Planck's Particle:

How a New Particle,
Defined as One Unit of Planck's Constant,
Might be the Sole Component of
All Matter and Energy

by
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Dedication

This book is dedicated with deep gratitude to three people.

To Dr. Max Planck for his discovery that energy comes in tiny units which cannot be divided any smaller. This unit became known as Planck's Constant and is the foundation on which I built my ideas that I will describe in this book.

As my way of showing him respect, I have decided to publish this book in both my native language of English, and his native language of German—even though I cannot speak a word of German. I will probably publish it in additional languages, but his feels like it should be a priority.

It is also dedicated to two additional people, who I will mention later in the text when I talk about their work.

Thanks, guys. You made it all possible.

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Chapter 1

There is only One Particle—It is defined by Planck's Constant

The notion that the earth orbits the sun, instead of vice versa, was a scandalous idea centuries ago, which angered many in authority. There was no math in that idea. The math to support it accumulated over the centuries that followed.

Atomic Theory was another idea that began without math. Democritus and John Dalton's atomic hypotheses were originally philosophical and qualitative. Much later, mathematical models of kinetic theory and quantum mechanics described atoms and their behavior more completely. But at first it was just an idea without math to back it up.

The history of science is filled with new ideas being presented for the first time without math. Only later—sometimes much later—equations were developed which formalized them and gave them credibility.

Evolution by Natural Selection, Plate Tectonics, The Germ Theory of Disease, The Cell Theory, Mendelian Genetics. All were first presented as ideas without math.

Some scientists have developed the notion that math must come first —before the ideas. They expect new ideas will burst forth fully grown out of the existing equations, just as Athena sprang into the world fully grown from the head of Zeus. In truth, this has actually happened on several occasions.

But sometimes what's needed for science to advance to the next level is a paradigm shift. An idea so radical that it cannot burst forth from the existing math. Sometimes we need a new approach. A new idea.

And sometimes this new idea will stand naked and alone, with no math to back it up.

The book you hold in your hands is a book of ideas. Oh, granted, there is some math described within the sentences and paragraphs—in some cases a good bit of math—but there are very few actual equations. My hope is that equations will eventually be developed to describe them, but for the moment, they are not rigorously backed up by math.

They are just ideas. Opportunities for fresh new experiments. Places from which to start.

Each of them must be evaluated to verify which has merit and which does not. If you are a scientist or a knowledgeable layperson, I welcome your scrutiny.

And in that spirit, let us start at the beginning—at the Planck scale.

SPACETIME AT THE PLANCK SCALE

It has become clear that there is something unusual about the behavior of fields at the Planck scale.

Attempts have been made to understand this behavior using a number of different theoretical approaches. Some headway has been made, but no one theory or model has emerged as the clear winner. To do this, it would have to explain why fields behave the way they do at the Planck scale, and consequently, sweep away all its competitors. This "sweeping away" has not happened. Not even slightly.

The Planck scale remains a mystery.

This situation has long frustrated me and weakened my confidence in the existing field theories. This is because it is my opinion that the structure of spacetime itself lies naked and bare at the Planck scale, and that it is there that spacetime is at its absolute simplest. By this reckoning, any field theory that cannot explain things at the Planck scale must be fatally flawed.

Consequently, I have taken a radical new approach to work out a field theory. Rather than creating a model on a large scale, such as the Standard Model, and then trying to make sense of it at the Planck scale, I have instead created it at the Planck scale to begin with, and examined it at increasing scales.

In effect, creating a model from the bottom up.

Analyzing the nature of events on the Planck scale yields two main features; energy and randomness. There seems to be a huge amount of both of these things at that level, and very little else.

It has been said many times that the continuity of spacetime actually seems to breakdown at the Planck scale. As though spacetime is no longer a continuum at that level. I have examined this closely and decided to accept this concept at full face value.

This model's founding principal then is that spacetime—and therefore the vacuum as well—is not contiguous, and that it is at the Planck scale where the individual units it is composed of begin to reveal their nature.

To keep the model simple, these individual units of spacetime are assumed to be identical in all their properties. A shortened version of the founding principle becomes the model's first postulate: "Spacetime is composed entirely of vast numbers of individual quanta. These

quanta are best thought of as individual particles, which are defined as one unit of Planck's constant.”

PLANCK’S CONSTANT

Planck's constant is universal.

In physics, constants are often used in a wide variety of equations, sometimes even in two or three different but related fields of study. Planck's constant is a prime example of this. Everywhere you look in the physics of atoms and subatomic particles, Planck's constant is there.

I propose that Planck's constant is universal for a reason. That it represents a mysterious new particle trillions of times smaller than a proton. And that by being so very, very, very small, protons must be composed of many trillions of copies of it.

But how can something so small form itself into something so big?

Read on, and maybe we can figure it out together.

MY TWO RULES OF PANDEMONIAL DYNAMICS

I have postulated two rules in formulating my theoretical model, which I call Pandemonial Dynamics. They are the foundation upon which everything in this book is built.

(1) Everything in the universe is made of only one particle, which is defined by Planck’s Constant.

(2) It is structure, and structure alone, that determines all the properties and all the behavior of everything in the universe, from protons to galactic superclusters.

The first rule is the one that got it all started, the second is the one that urges me on.

The implication of the second rule is that the structure of a thing, including subatomic particles and their fields, can be determined—reverse engineered, so to speak—by an analysis of its properties and behaviors.

Which means that everything I know, and everything I read, that is of a scientific nature, is a clue. Clues are everywhere. All my physics books are packed end-to-end with clues. All their texts are clues, all their diagrams are clues, but the most powerful clues of all are their equations.

Equations define relationships. They show how behavior will change as conditions change. Sometimes one good equation can provide more clues than ten pages of text. Granted, an equation is not a model, but it sets strict limits on reality. Our models must match the equations, and they must match them absolutely.

But I digress.

Back to business.

PIPS

I introduce to you, a new particle.

One vastly smaller than any of the traditional subatomic particles in the Standard Model—such as protons, neutrons, and electrons. One that would be active on the Planck scale. Approximately ten to the minus thirty-five meters.

I have named this particle a Pip, because it means seed, and it suggests smallness.

By definition, this particle has a mass so small that the "action" of changing its velocity from zero to the speed of light, or vice versa, is equal to one Planck's constant. And that it is this very "action" we have always measured whenever we measured Planck's constant. In other words, this particle and this action are the source of Planck's constant.

