

The Pattern Pieces

Folder 4

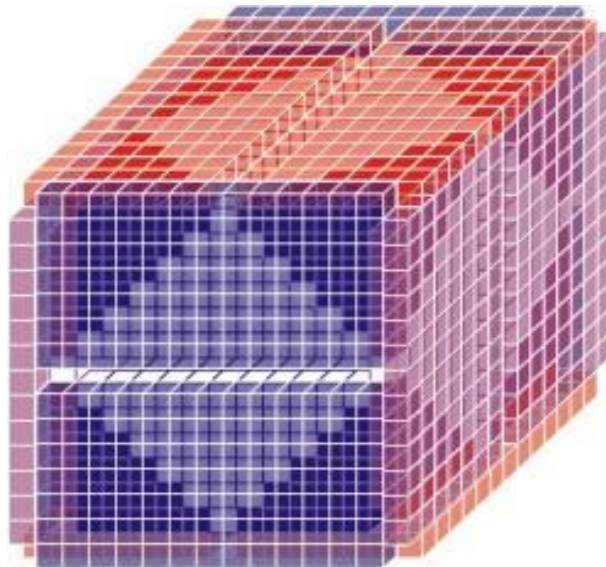
The Geometric Standard Model

“The Geometric Standard Model is proof of the Pattern.”

The Standard Model of Elementary Particles had been under development for more than 50 years, but it still does not have a single unifying symmetry which is what scientists want. It is viewed as “something ugly that was cobbled together”.

The Geometric Standard Model proposal gives the Standard Model a single architecture that is based on the Pattern Cube. It also provides scope for additional features, such as gravity and genetics.

The Pattern Cube



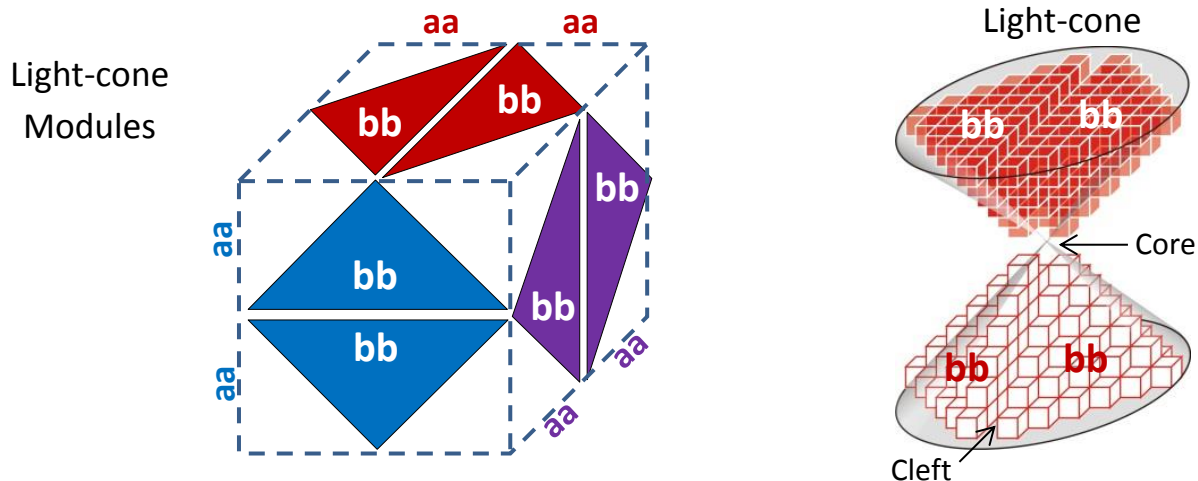
The Pattern Cube consists of seven concentric cubes. The three face pairs of each concentric cube are red, purple and blue. Each face has a cleft in the middle, and the eight vertices of each concentric cube have no cubes. The cover, the seventh concentric cube of the Pattern Cube, is shown here as a transparent layer to reveal the composition of the faces of the sixth concentric cube.

The Pattern Cube had been derived from the Pattern Code which, in turn, was derived from the Pattern Cluster. See the detail of the Pattern Cube in the Pattern Pieces Folder 3 *The Pattern Numbers* in thepatternbook.com.

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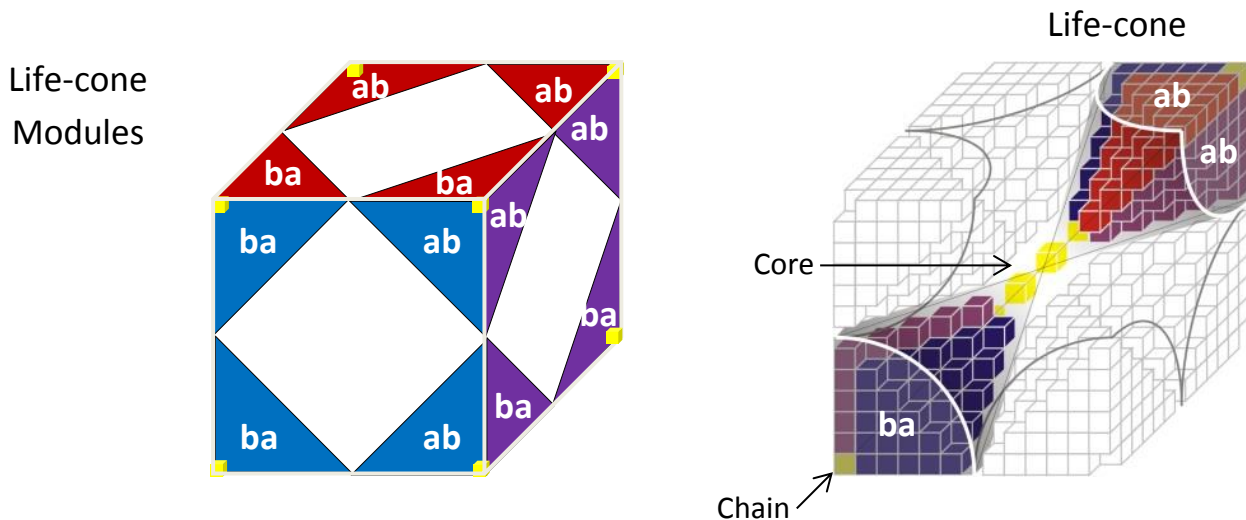
The Cones of the Pattern Cube

The Pattern Cube consists of three Light-cones, four Life-cones and a core. The Light-cone drawing (below, left) shows the upper parts of the red Light-cone (vertical), of the purple Light-cone (horizontal, right) and of the blue Light-cone (horizontal, front). Each Light-cone consists of an upper half with two bb-modules and a lower half with two bb-modules as illustrated by the red Light-cone on the right.



