct quantum predictions ... the particle is seen to be the source of a field which alters the particle's trajectory via self-interaction ...
The Dirac case ... each particle in an entangled many-particle state will be described by an individual Lagrangian density ... of the form:

$$\mathfrak{L} = \mathrm{Re}\left[\frac{1}{\langle f|i\rangle}\left(-i\bar{\psi}_f\gamma^\alpha\partial_\alpha\psi_i + m\bar{\psi}_f\psi_i\right)\right] \mp \sigma_0\rho_0\left|u_\alpha u^\alpha\right|^{1/2} + \sigma_0 u_\alpha j^\alpha$$

... the ...[first]... term ...[is]... the ... Lagrangian densities for the PSI field alone ...
sigma_o is the rest density distribution of the particle through space ... j is the current density ... rho_o and u are the rest density and 4-velocity of the probability flow ...".

Sutherland Lagrangian is for Dirac Equation based Bohm Quantum Trajectories.
Das and Ali (arXiv1404.3093) show that Bohm quantal trajectories are interchangeable with geodesics of cosmological gravity (Friedmann equation with quantum corrections) by using quantum Raychaudhuri equation described by Das (arXiv 1311.6539).

Jack Sarfatti extended Sutherland Lagrangian to include Gravity-type Back-Reaction



where VM4 is in Cl(2,4) and VCP2 forms CP2 and S+ and S- form OP2 so that
26D = 16D orbifolded fermions + 10D and 10D = 6D Conformal Space + 4D CP2 ISS
(ISS = Internal Symmetry Space and 6D Conformal contains 4D M4 of K-K M4xCP2)
saying (linkedin.com Pulse 13 January 2016): "... the reason entanglement cannot be used as a direct messaging channel between subsystems of an entangled complex quantum system, is the lack of direct back-reaction of the classical particles and

classical local gauge fields on their shared entangled Bohmian quantum information pilot wave ... Roderick. I. Sutherland ... using Lagrangian field theory, shows how to make the original 1952 Bohm pilot-wave theory completely relativistic ...
The trick is that final boundary conditions on the action
as well as initial boundary conditions influence what happens in the present.
The general theory is "post-quantum" ... and it is non-statistical ...
There is complete two-way action-reaction between quantum pilot waves
and the classical particles and classical local gauge fields
...
orthodox statistical quantum theory, with no-signaling ...[is derived]... in two steps, first arbitrarily set the back-reaction to zero. Second, integrate out the final boundary information, thereby adding the statistical Born rule to the mix.
...
However, orthodox quantum theory assumes that the quantum system is thermodynamically closed between strong von Neumann projection measurements that obey the Born probability rule.

The new post-quantum theory in the equations of Sutherland,
prior to taking the limit of orthodox quantum theory,
should apply to pumped open dissipative structures.
Living matter is the prime example. ...”.

For details of how this gives Quantum Consciousness, see
http://vixra.org/abs/1512.0300