Those two properties, the size of pips and their relationship with Planck's constant, are all that can be said about this particle with any assurance.

All the other statements I make about their properties must be considered speculative. I do not know that they are true, but we need a starting point, and so here are a set of assumptions that are internally consistent and are based on our experience with tiny particles such as atoms when examined alone, and when acting together in vast numbers as a group.

More importantly, these assertions are simple. Indeed, they are the simplest and most basic set of assertions I have been able to assemble. Simplicity is my starting goal. Accuracy will have to be developed over time.

I envision pips as being small, round, and—for the purpose of modeling at least—hard.

I propose that every last one of these pips remains completely identical at all times. The only differences between any two, being in their location in four-dimensional space, their direction of travel, and their momentum.

I make no allowance for pips storing angular momentum within themselves. That is, in the form of a pip spinning on its own axis. (They may eventually prove to do this, but for now I will ignore the possibility for the sake of simplicity.)

I propose that pips are the only kind of particle in the universe, and that all the traditional subatomic particles we have studied, as well as those we have not yet discovered, are composed entirely of vast numbers of pips, and nothing else.

I propose that pips have kinetic energy, and that they are constantly in a highly agitated state, much like a common gas. And that when considered as a group that they will share many of the properties of a gas, and consequently I propose a Kinetic Theory of Pips.

I propose that these pips are present everywhere throughout the universe, and that even the hardest, coldest vacuum is teaming with pips.

I propose that this gas-like substance obeys the ideal gas law and the laws of compressible fluid-dynamics—as modified for four-dimensional space. The gas-like substance which results from the Kinetic Theory of Pips is the material that composes the universe, both the vacuum of spacetime and all subatomic particles. As such, it is important enough to have its own name. I have named it "Pandemonium."

I also propose that all the traditional subatomic particles we refer to as the Standard Model are four-dimensional vortexes, each one with a different shape, spinning around their ring axis at the speed of light. This means that it is only through an understanding of fluid-dynamics in four-dimensions that we can understand the internal structure of subatomic particles. I called this Vortex Theory.

Because all subatomic particles are composed of only one kind of particle "It is by their structure, and their structure alone," that all our familiar subatomic particles differ from one another. And that all the properties and all the behavior of all the different types of subatomic particles are a direct product of each one's particular structure.

[NOTE: In the previous paragraphs, I referred to pips as particles a number of times, because technically they *are* particles, but throughout this book, I will try *not* to use the word particle when referring to pips.

To reduce confusion, I will try to only use the word "pip" to refer to pips. And as much as possible, I will try to use the words "subatomic particle" or "vortex particle" when referring to all the traditionally

known particles, such as the proton, neutron, and electron. I may stray from that, but I will try.]

PLANCK'S CONSTANT

Planck's constant is the smallest unit of momentum-change because it describes a change in the momentum of the smallest thing in the universe, a single pip.

Planck's constant is small because pips are small. Planck's constant is everywhere because everything is made of pips. Planck's constant is equal to the change in the momentum of a pip as it changes velocity from zero to light-speed, or vice versa.

The reason this always involves light-speed is because the surfaces of all subatomic particles are spinning at light-speed, and the interactions involving particles are based on the particles gaining or losing pips. In gaining a pip, the particle must speed the pip up to light-speed, and in losing a pip, the surrounding pandemonium must slow the pip down from light-speed.

FURTHER PROPERTIES OF PIPS

Consider a single pip. Just one, alone, isolated from all others. What are its properties? First, let me describe a few properties that it does NOT have.

It has no charge, and hence, no electric field and no magnetic field. It does not respond or interact through either the strong or the weak force. It is neither attracted nor repelled, from one another. And despite possessing inertia, it has no gravitational field. Not just very little, it

has none at all. An individual pip hasn't any of these things itself because each of these things is the product of the group behavior of pips. They are emergent properties of pandemonium.

So what properties do pips have?

Well, I mentioned they have inertia. And because they have inertia, they obey Newton's classical laws of motion.

Pips travel in straight lines. They can travel at any speed, from zero to light speed.

They have extension. That is, they are not points in space with zero volume. Two pips cannot overlap in space. When they try to do this, they make physical contact—and rebound, traveling away in a new direction. The collisions are elastic, no energy is lost to them.

PIPS OBEY THE RULES OF CLASSICAL PHYSICS

NOT RELATIVITY

NOT QUANTUM PHYSICS

Who would expect a single molecule of oxygen to obey the rules that govern the behavior of a tornado two kilometers wide at its base?

This is also the case with pips.

It is only through the behavior of vast numbers of pips acting as a group that the rules of Relativity and of Quantum Mechanics come into existence. Individual pips are not subject to those rules.

Pips obey only the laws of classical physics. They have a genuine location and momentum. And regardless of its velocity, the mass of a pip never changes. (Later in this book, I will explain how Relativistic effects and Quantum effects are emergent properties of pandemonium.)

What's more, the velocity of a pip is not quantized. It can travel at any velocity at all, from zero to light speed—and beyond. (Much more on those last two words later.)

PANDEMONIUM

I chose this name to remind myself of its underlying chaotic nature, but also because it starts with "Pan," which means everywhere, and because it ends with "-onium," which makes it sound like a proper scientific name for a substance.

In fact, I've been calling it this ever since I first theorized it. This name appears in my notes, diagrams, and personal papers close to a thousand times.

I define pandemonium as a compressible gas.

Compressibility is an important part of my model, because it allows the universe to expand. The kinetic nature of gasses fits well with the idea of compressibility and leads directly to the ideal gas law. That is, provided the law is modified to account for the four-dimensionality of pandemonium. After all, the individual pips that form pandemonium are kinetically active equally in all four-dimensions.

Pandemonium likely obeys the ideal gas law, at least as well as any of the more conventional molecular-based gases. And just as molecularly based gases do not obey the ideal gas law to absolute perfection. I don't imagine that pandemonium will, either.

In ordinary gasses, the deviation is generally greatest for those molecules with the most structural complexity—especially if the molecule is asymmetrical—and least for those with the least structural complexity, and the most symmetry.

How closely pandemonium follows the ideal gas law will be an indication of how much structure is contained in a pip. The study of

that structure, should it exist, would form a future level of scientific investigation—after this one.

PANDEMONIAL FLUID-DYNAMICS

One of the most important properties of pandemonium is that it has the ability to flow—in forms both laminar and turbulent. The fluid-like movement of pandemonium is the foundation upon which Pandemonial Dynamics builds the structure of subatomic particles, their fields, and indeed the entire universe.