Each half (upper or lower half) of a Light-cone is split in two by a cleft. The two clefts of the two halves touch the core (cube) at the pinch-point of the Light-cone. The aa-modules are the complements of the bb-modules. The twelve aa-modules (four red, four purple and four blue) are compressed into rectangles to form the seventh concentric cube which is the cover of the Pattern Cube.

The two drawings below show the ab-modules and ba-modules of the Life-cones of the Pattern Cube. The three modules at each Cube vertex represent an upper half or a lower half of a Life-cone.



Inside each half of a Life-cone is a diagonal chain that consists of virtual cubes, or links. Each chain has seven links that stretch from the virtual core of the Pattern Cube to its eight vertices.

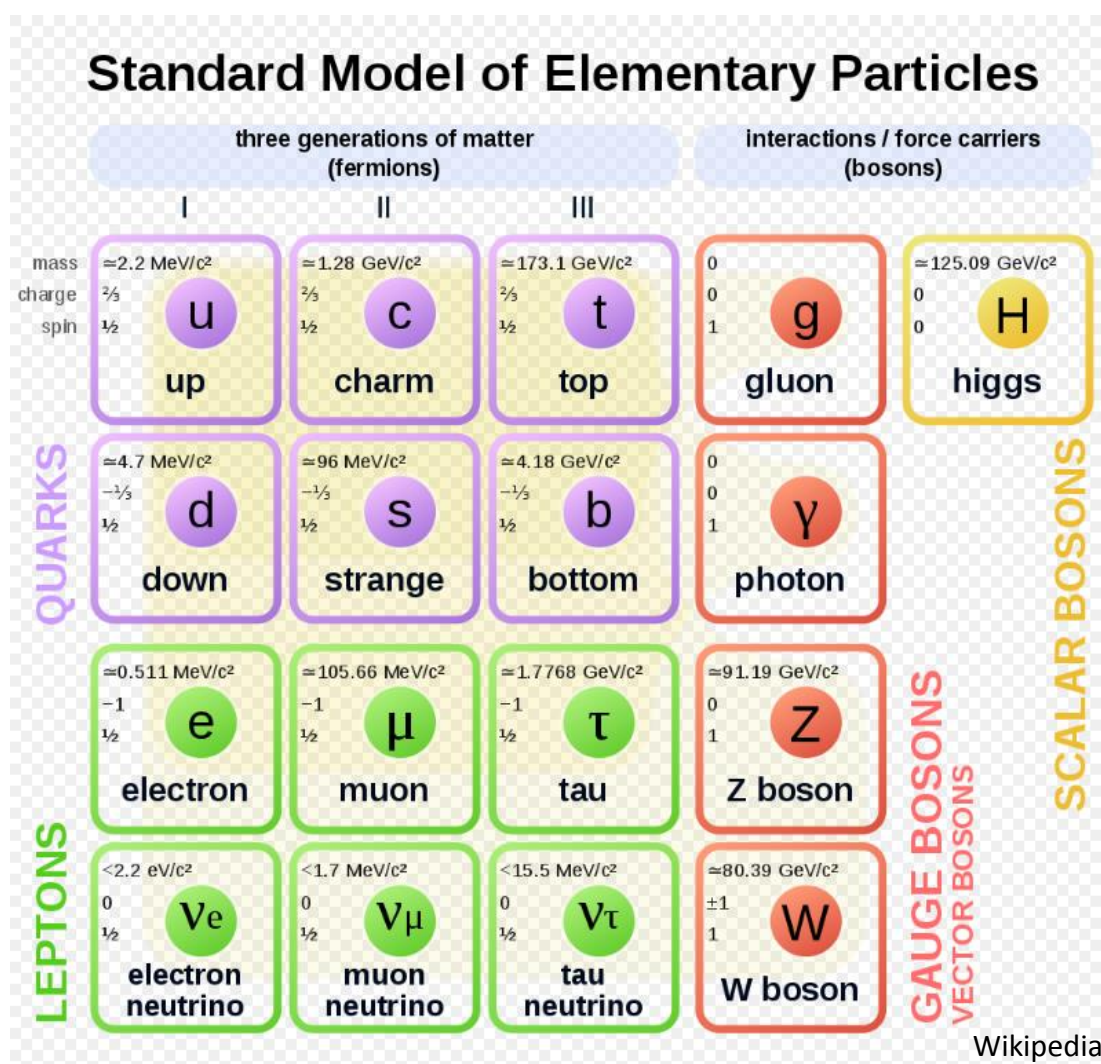
The virtual components of the Pattern Cube, the core, the clefts and the chains, represent types of 'glue' that hold the modules of the Pattern Cube together.

(A cleft of a Light-cone consists of a column in the middle and a cleft pair at its sides. The detail of this configuration is shown in Pattern Piece P04:9).

The Standard Model of Elementary Particles

The current version of the Standard Model of Elementary Particles is shown below. The main constituents of the Model are the leptons and the quarks that make up the fermions. All matter such as protons, neutrons and electrons, consists of fermions. Quarks are the constituent particles of protons and neutrons, for example. The bosons are like forces, or glue, that holds the fermion particles together. Examples of bosons are photons and gluons.

The Higgs boson is unique because spontaneous symmetry breaking caused it to give mass to the particles that are currently the constituents of matter.

