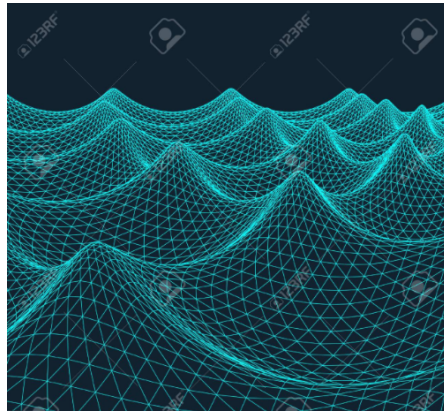# CASSIOPEIA'S ToE

4

WORMHOLE VIEW – ELECTRON

So let's imagine a physical particle, a fermion -- perhaps an electron -- in one of these Fields of quantized space.   According to QFT, there is a particular electron field that permeates all of space. It is filled with quantized **virtual** electrons as well as being the home field for all **real** electrons.

And, in QFT, a real electron is nothing but some mixture of "excited" vibrations in this field. But in our visualization, let's call it the "**wormhole view**", the energy, mass, charge, spin, magnetic moment, and other properties of this electron are manifested in the surrounding wormhole connections in specific ways.   And the quantum mechanical wave function that describes the particle is nothing more and nothing less than a precise description of these different formations of wormholes. (In visualizing a single electron in the wormhole view, the relativistic, QM wave function is a good place to start.)

Said another way, a (QM) wave function of a particle actually describes the shape of space – the topology and connectivity of space quanta as established or modified by the particle. And the Fields of QFT (state functions) describe the complete plexus of connected quanta of a single-type.
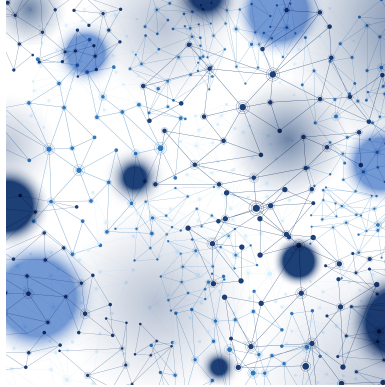
The different properties of the particle can be viewed as being manifest in the connectivity – the shape – of the wormhole topology in different Fields. So the electric charge of the electron changes and aligns the wormholes in the "EM-Field". And the mass-energy of the electron changes and aligns the wormholes in the "Gravity-Field".

The topology of the electron-induced wormholes in the EM-Field, is defined by QED. There will be gradients in the density of the wormholes that we recognize as the Electric Field (and ultimately as a source of electromagnetic force). We now have a concrete way to visualize an Electric Field -- it is an actual picture of a quantized space modified by "electric charge".

The electron causes the wormholes in the EM-Field to align and quasi-stabilize in a specific pattern. (It is like adding a magnetic field to a ferrous material, which results in the previously random directions of electron magnetic moments aligning with the dominating field.) (add video clip)

For proper visualization, though, let's not forget the disjoint in scale as well. The free space (vacuum) wormholes are random lengths and random directions and can be very tiny – on the scale of a Planck length. But the charge of an electron shapes space on a scale 10^{23} times larger… the scale of the electron in an atom is huge compared to the scale of the Planck length. (add video clip)

Having different wormhole Fields for different gauge bosons and their associated interactions makes it easy to understand why the mass of one particle does not interact with the charge of another – there are no wormhole connections between the two fields other than through PARTICLES that couple to both fields. . Although an accurate option for visualization would have the separate Fields fully intermeshed with a common "center" in space-time… (add video clip)