The scientific study and analysis of fluid-like flow is called fluid-dynamics. My theories are based heavily on the science of fluid-dynamics.

In Pandemonial Dynamics, all subatomic particles—such as protons, neutrons, and electrons—are composed only of pandemonium that is in motion, nothing more. The movement of pandemonium inside these particles (at the speed of light) and around them (at lesser speeds) is subject to the laws of fluid-dynamics. It is these laws that determine everything about subatomic particles: their properties, their interactions, and their behavior. Nothing about them is exempt. Nothing.

PROPERTIES OF PANDEMONIUM SUMMARIZED

It is not a superfluid. It experiences friction.

Like those gases made of molecules, it too is composed of highly agitated hard objects, though immensely smaller.

Like a gas, it is compressible, and obeys the ideal gas law. (As modified for 4D space.)

It abhors a vacuum. If a gap were created, it would move to fill it. Consequently, it is contiguous in every direction (though not infinite in any direction).

It obeys the laws of conservation of energy and of momentum.

It obeys the laws of thermodynamics.

It has other features of a common gas: inertia, bulk modulus, pressure, temperature, and a specific heat capacity.

Chapter 2

Subatomic Particles are Four-Dimensional Vortexes

As you progress through this book, you may notice some repetition in the text. This is because it is a collection of essays I wrote over many years. For this publication, I've edited many to improve clarity, and combined some to remove redundancies. But some redundancies remain, and for that, I apologize.

EVIDENCE THAT SUBATOMIC PARTICLES ARE FOUR DIMENSIONAL

Aside from Einstein proving, through his General Theory of Relativity, that space is four-dimensional, we also have the long established Stefan-Boltzmann Law, which allows us to calculate the amount of energy emitted as black-body radiation. This provides direct

evidence that electrons—the prime emitters of black-body radiation—randomly vibrate with four degrees of freedom.

The Stefan-Boltzmann equation is: Total Energy = Stefan-Boltzmann Constant multiplied by the Temperature raised to the fourth power.

The fourth power. Not the third, or any other number.

Four degrees of freedom for a particle can only be defined as freedom to move in four spacial dimensions.

Thus, the known accuracy of the Stefan-Boltzmann Law not only requires that the universe contain four-dimensions, but that electrons—and presumably other subatomic particles as well—are able to move in all four of them.

Furthermore, it requires that electrons are able to move in four-dimensions only. Not five; not six; not twenty-six, but four; exactly four.

It also requires that electrons are able to move in four-dimensions of space equally. Not better in some dimensions than others, or with any dimension given preference over any other.

So our universe, at least on a subatomic level, is four-dimensional.

VACUUM ENERGY

Even as far back as the mid 1900s, Richard Feynman and John Wheeler calculated the energy content of empty space to be ten times greater than the nuclear binding energy. Their figures indicated that a volume of empty space the size of a light bulb contained enough energy to boil all the oceans on Earth. They called this zero-point energy the 'Vacuum Catastrophe.'

You may wonder why the energy of the vacuum is so very great. The reason is not really that surprising if you look at it this way.

Consider; what is the area of a square one centimeter by one centimeter? It's one square centimeter. Even a flatlander knows that.

I am referring, of course, to an inhabitant of Flatland, as envisioned by Edwin Abbott Abbott in his book "Flatland: A Romance of Many Dimensions." His flatlander is an imaginary two-dimensional person living in a two-dimensional universe. In the years since he published that book, flatlanders have been used to explore concepts involving various dimensions of space.

But what does our flatlander think of a cube? He's never seen one. He can't imagine one. He's also stumped if you ask him about the cube's volume.

"Volume?" he might say. "What's volume?"

You stumble through some kind of explanation, which, no matter how good it is, he won't fully understand.

But let me ask you—you, a person long familiar with three-dimensional objects and spaces—how much larger is the cube than the square? Both are one centimeter on a side. Is the cube ten times larger? A hundred times?

Think about it. How many copies of the square will fit inside the cube? Stack them one on top of another until you fill it up.

If both the cube and the square are mathematically perfect, it would take forever to stack them up. Because the square is infinitely thin. Which means an infinite number will fit inside the cube.

That's the situation we face with the vacuum energy. You and I are three-dimensional, but the vacuum's dimensions are four. You and I can't fully imagine it, but the number of our 3D cubes that will fit inside a 4D hyper-cube—with the same length on a side—is infinite.

Which is why the energy in the vacuum seems so very infinite to us.

$E=mc^2$

Einstein's most famous equation has been proven to be accurate through countless experiments, and so my interest in it is not in whether it is true or false, but in what clues it can offer concerning the underlying relationship between matter and energy.

One thing that stands out about this equation is that it is not quantized. This, despite the fact that it defines the quantitative relationship between matter at rest, and the energy it is composed of, and will release should it undergo annihilation.

What specifically does the equation tell us?

Let me start by pointing out that if it weren't for the "c squared" on its far right side, the whole equation would be just "E=m." That would certainly be an easy equation to remember. Energy equals matter. What could be simpler?

But of course that's not the equation. The reason I point it out is to emphasize that the only thing in the equation that prevents it from being an incredibly simple equation is the "c squared" on the far right.

This is a remarkably important statement. It means that if it weren't for the "c squared," matter and energy would be the same thing. Not similar things, or related things, but exactly the same thing. Indistinguishable from one another.

Thus, while "c squared" is the only clue the equation contains concerning the relationship between matter and energy, it is also an exceptionally powerful clue. Powerful because it represents the only difference between matter and energy. There is no difference between matter and energy—other than "c squared."

Whatever it is that causes matter to differ from energy can be, and is, described totally in that one phrase. That's all. There is nothing else.

So let's look at this one clue.

First consider just the letter c. Here, c represents a speed. It is a very specific speed—the speed of light.

And in this equation, the speed is squared.

There are many occurrences where squared speeds show up in equations, such as in calculating the kinetic energy of an object. Calculating the average translational kinetic energy of a gas molecule. Calculating the net work done on a particle, which relates to the change in its kinetic energy. And finally, the calculation for an object in uniform circular motion, where the object possesses kinetic energy related to the square of its speed.

In the first three of these cases, the squared speed is directly related to the energy of motion. The fourth is different in that the squared speed is part of the equation for centripetal acceleration, which describes the rate of change in the direction of the velocity.

Acceleration in a circular path.