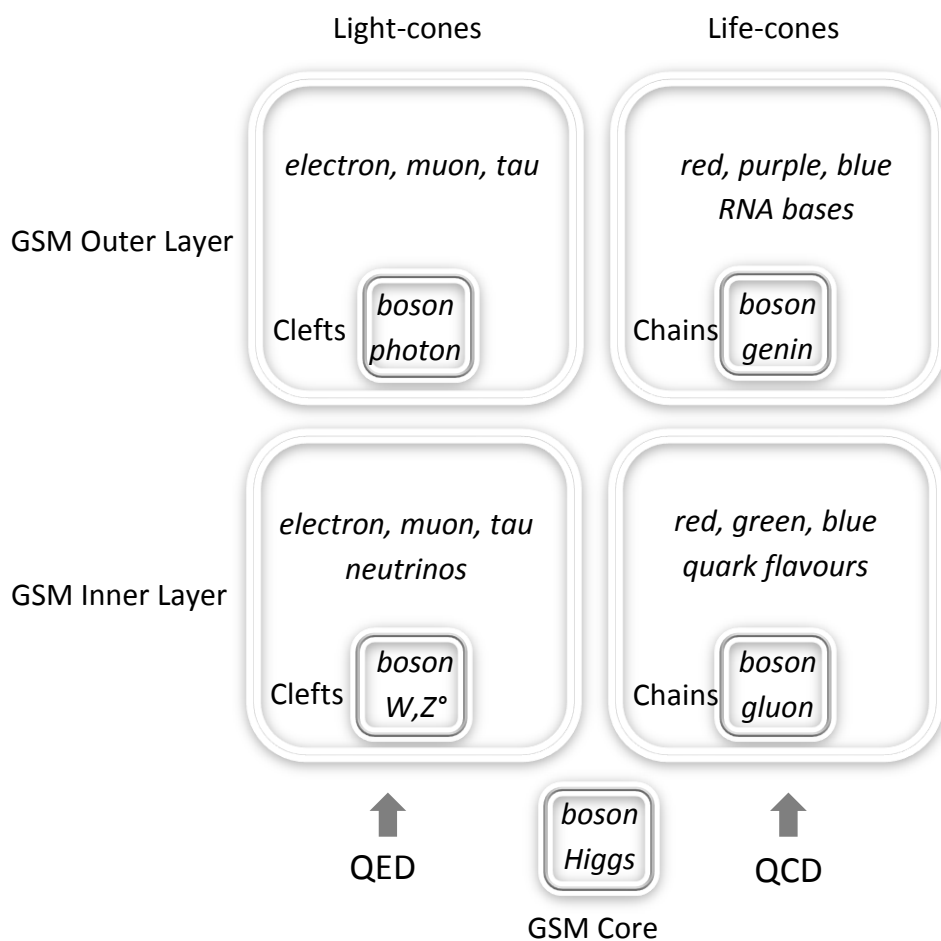


The Standard Model is a new kind of periodic table for the fermions. The usual periodic table depicts only atoms with electrons, not atoms with muons and atoms with taus. Only the fermions in the first column of the Model exist in the 'normal' world. The fermions in the second and third columns are not normally found in nature.

The Standard Model is the result of the work of many years by many scientists, and it is an achievement in science that ranks amongst the most important ever because the Model represents the structural components of the universe as we know it.

The GSM Schema

The *schema* of the GSM is shown below. It has two layers of Pattern Cubes, each with the full complement of three Light-cones and four Life-cones. The bosons are indicated within each cone block with the exception of the Higgs boson which is shown separately. Bosons represent types of 'glue' that holds the modules of the GSM together. The proposed *genin* boson that is indicated in the GSM outer layer Life-cone represents the force that holds the RNA codons together. (*Genin* stands for genetic integrator.)



Quantum electrodynamics (QED) is a theory that deals with fermions and the electroweak force.

Quantum chromodynamics (QCD) is a theory that deals with quarks and gluons.

The colours of the Life-cone modules in the two layers of the GSM are different owing to their respective origins. The red, purple and blue colours originated in the Pattern Cube and the red, green and blue colours originated in the Standard Model.