It is topologically equivalent to *visually* separate the different Fields, and this makes it easier to see where the crossover points are…
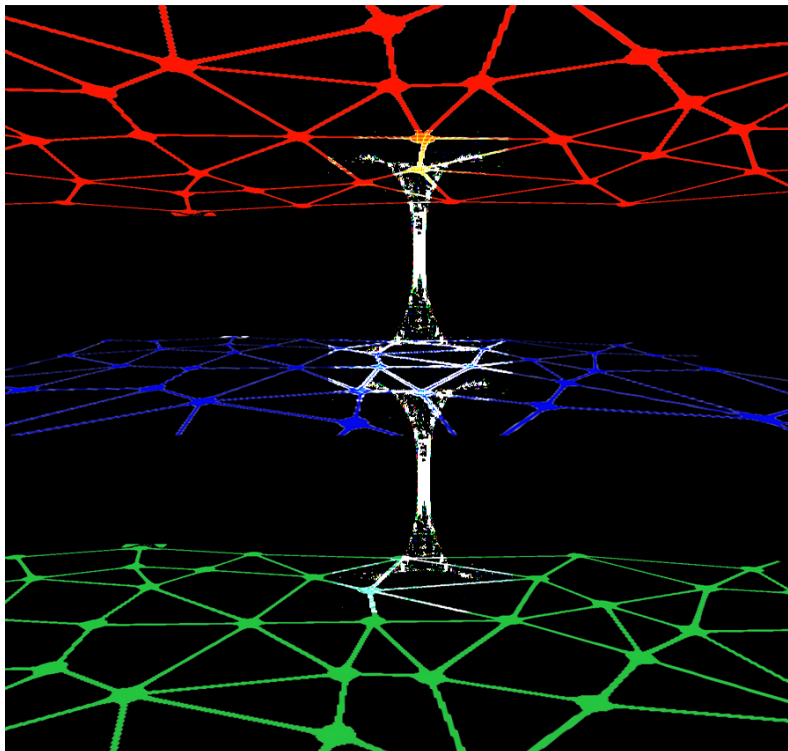
These crossover points represent a PARTICLE that couples to more than one Field. It has properties that affect the wormhole topology in more than one Field.

The BLUE Field is the electron Field. (We will later consider what alignment of wormholes in the Electron Field represents a real-electron and what alignment represents virtual positrons and electrons.)

The RED Field is the EM-Field and is accessible to and affected by the electric charge of the electron.

And the GREEN Field is the Gravity-Field and is affected by the mass-energy of the electron. EVERYTHING that exists affects the Gravity field – so there are crossover wormholes from every other field – bosons and fermions. In fact, the energy contained in the Gravity-Field affects itself.

All particle Fields connect to at least one other Field – this is true for all the particles we know! If there were particles that connect to only one field, it would have to be the Gravity Field (Dark Matter?).

The electron field couples to the other fields through crossover wormhole connections and causes a local, stable (but dynamic) alignment in the wormhole topologies of these other fields…
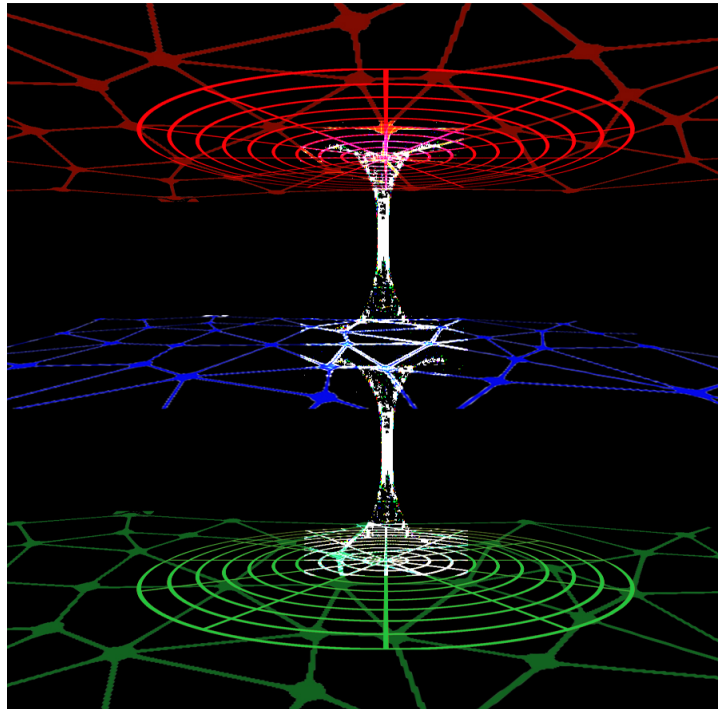
Since the electron generates wormhole alignments in various Fields, we can view this *extended* topology as the complete electron and can imagine that the electron is simultaneously (as far as we are able to measure) in all of the space quanta that are connected by the wormholes it aligns. Or, perhaps, more specifically, the harmonics – the vibrational modes of the electron – that are identified with a given property (like charge or mass or position or momentum) reside in the space quanta connected by the wormholes in the associated Field. And the fundamental energy of the electron in its home field – the BLUE field -- forms wormhole connections that correspond to its internal symmetries like lepton flavor, lepton number, baryon number and other conserved but not