If we are willing to proceed with this last idea, even for a short period of time, we might easily speculate that the energy equivalence of matter is based on the amount of matter involved, times an acceleration to the speed of light within a circular path.

A fascinating idea, but it lacks for one thing; exactly **what** is running around in a circle at the speed of light? Matter? Energy? The equation doesn't say.

I have long suspected that when energy changes into matter, 'some mysterious thing' is accelerated to the speed of light and begins traveling in a circular path. And by doing so, this mysterious thing becomes captured in the form of matter. In this book, I will attempt to make the case that this mysterious thing is pandemonium.

The point that must be emphasized is that the matter in question may be totally at rest and, so to speak, unmoving.

Therefore, $E=mc^2$ implies—to me anyway—all the following:

1) That matter is composed of something in motion which follows a circular path.

2) That this something is moving at exactly the speed of light.

3) That this something is moving uniformly even when the matter is stationary.

4) That when allowed to annihilate completely, this something decelerates by the equivalent of the speed of light.

5) And that on annihilation, it gives up its energy to something else.

Naturally, I am describing all this because it fits so well with the theoretical models I will describe in this book. I refer most notably to Vortex Theory and the Kinetic Theory of Pips.

However, regardless of whether my model proves to be a close approximation of reality or not, the following statement stands and must eventually be addressed.

Matter and energy are two versions of the same thing, and somehow the difference between them rests solely in "c squared." Discover what "c squared" is and you will have discovered what it is about matter and energy that allows them to be composed of the same thing, and yet behave so very differently.

THE "FLATLANDER'S MISTAKE"

Imagine a flatlander who is a brilliant and accomplished physicist.

In this little story, my hypothetical flatland scientist has run a series of experiments on a type of charged particle that exists only in his two-dimensional universe. It does not exist in ours. It can't. It's only two dimensional.

His experiments showed that the "charge" of this particle exists in two small concentrations within the charged particle itself. He discovered that each concentration seemed to have a fraction of the

charge of the entire particle, and so he announced that the charged particle is composed of these smaller "fractional" particles.

Unfortunately, when he tried to separate them, he failed. He tried again and again, but always he failed. In the end, he had no choice but to make up theories to explain why it was impossible to separate the fractional particles, and why a fractional particle could never exist in isolation from others of its kind. His explanations were a bit weak and contrived, but that hardly mattered. His experiments were proof enough that separation was impossible.

All his work was carefully done. His theories were thorough and logical, yet he made one error. He assumed that all the particles he studied were two dimensional—just as he was.

What he did not know, and would have had difficulty trying to visualize, is that his original particle was really three-dimensional. The geometry of its structure, or form, occupied the direction he thought of as "Time" as well as the two dimensions he was familiar with. Its actual shape was that of a three-dimensional torus or doughnut.

The flatlander understood two-dimensional space. But for him, Time was a mysterious third dimension. He was aware of the passage of Time, but the "present," or the "now," was always only two-dimensional. Thus, his "plane of awareness" was also two-dimensional.

The torus shaped particle he examined was oriented such that it intersected his plane of awareness in two locations, as two flat disks. Those were the two "fractional" particles he had detected experimentally.

In his plane of awareness, they were separate particles, but in the fullness of their three-dimensional shape, they were not separate particles at all. They were joined into a single larger particle.

We face this same situation with our own subatomic particles. Protons, for example, are four-dimensional, and have the form of four-dimensional hyper-toroids.

A hyper-toroid is a shape vaguely like a doughnut, but because it exists in four-dimensional space, it has one more dimension than we are familiar with. Because of this extra dimension, it can be any of a number of different shapes, while an ordinary doughnut can have only

one shape. These extra shapes also offer the hyper-toroid far more complexity than can be found it a conventional doughnut.

A single hyper-toroidal particle intersects our three-dimensional awareness as several spheroids. And while the spheroids (as seen in our three-space) are not connected to one another, in four-space, they are connected. They are one contiguous particle.

Thus, our protons and neutrons, and in fact all other baryons as well, are hyper-toroids that we observe as three such spheroids. While mesons are a different shape of hyper-toroid that intersect our three-space as only two spheroids.

Our three-dimensional scientists have actually detected these spheroids in experiments. They call them quarks. Quarks are a three-dimensional view of a portion of a larger four-dimensional object.

Possibly the strongest evidence I can present for my model at this point (and therefore the easiest to explain) is the universal refusal of quarks to separate themselves and standalone. No matter how hard experimenters have tried, they've never managed to isolate a single quark.

They describe the force that binds quarks together as one that gets stronger as the distance between quarks increases. This is exactly the opposite of all the other known forces in the universe (electromagnetism, gravity, the strong force, and the weak force). It is rightly considered remarkably peculiar.

In my model, the quarks that form a single hadron are physically attached to one another. A hadron (like all particles, and the universe itself) has a shape that is four-dimensional. If you could grab two associated quarks with your bare hands and try to pull them apart, you would feel the force increase as the separation increases. This is because you are simply stretching a single contiguous particle.

If you want to know what this feels like, get yourself a good rubber band, and stretch it.

FALSE-4

Anyone can visualize in three-dimensions. That's no problem at all. But in order to fully understand a universe of four-dimensions you must be able to think in four-dimensions.

Being human, I can visualize four-dimensional objects only haltingly.

Unfortunately, my theoretical models are all four-dimensional, and so I've had to use a common compromise method of visualizing in 4D. I remove one of our usual three-dimensions and replace it with "Time." I usually have "Time" vertical, with the "Future" up, and the "Past" down.

The compromise part is that I am left living in a universe where my planet, my house, and my body are all only two dimensional. It's inconvenient, but at least it works—usually.

To remind myself that this is not really 4D, I call it "False-4."

When I am thinking about my models, I am usually doing it in false-4. Though I am able to do some of it in what I believe is true four-dimensional visualization. But even then the results of my work must be reduced to false-4 in order to explain it in diagrams and the written word. Consequently, I will be referring to false-4 visualization repeatedly in my writing.

SUBATOMIC PARTICLES ARE VORTEXES

A gas has no structure, and no ability to provide itself with structure. But vorticity—a simple rotating motion—has the power to force structure upon it. Thus, vorticity has the unique, almost magical, power to impart structure upon chaos. This is the central idea behind my Vortex Theory.

I remind you of the second rule: "It is structure and structure alone that determines and creates every property of everything in this universe."