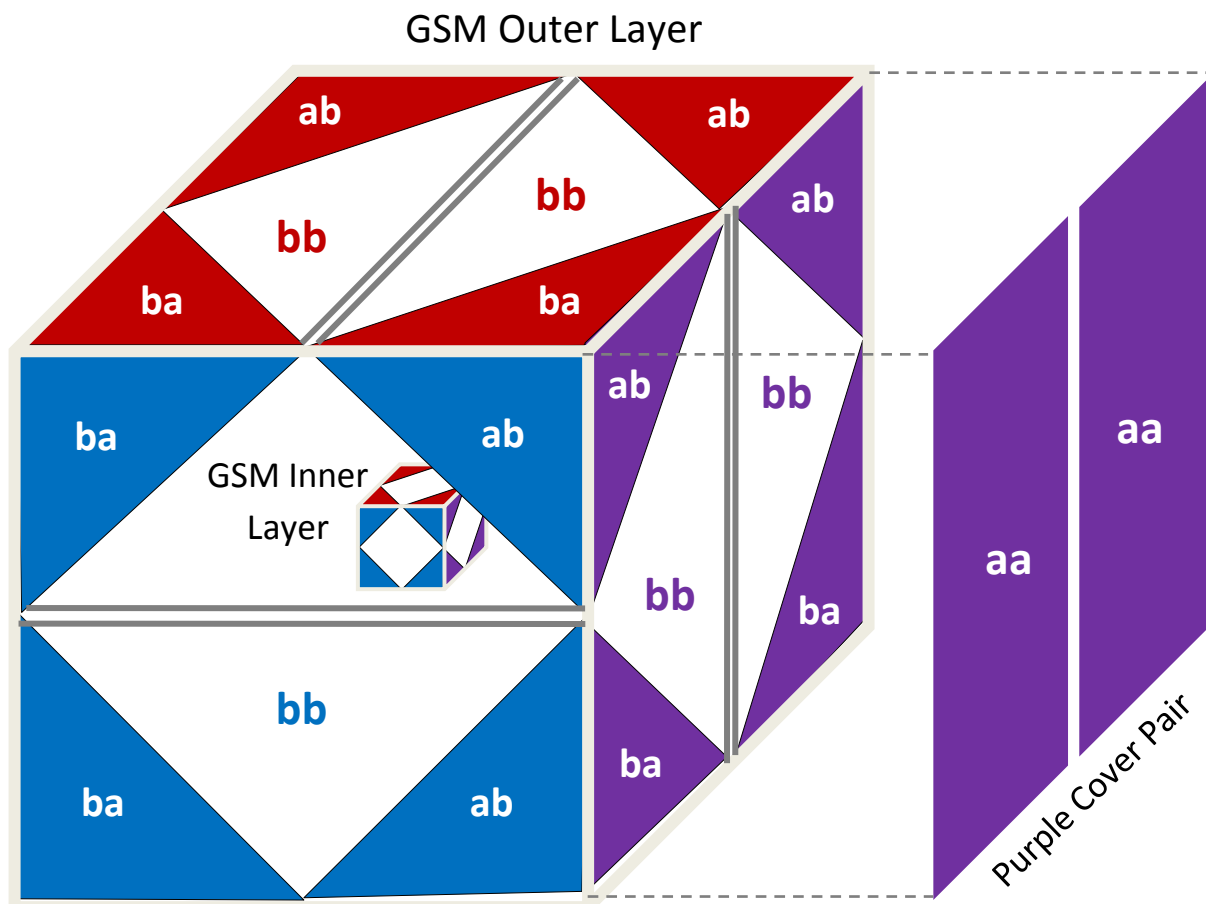
Puzzle Pieces

The perfect manner in which this *schema* makes provision for all types of particles of the Standard Model is an indication of the high probability that the Pattern Cube, or Cleft Cube as it is also known, could be the correct framework match for the Standard Model.

The Standard Model's relativistic quantum fields are, just as 3D puzzle pieces, the modules that build the Pattern Cube.

The Two GSM Layers

The GSM is a layered model consisting of a small Pattern Cubes in the position of the core of a big Pattern Cube. The drawing below shows the two Pattern Cube layers, the GSM outer layer Cube and the GSM inner layer Cube. One pair of covers (purple) is shown on the right as an example of the six aa-cover pairs of each Pattern Cube.



Note that the small Pattern Cube that is drawn inside the big Pattern Cube is not drawn to scale and also has less detail.

GSM Module Naming

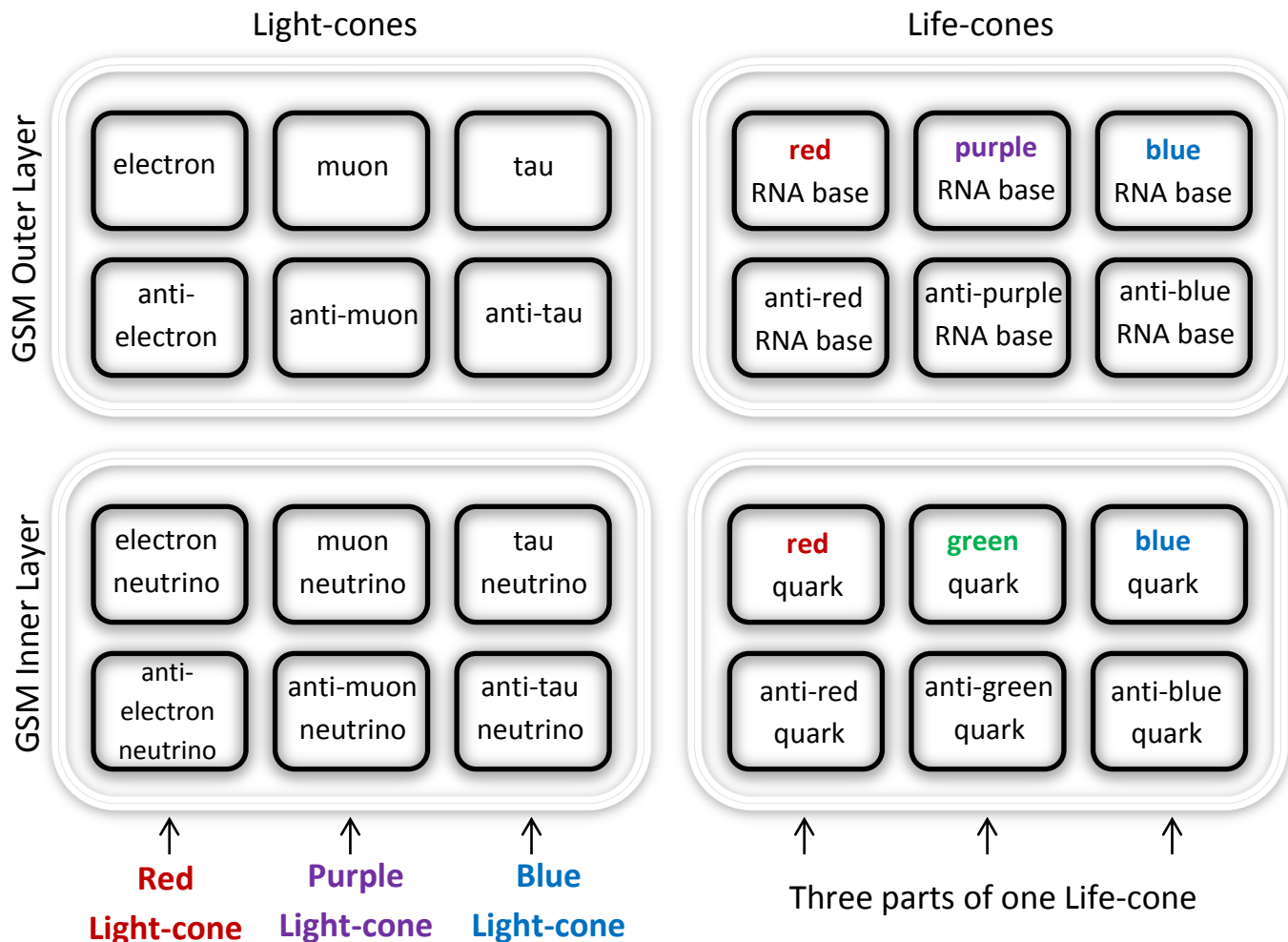
The modules of Light-cones are the conic shaped bb-modules as well as the aa-covers. The 91 small cubes of each aa-module were compressed into a single layer (7 x 13 cubes) to form the six cover pairs of the Pattern Cube. The aa-modules are the anti-modules of the bb-modules.

The modules of a Life-cone are ab-modules or ba-modules. Three ab/ba modules of three different colours at a Pattern Cube vertex form a codon or particle, such as a proton or neutron. The Life-cone modules are all of the same shape.

Note that the three terms, modules, quantum fields and particles, are all descriptions that could be used interchangeably for the same objects, but the context should also be considered when the exact meaning is attributed. Note also that the naming of the individual modules, e.g. bb-module, is derived from the squared Pattern equation, $(a + b)^2 = aa + ab + ba + bb$, from which the Pattern Cube is derived. See the Pattern Pieces Folder 3 for detail of the Pattern Cube (also called the cleft cube).