dynamic properties. (Baryon and Lepton number are not symmetries specifically addressed in QFT, but they are clearly recognized by nature, so there must be a physical representation somewhere).

The electron, of course, also has extensions into the Weak/Higgs Field that contains the topology of wormholes generated by the Weak-Isospin as well as the Higgs Field that gives it "rest mass". (We will combine Weak and Higgs in our visualization – the wormhole view -- for reasons that will become evident.) The Electron Field couples to every *gauge* Field except the Strong-Field. We will later discuss the Electroweak symmetry breaking and why we choose to represent the Electroweak interaction the way we have.

We will do most of our visualizations without explicit representation of "quantum jitter", but we would be remiss if we failed to mention that omission. We should visualize the energy-object that is the electron as constantly moving and occupying all of the space quanta that are connected by the wormholes described by its wave function, and we will also get secondary charge and mass effects because the electron's "locus" is not static, and also because the electron can morph into other particles and then morph back, interacting with other Fields in this process (so-called radiative corrections). These physically real, secondary phenomena correspond to higher levels of QED Feynman Diagrams and their decreasing (but important) contribution to the measured properties of the electron. (e.g. magnetic moment).

The **aligned wormholes** in the EM-Field, that are the manifestation of the Electric Field and which are created by the electron, **are** (equivalent to) the **virtual photons** as described by QED. They are the quanta of the Electric Field. And if the electron is accelerated, it is possible for a self-contained EM wormhole (photon) to "break free" and exist as a stable, traveling arrangement on its own – connected only to the EM-Field and the Gravity Field.   This occurrence describes a free photon emitted from the electron. It of course inherently travels at "c", the speed of light. Our visualization will correlate one wormhole with one photon connected from the EM-Field to the Gravity Field. Note that the wormhole moves and not the quanta that it connects. And since we are relating the wormhole to the Electromagnetic Field of the photon, we will visualize rthe photon traveling perpendicular to the length of the wormhole (a la the Poynting Vector).

The reverse process is when a free photon, visualized as a self-contained, traveling wormhole in the EM-Field (and the Gravity Field), encounters the aligned wormhole field of an electron, the photon can be absorbed and the electron gains energy and momentum as a result (it is scattered).

A brief word about motion of a particle… the uncertainty principle means that any particle cannot be viewed as a static configuration of wormholes. And according to QED, the particle moves through every possible path available to it at all times,

and the associated fields, which are the wormhole topologies, are equally dynamic because of this. If there is motion, momentum, kinetic energy associated with the particle, then the combined result of all this jumping around is observable motion along paths that ultimately conserve momentum, energy, etc. We should not view this motion as a sequence of wormholes following themselves one-after-the-other in sequence as they form, rather we should picture a chaotic maelstrom of wormholes forming and disappearing with the average epicenter behaving as a classical particle would. We should also realize that some contributions to this maelstrom consist of the particle morphing into all possible other particles and combinations of particles and then morphing back. There are always exchanges between fields wherever such exchanges are not forbidden. This is equivalent to the particle traveling "every path" simultaneously.