Within this book, I will present my idea that all subatomic particles are four-dimensional vortexes of various hyper-toroidal shapes, which are spinning at the speed of light. Their spin is their existence. It's all the existence they have. To lose their spin is to cease to exist.

More on that later.

FOUR-DIMENSIONAL GEOMETRY

It's easy to say that four-dimensional geometry is more complex than three-dimensional geometry, in the same way that three-dimensional geometry is more complex than two-dimensional geometry. But there is a tendency to give this monumental fact little more than lip service.

My discovery that there are at least seven shapes of four-dimensional hyper-toroid, while there is only one shape of toroid in three-dimensional space, is what it took to shake me out of my complacency. I will never again discount the complexity of four-dimensional space.

This is one of the reasons I am skeptical of theories that involve multidimensional relationships, yet base the full weight of their argument on good math.

Mind you, no one has more respect for equations than I do. But as wonderful as the greatest of the great equations are, and many spring to mind; Maxwell's equations, Einstein's $E=mc^2$, no matter how wonderful they are, they don't tell you the "why" about something, they only tell you the "what."

We have proven that $E=mc^2$ thousands of times, but did even Einstein himself ever put forth a model that showed exactly why $E=mc^2$? No, he did not.

Face it, an equation is not a model.

A good model will not only tell you the "why," it will even throw in the "what," "when," "where," and my personal favorite, the "how."

My respect for equations comes from the two things they are incredibly good at.

First, they are powerful tools for predicting what will happen in a given situation. For example, engineers can use equations to calculate the strength of a bridge long before it's built. It would be disastrous to build a bridge and have it collapse with people on it.

Second, equations are powerful tools for weeding out false models. Nothing will kill a false model faster, or more thoroughly dead, than a good equation.

The strong suit of an equation is accuracy. An equation lives or dies on whether it can accurately predict what will happen under specific conditions.

The strong suit of a model is understanding. You can't model something you don't understand. And a model that doesn't provide its user with a better understanding of why the thing in question does the things that it does, isn't much of a model.

SHAPES CREATED BY ROTATION

Circles, spheres, toroids, and hyper-toroids are all defined by mathematicians as shapes created by rotation.

(This use of the word “rotation” should not be confused with each particle’s vorticity—the direction of its spinning pandemonium. These two “rotations” are unrelated.)

The simplest shape that can be created through rotation is a circle. A circle is created by rotating a point around a fixed point without varying the distance between them. When the point in motion comes back around to its original location, a circle has been created.

A sphere is created by rotating a circle on an axis that crosses both its center point and some point on its circumference.

Back in the mid 1980s, I thought there was only one form of four-dimensional hyper-toroid. After all, in our 3-space there is only one form—a doughnut. When I realized that there was a second form, I assumed that one form represented the structure of subatomic particles and the other did not.

Then I came up with another type of hyper-toroid. That made three. And then another, which made four! I was beginning to get confused, and maybe just a little worried. Just how many types of hyper-toroid could there be? And if there are so many, how could I be sure I was using the right one in my model?

So I sat down and drew out a systematic treatment of every type of hyper-toroid I could imagine. I came up with seven different structural forms. A few days later, I came up with two more, which made nine.

Right away, I noticed that two of them, while different, were similar topologically—such that they might be able to switch back and forth from one form to the other. What's more, if my theory concerning electric charge was correct, one form would have a charge and the other would have no charge at all. The one with no charge looked as though it was an unstable form of the one with charge. The two shapes, if I understand them properly, appeared as though they could mesh, or even interlock. Treat this as speculation, but such an interlocking might give the uncharged form the stability it lacks. The notion that these two might represent the proton and neutron was, of course, enticing, but far from conclusive.

Even if this shape changing idea was a dead end—which may be true—the fact that there are so many different hyper-toroids gave me a whole new area to investigate. Could each stable subatomic particle be the only stable size of each form that a hyper-toroid of its shape can take? If so, and if there are nine different hyper-toroids, then I might be able to match each of them to nine different subatomic particles. The

most obvious candidates were protons, neutrons, electrons, photons, neutrinos, muons, etc.

But I'm getting ahead of myself.

HYPER-TOROIDAL GEOMETRY

I've mentioned there are at least nine different forms of hyper-toroids, but I haven't actually specified what those shapes are. I would like to do that now.

You can forget, for the moment, all the 4D objects that have flat sides. We are interested only in 4D shapes that can be traced out by rotating a 3D sphere or a 3D torus through 4D space on a single axis of rotation.

These can be classified into groups based on the geometry of their rotated 3D shape, and the location of their axis of rotation.

For example, there is only one way to make a hyper-toroid using a 3D sphere rotated on an axis outside itself. This is the simplest of the hyper-toroids.

But there are six ways to make a hyper-toroid by rotating a 3D torus. (Assuming each is perpendicular to one another. If you count all versions that are tilted only slightly, the number is infinite.)

Three of these six versions use a 3D torus rotated on an axis through its center. These are toroidal as seen in our 3-space when oriented in 4-space at some angles, but spheroidal as seen from others. These are of intermediate complexity.

The remaining three of these six are made using a 3D torus rotated on an axis outside itself. These have by far the most complex geometric structure.

I keep thinking that there may be hyper-toroids that I have overlooked. But then it doesn't matter who discovers them, so long as someone does.