The GSM Modules

The individual modules of the GSM that represent the different types of relativistic quantum fields of the Standard Model are shown below. The types of quantum fields are the leptons (of the Light-cones) and the quarks/bases (of the Life-cones).



Note: The RNA version of the genetic code is used because the RNA-world is simpler when compared to the DNA world. RNA codons differ from DNA codons only by the use of the uracil (U) base instead of the thymine (T) base.

A Cube of Cones

A cone shape represents a relativistic entity, an entity that expands X-like.

The Pattern Cube consists of three Light-cones and four Life-cones, each composed of different types of quantum modules. The Pattern Cube is, therefore, an assembly of relativistic quantum modules.

The different types of relativistic quantum fields of the Standard Model match the different types of modules of the Pattern Cube.

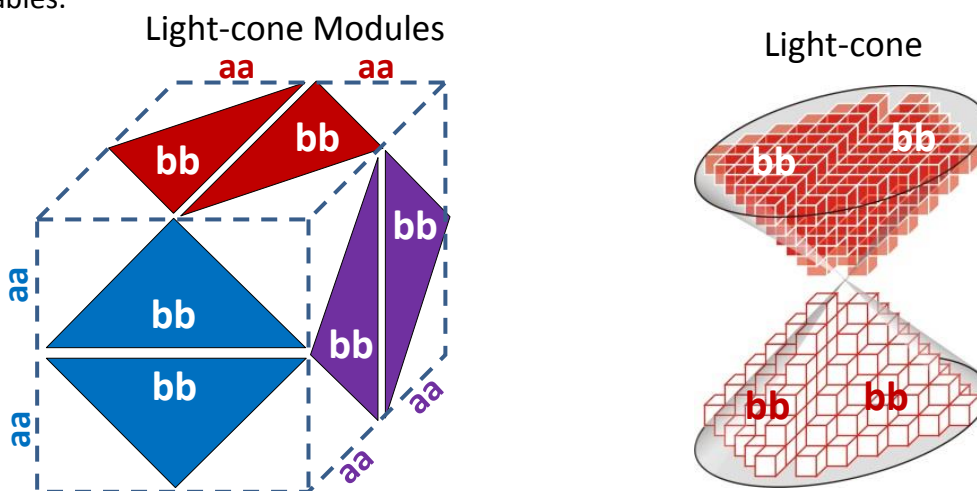
The Pattern Cube's cones represent symmetries because their modules replace one another when rotated without changing the overall shapes. The Light-cones rotate around clefts and the Life-cones rotate around chains. The upper and lower halves of the cones rotate about the core of the Pattern Cube.

The symmetries of the GSM are described in more detail in Pattern Piece P04:9.

The GSM Outer Layer

Light-cones The Symmetric Periodic Tables of the Chemical Elements

The red Light-cone contains the electron-based chemical elements. The Symmetric Periodic Table, as derived from the Light-cone, is shown in *The Pattern of All Things* in thepatternbook.com. The muon and tau elements of the other two Light-cones (purple and blue) could be presented as similar periodic tables. The aa-covers of the Pattern Cube represent the anti-particles of the particles in each one of the three periodic tables.

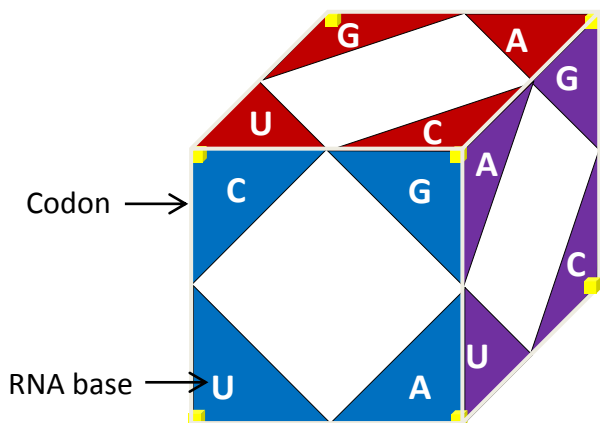


The elements of the three Light-cones do not affect one another owing to the fact that the Light-cones are orthogonally placed with respect to one another.

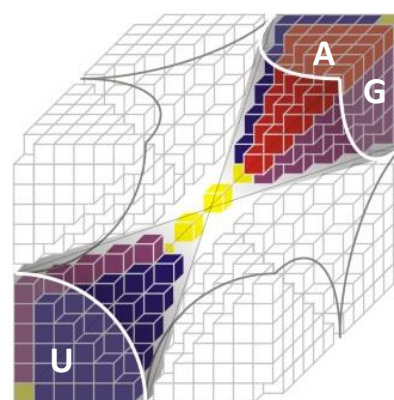
Life-cones The Geometric Genetic Code

Each vertex of each of the seven concentric cubes in the Pattern Cube represents one RNA codon. A codon consists of the three differently coloured RNA bases at each vertex, as shown below. A map of the RNA codons of the complete genetic code is shown in the Geometric Genetic Code part of *The Pattern of All Things* in thepatternbook.com.

The RNA Bases of the Cover Concentric Cube



Life-cone

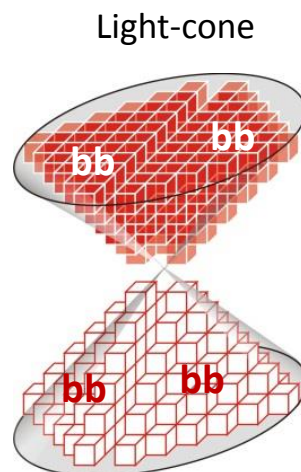
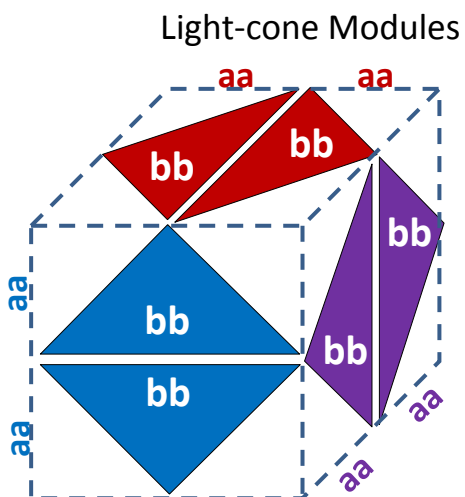


Note that one set of eight codons had to be represented by the vertices of the cover cube of the GSM inner layer. The reason is that the Pattern Cube has only seven concentric cubes, while the genetic code requires eight concentric cubes ($8 \times 8 = 64$ codons).