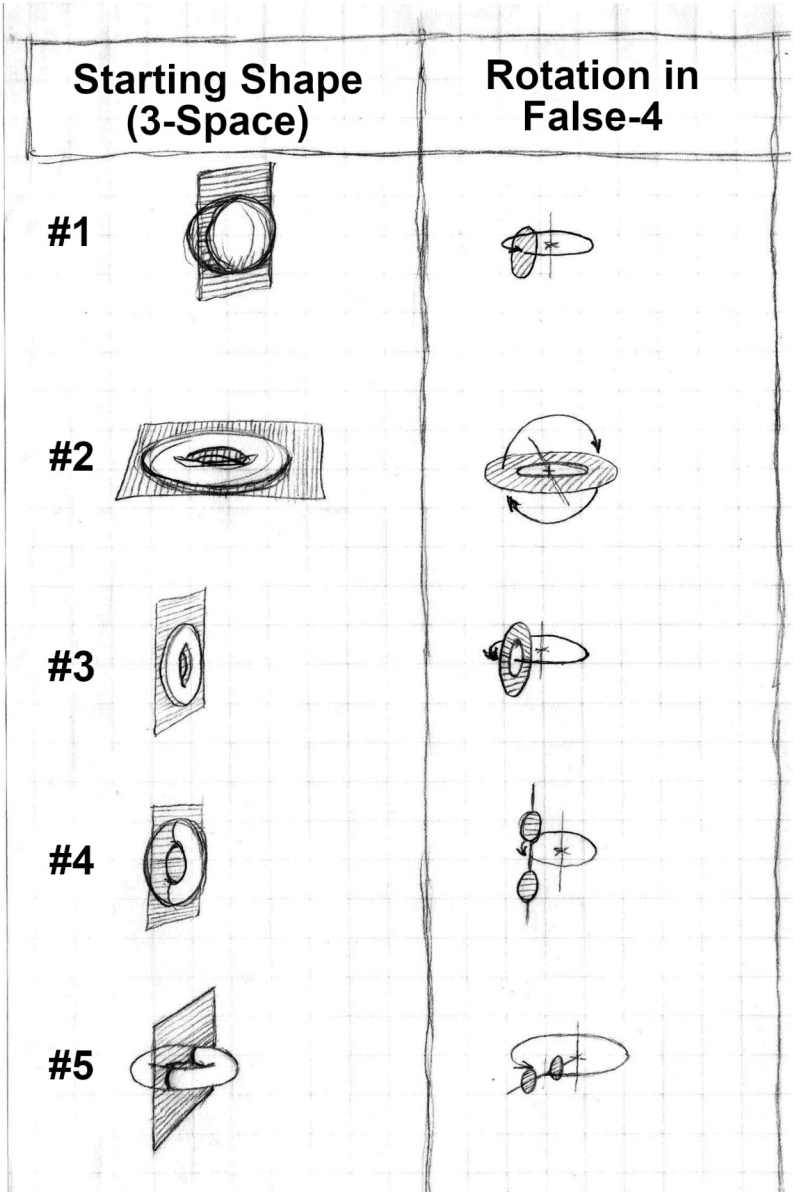
In the two-page-wide diagrams that follow, each horizontal row describes a unique shape of hyper-toroid. Each vertical column shows one aspect of that hyper-toroid.

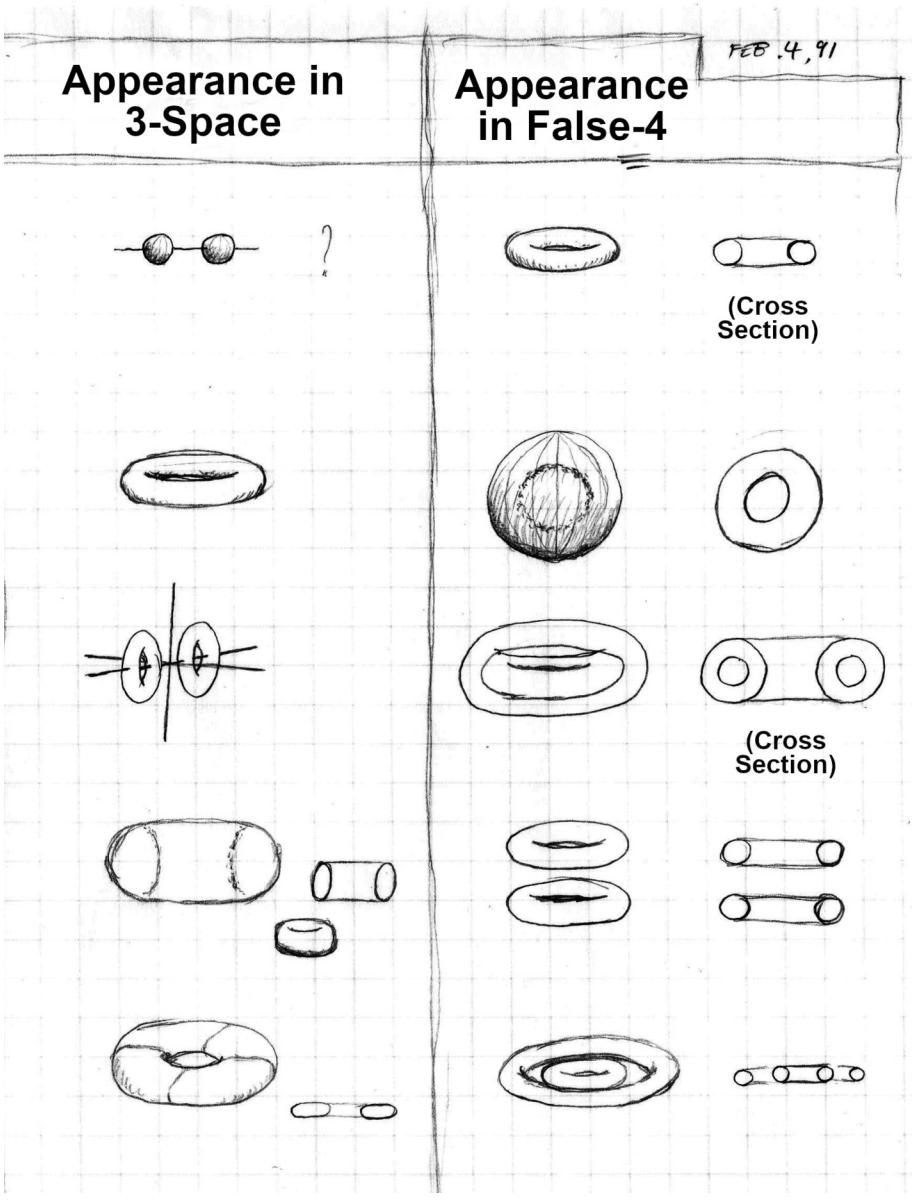
Column 1 shows the original starting 3D shape before rotation.

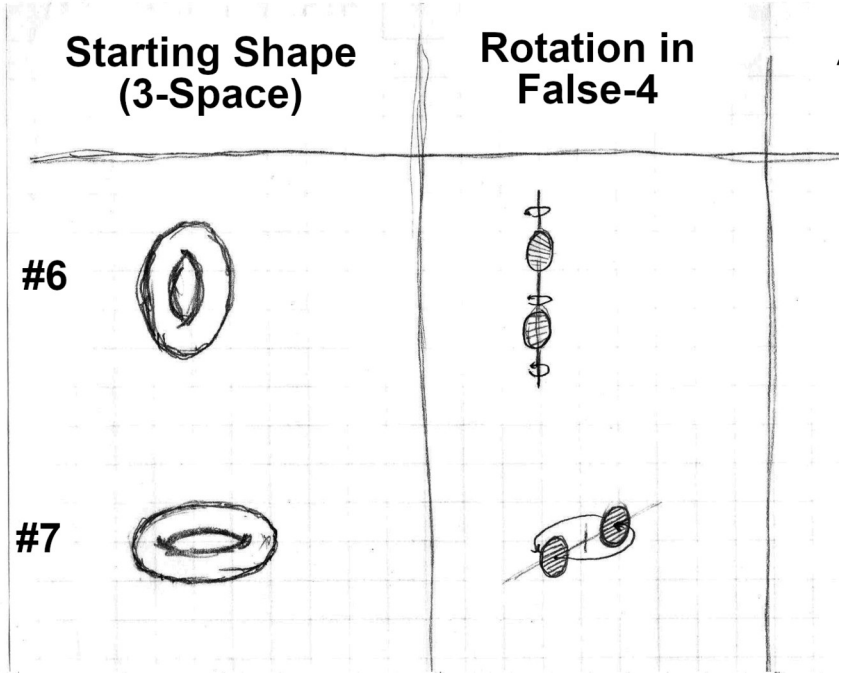
Column 2 shows the rotation in False-4 used to create the hyper-toroid.

Column 3 shows its appearance in our 3-space.

Column 4 shows its appearance in False-4.


Starting Shape (3-Space)
Rotation in False-4
#1
#2
#3
#4
#5


Appearance in 3-Space
Appearance in False-4
FEB .4, 91
?
(Cross Section)
(Cross Section)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(3-Space)
Rotation in
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#6
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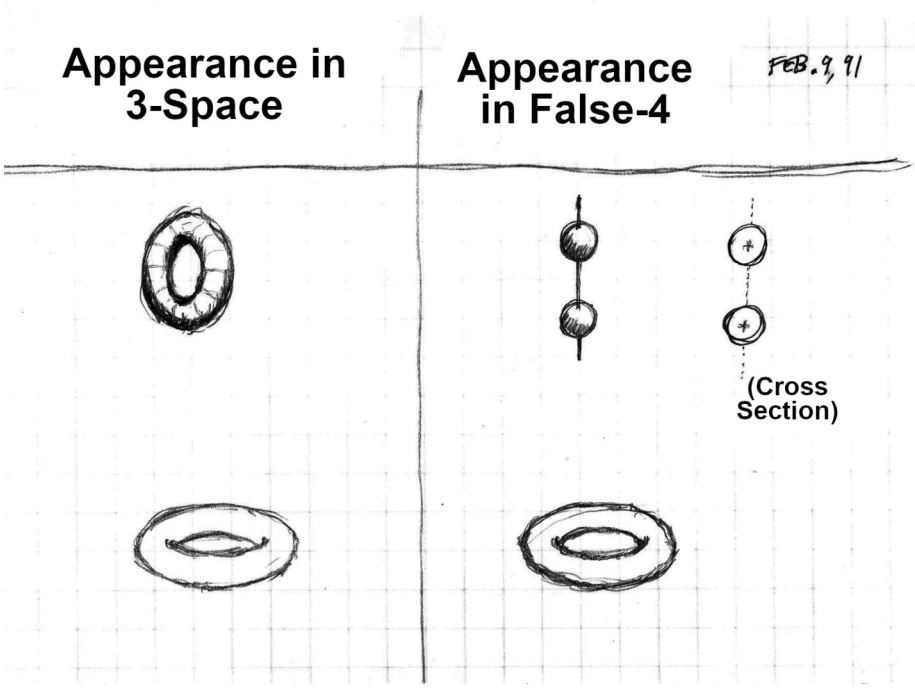
Appearance in 3-Space
Appearance in False-4
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(Cross Section)

MESON STRUCTURE IN 4D

I often find the best results by approaching a highly complex system at that place where its simplicity is greatest and its complexity is the least.

Structurally, the meson is the simplest of the hadrons.

A meson is said to be composed of two quarks. One "normal" quark, and one anti-quark. Because of this particle/anti-particle balance, a single meson can be created out of energy, without a separate antiparticle also being created to prevent breaking any of the conservation laws.

Because of this, and a number of other clues, I believe the meson represents the simplest of the hyper-toroidal shapes. Mathematically, this type of hyper-toroid can be defined as a 3-D sphere rotated on a point outside itself, and swung through a 360 degree arc in 4-D space.

In my drawing, shown above, this would be hyper-toroid #1.

Just one copy of such a hyper-toroid would intersect our three-space at two places, providing the appearance of two spheroids, which can then be interpreted as two quarks.

ELECTRON STRUCTURE IN 4D

After all this talk of the intersection of our three-space to form several spheroids called quarks, I feel compelled to describe a hyper-toroid that does not yield any quarks.

I suppose I like this one best out of all of them because it was the first hyper-toroid I devised back in 1985. For years, it was the only one

I thought existed. It and it alone lead directly to the birth of my Vortex Theory.

Mathematically, it can be defined as the 4D shape traced out by rotating—through a 360 degree arc—a 3D torus on an axis that runs through both its own center-point and through its ring axis.

In my drawing, shown above, this would be hyper-toroid #2.

Such a hyper-toroid is unique among the other types of hyper-toroids in that its intersection with our plane of awareness does not produce multiple spheroids. Its intersection produces only one spherical shape. Just one.

Thus, the particle is not seen to be composed of a number of separate spheroids or quarks. It is seen—even within our 3-space—as one particle; a whole unit; indivisible.

And because it has no apparent components, it was assumed to have no internal structure. It became dubbed a fundamental particle, and further research into its structure dwindled decades ago.

This is my model of the electron, as well as its heavier buddies; the muon, and the tau particle.

The two heavier versions are naturally unstable because, being larger, turbulences accumulate within them, which tear them apart. The electron is stable because its size allows for its flows to remain laminar in form. Laminar flows, being so smooth, produce no stresses or deformation to the shape.

This is why every vortex particle has only one size. Theoretically, a hyper-toroidal vortex can form at any size. But stability requires laminar flow. And laminar flow can only be achieved at one specific size.

(Laminar flow in pandemonium is tied to its R factor, which is also tied to its viscosity. But more on that in a later chapter.)

PROTON STRUCTURE IN 4D

As I mentioned, after I devised seven hyper-toroids, I thought I had come up with all the possibilities, but a few days later I invented two more.