The GSM Inner Layer

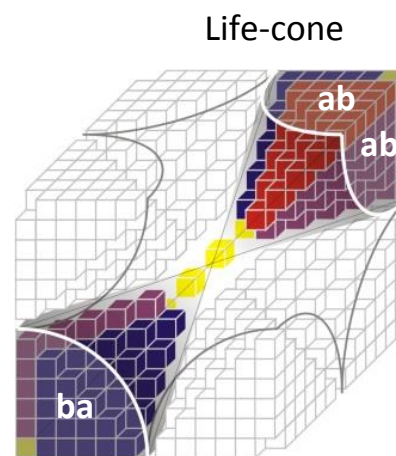
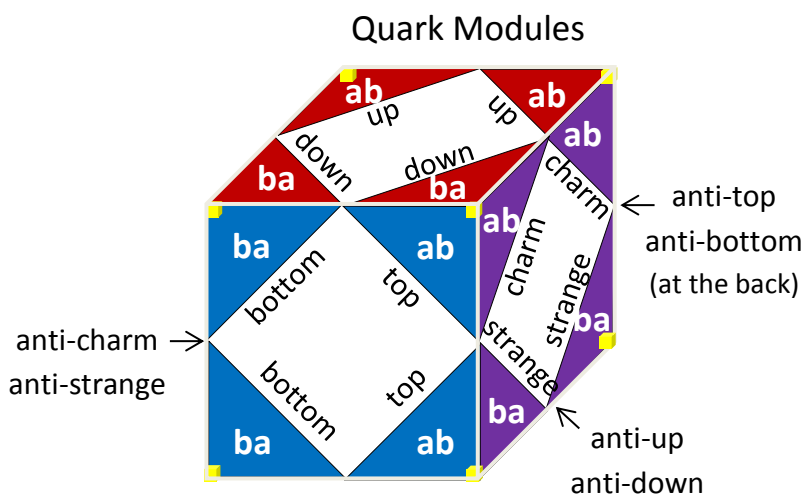
Light-cones The Symmetric Periodic Tables of the Neutrinos

The three types of neutrinos mirror the electrons, muons and taus of the GSM outer layer precisely. The arrangement of electron neutrinos would be the same as the electron Symmetric Periodic Table. The tables of muon neutrinos and tau neutrinos would also be the same as the tables of the muons and taus. The anti-particles are also accommodated in the different aa-covers of the GSM inner layer.



Life-cones The Geometric Quark Cube

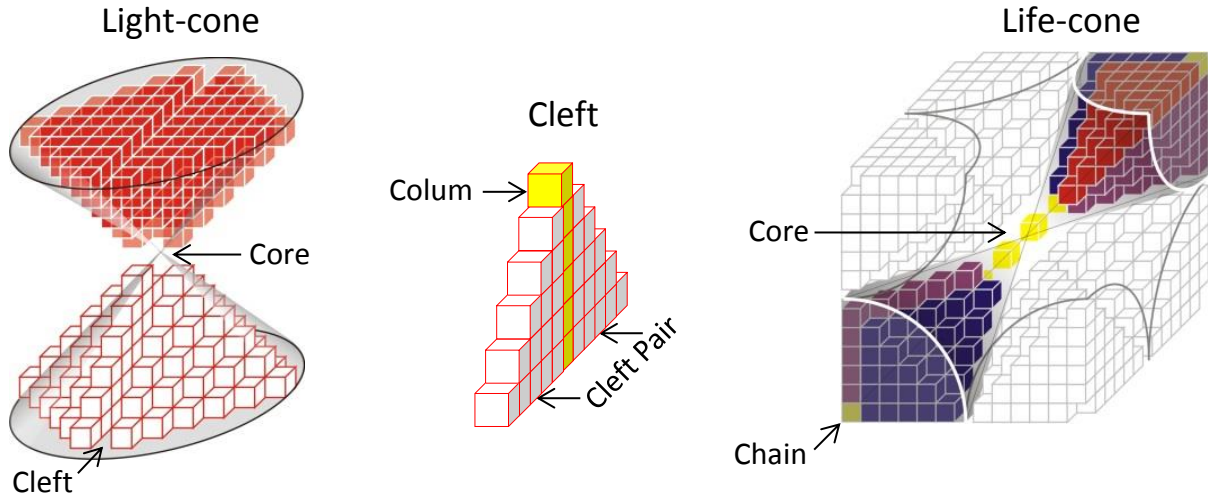
Each vertex of the Pattern Cube consists of three ab/ba-modules, each module of a different colour. The six faces of the Cube represent the quark flavours, i.e. up-down, top-bottom and charm-strange as well as their anti-particles. Different combinations of quark flavours at the vertices are possible. For example, all three modules at one vertex could be up/down quarks. (The GSM represents the architecture, not the actual structures.)



The gluon chains of the Life-cones are also coloured according to the faces of the Cube. The combination of three quarks at any vertex is 'colourless' which means that they consist of all three colours. The three quark modules at each of the vertices form particles such as protons and neutrons.

The GSM Symmetries

The Pattern Cube on which the GSM is based contains three types of virtual components, or bosons. The bosons act like glue that holds the modules of the Pattern Cube together. The different bosons are the core, the clefts and the chains as shown in the Light-cone and Life-cone diagrams below. The cleft of a Light-cone, in turn, consists of a column and a cleft pair as shown in the middle drawing.



The columns and chains are effectively extensions of the core cube, touching at its six faces and eight vertices. (The core cube's edges also touch all twelve bb-modules of the Pattern Cube.)

The symmetries of particle modules find expression in their bosons. The four types of bosons of the Standard Model relate to the four types of symmetries of the GSM.

- The column bosons seem to represent the electromagnetic force with U(1) symmetry.
- The cleft bosons seem to represent the weak force with SU(2) symmetry.
- The chain bosons seem to represent the strong force with SU(3) symmetry.
- The core seems to represent the Higgs boson with SU(3) x SU(2) x U(1) symmetry.

The Pattern Cube itself could be viewed as the quantum field (of quantum fields) that represents the SU(3) x SU(2) x U(1) symmetry. To equate the core with the overall symmetry of the Standard Model is a speculative proposal. If, however, it is noted that the Cube and its core are self-symmetric, such a proposal is perhaps not far-fetched. See Pattern Piece P04:11 for the reason why the core could also represent the graviton.

Glue of the Gluons

The structures of the particle modules that surround the different bosons seem to give clues with regard to the properties of the bosons. The number of cubes in the different layers of a bb-module of a Light-cone is $1^2, 2^2, 3^2, 4^2, 5^2, 6^2$. This sequence seems to manifest in the open-ended, or long range, nature of light.

The number of cubes in the diagonal layers of the three ab/ba-modules in a half Life-cone is $1^2, 2^2, 3^2, 4^2, 5^2, 6^2, 4^2, 2^2$. (The virtual links of the chain are included in this sequence.) The sequence increases at first but then decreases steeply towards the end. This closed sequence could, perhaps, be an explanation for the rubber-band type behaviour of QCD. A rubber band stretches initially quite easily but at longer distances the force increases dramatically. This property of QCD is known as asymptotic freedom, and it is the reason why quarks could not be found as separate particles in nature.

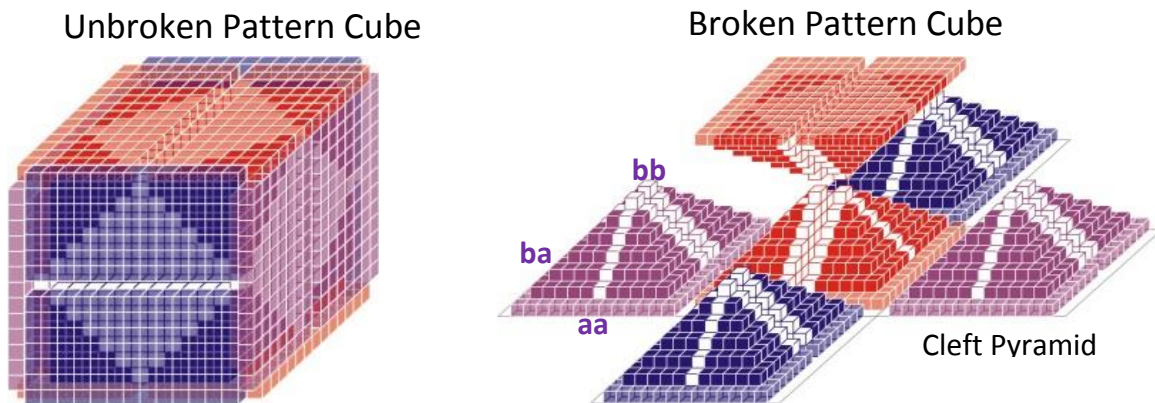
Symmetry Breaking and the GSM

The following quotation is from *The Theory of Almost Everything* by Robert Oerter, page 201, published by PLUME, Penguin Group in 2006.

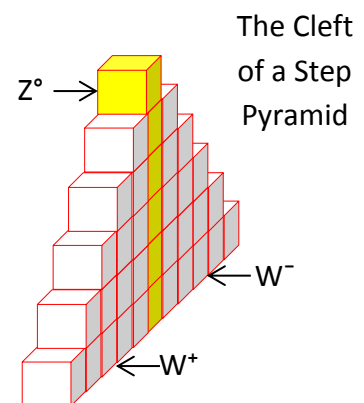
“ . . . starting with a theory of entirely massless particles – massless electrons, massless quarks, massless neutrinos, and massless intermediate particles – and adding in the Higgs particle with its Mexican hat potential, spontaneous symmetry breaking yields a theory with massive electrons, massive quarks, massive W^+ , W^- , and Z^0 particles, and a massless photon; just what we see in the real world.”

The GSM should be considered in two contexts. The one context is before spontaneous symmetry breaking and the other is after symmetry breaking. Things could have been simple before symmetry breaking when there were only massless particles. Such a situation is extremely difficult to envision, but its GSM could have consisted of just one GSM layer, e.g. one with electrons, muons, taus and codons. The unbroken Pattern Cube drawing (below, left) represents the state before symmetry breaking.

The broken Pattern Cube (below, right) represents the GSM after symmetry breaking. The broken Cube was caused by the collapse of its core that holds all components of the Cube intact. After symmetry breaking, the broken Cube looks like a Higgs field with its Mexican hat potential. (The unbroken Cube could represent the Higgs field before symmetry breaking but it could also represent the balanced gravity field as explained in Pattern Piece P04:11.)



Spontaneous symmetry breaking caused the Higgs particle to give mass to the three massive intermediate particles of the weak force. They are the W^+ , W^- and Z^0 bosons. In the diagram on the right the massive W^+ , W^- and Z^0 bosons seems to occupy the cleft space of a pyramid in an unbalanced state. The collapse of the Pattern Cube could, therefore, be construed as a Higgs type symmetry breaking event that caused the mass of the W^+ , W^- and Z^0 bosons.



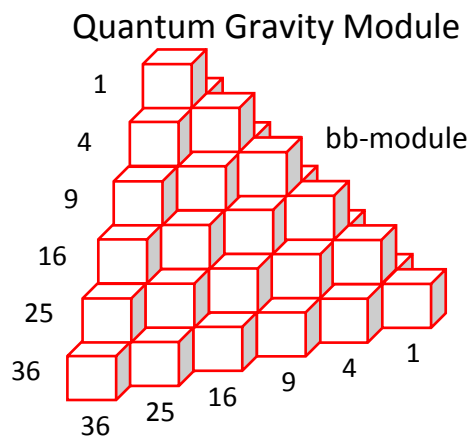
The spontaneous symmetry breaking that happened in some distant past could have caused our massive universe with its radiation and entropy. Speculation as to the cause of the symmetry breaking may be many and varied, but, in the context of the universal Pattern theory (as explained in thepatternbook.com), it is reasonable to link it to the event of the Fall in Eden as described in Genesis 3.

Quantum Gravity and the GSM

The layers of the bb-modules of the Light-cones exhibit the quadratic sequence; $1^2, 2^2, 3^2, 4^2, 5^2, 6^2$. This sequence is the same as the 'odd numbers rule' for gravity that was discovered by Galileo.

Galileo's 'odd numbers rule'

| Time | Distance fallen | Odd numbers rule |
|------|-----------------|----------------------------------|
| 1 | 1 | $(1^2) = 1$ |
| 2 | 4 | $(2^2) = 1 + 3$ |
| 3 | 9 | $(3^2) = 1 + 3 + 5$ |
| 4 | 16 | $(4^2) = 1 + 3 + 5 + 7$ |
| 5 | 25 | $(5^2) = 1 + 3 + 5 + 7 + 9$ |
| 6 | 36 | $(6^2) = 1 + 3 + 5 + 7 + 9 + 11$ |



The discreteness of the bb-module and its shape that depicts the gravity sequence makes it a quantum gravity module, or a quantum gravity field.

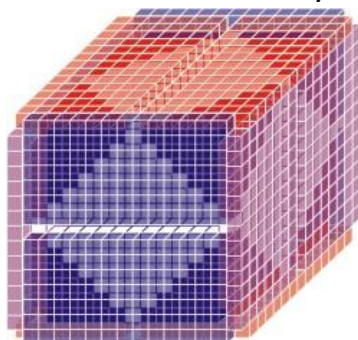
The cubes of the bb-module exhibit three different quadratic sequences in three directions, two orthogonally and one radially. The two orthogonal sequences are shown above, but the third sequence emanates in the middle of the module, at its back. The number of cubes in the two diagonal (front) surfaces of the module is 36, the last number of the radial quadratic sequence that starts at the back. If the sequences are replaced by vectors, the net effect is a small diagonal vector 'downwards'.

Balanced an Unbalanced Gravity

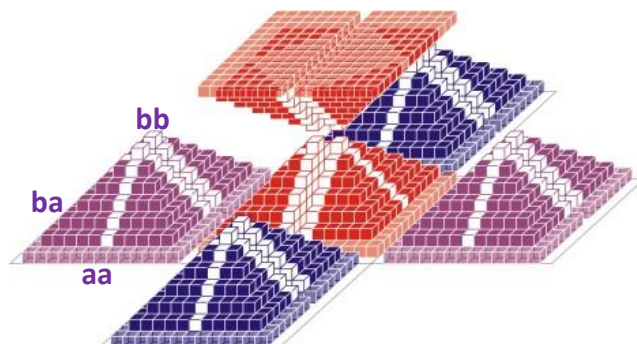
The arrangement of the bb-modules of the Pattern Cube cones causes all gravity sequences to be balanced. For example, the sequence $1^2, 2^2, 3^2, 4^2, 5^2, 6^2$ is balanced by sequence $6^2, 5^2, 4^2, 3^2, 2^2, 1^2$. The Cube could represent the total balanced gravity field composed of quantum gravity modules. The Cube and its core are self-similar and the core could, therefore, represent a gravity boson.

In the case of the collapsed Pattern Cube, the Cube's symmetry is broken. For example, the bb-modules of the cleft pyramids are no longer balanced (below, right). (Note that the collapse of only the aa-covers and the bb-modules of the Pattern Cube is also a possibility although it is not pictured here.)

Balanced Gravity Fields



Unbalanced Gravity Fields



The gravitational sequences are no longer balanced and a net gravitational effect is manifest. This could explain the origin and the effect of gravity in everyday life. We seem to live in a collapsed world, a world whose original perfect symmetries had been broken.

The Pattern Present

The following quotation is from *The Theory of Almost Everything*, page 203, by Robert Oerter, published by PLUME, Penguin Group in 2006.

“The Standard Model is built from relativistic quantum field theories we already know about. QED is incorporated into electroweak theory, and the whole is woven together with QCD to create a single theory whose essential elements can be written in a single equation. This equation is the simplicity at the bottom of it all, the ultimate source of all the complex behavior that we see in the physical world: atoms, molecules, solids, liquids, gases, rocks, plants, and animals. . . . The Standard Model is an incredible achievement – a single theory that not only summarizes everything we know about matter and its interactions, but also answers fundamental questions about symmetry and structure of the universe.”

The Standard Model is itself ‘an incredible achievement’ but the Geometric Standard Model could be an even bigger achievement. Einstein’s dream of a purely geometric origin of matter may have been achieved, although probably in a much simpler manner than he had envisaged. A truly unified (quantum) field theory is now possible although much detail still has to be worked out before it could be called anything close to a final theory.

The simplicity of the GSM is astounding. The Pattern Cube’s origin is the Pattern equation pair $(a + b = c$ & $c = b + a)$ that is first squared and then cubed. (The four forms of the Pattern equation, $(a + b)^0$, $(a + b)^1$, $(a + b)^2$ and $(a + b)^3$, that constitute a loop, seem to relate to the four symmetries of the GSM.) No higher mathematics is involved, only simple Pattern number calculations such as addition and multiplication, and also 3024 cubes, or balls, that are assembled into an intricate and magnificent edifice ‘full of wisdom and perfect in beauty’.

The matching of the Standard Model with the Pattern Cube framework expands the scope of the Standard Model to include also the critical aspects of gravity and the genetic code. It is quite possible that even more aspects, such as dark matter, could in future be included in the GSM. Another possibility is that the (compressed) covers of the Pattern Cube could be representative of the holographic principle.

The GSM could play an important role in creating new theories about the origin of the universe, theories with fewer initial dimensions. The Pattern Cube is a hypercube only, but its explanatory power is amazing.

The unification of diverse aspects of nature, such as light and life, have been no more than a dream thus far. Now, for the first time, the GSM harmonises quantum physics with classical physics, the organic with the inorganic, the unbroken with the broken, the higher-dimensional with the lower-dimensional. In fact, all things could perhaps eventually be explained in terms of the GSM which will make it the true Pattern of all things.

Finally, above all, the evidence of symmetry breaking in the GSM corroborates the biblical narrative of a fundamental collapse of the original Creation.

“To know the origin and architecture of the Standard Model is to know the mind of God.”

For the earth will be filled with the knowledge of the glory of the Lord.

Habakkuk 2:14