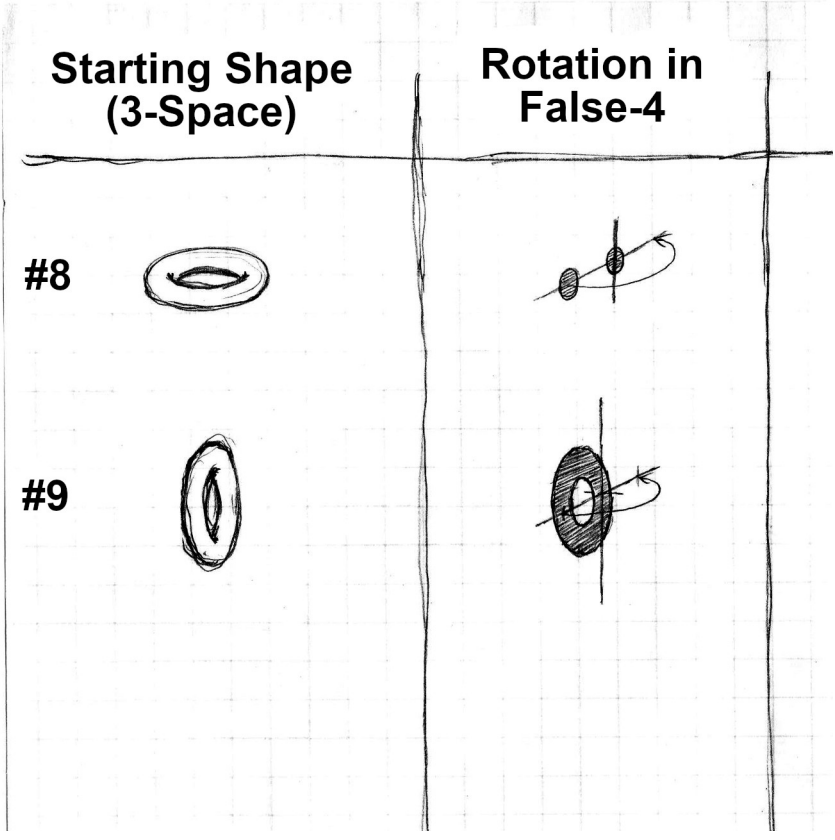
My eighth I am particularly pleased with, because it is potentially the most important hyper-toroid of all. This is because it is the first—and only—hyper-toroidal shape to fit the description of a proton.

In my drawing, on the next page, this would be the hyper-toroid labeled as #8.

The reason this one fits, and the others did not, is because a proton has three quarks. But the seven hyper-toroids I had previously invented yielded two or four quarks. Not one of them would have yielded three. But this one does.

Mathematically, this hyper-toroid is interesting in that it is structurally unique. It is topologically different from all the others, and doesn't seem to be modifiable in to any other group.

Mind you, there is no guarantee that this is the shape of a proton. It's just that this is the first hyper-toroid I developed that seems to fit.


Starting Shape
(3-Space)
Rotation in
False-4
#8
#9

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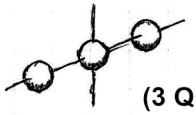
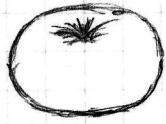
Appearance in 3-Space	Appearance in False-4
 (3 Quarks?)	
?	 (A Tomato?)
	 (Cutaway Views)

VORTEX THEORY

All the subatomic particles in the Standard Model are vortexes in the pandemonium. All of them without exception.

Each has a four-dimensional hyper-toroidal shape that is unique to that particle. They spin at the speed of light, and their spin is their only existence. To lose their spin is to cease to exist.

Those that are stable are stable because the vorticity of their hyper-toroidal shape is stable. And those that are not, are not because their shape is not.

Their interactions with one another are a direct product of their unique hyper-toroidal shapes, which drive—by friction—the flow patterns of the pandemonium in their immediate vicinity. Because they spin at the speed of light, these interactions can be powerful at close range, but still meaningful at a distance.

4D COMPUTATIONAL FLUID-DYNAMICS

Because Vortex Theory is based on the fluid-like behavior of pandemonium, in order to develop a deep understanding of subatomic particles and their fields, we must first understand their vorticity. The study of fluid-dynamics is the key to this understanding.

These days, software is used to study fluid-dynamics, specifically Computational Fluid-Dynamic software (CFD). Unfortunately, because we live and work in a 3D world, all CFD software is currently limited to simulations of fluid movement in 3D space.

But we need 4D.

So it is up to us to develop a 4D version of CFD software. Without it, we will never fully understand the nature and interactions of subatomic particles and their fields.

In the back of this book, I've included a long list of questions that we can answer using a 4D version of CFD software. Many of these questions, if answered, would be considered major scientific breakthroughs. Some of them, Nobel level.

Here are three examples:

6. Identify the specific 4D hyper-toroidal vortexes corresponding to protons, neutrons, and electrons.

9. How is the electric charge of a vortex particle produced by the primary spin? Or is it a product of one of the lesser spins?

12. Identify the specific 4D hyper-toroidal vortexes corresponding to the zoo of unstable particles, and to the various neutrinos.

There are several packages of CFD software that are open-source, such as OpenFOAM and BARAM, as well as others. Because they are open source, they can be freely accessed and freely modified by a skilled programmer, or preferably a team of programmers.

I worked full time as a programmer for several years, but that was from 1987 to 1992. I am way rusty, and the languages I worked in are way out of date. Today, I am a programmer only at an amateur level. Still, I would love to work with just such a team. I would love to help build a 4D CFD software package and to explore the structures hidden deep within and all around subatomic particles.

PARTICLES ARE VOIDS

Try to imagine a tornado spinning so rapidly that the centripetal force acting upon the air molecules in its center is so great that all the

air is forced against the inside walls of the tornado, leaving its center occupied by a perfect vacuum. A tornado of such incredible power has never existed on this planet, but until you can come to terms with such a thought, you can not grasp the incredible forces involved in the existence of a single vortex particle.

I am convinced that this is exactly what a vortex particle is; a void, a hole in the gaseous substance I call pandemonium. A hole formed and maintained by the centripetal force of the particle's spin.

The surface of the particle is a discontinuity in the uniformity of pandemonium. It's the boundary layer between the inside of the particle where there are no pips, and the outside of the particle where there are many pips.

The pips want to get into the center, but they are kept out by the centrifugal effect of their rotation around the vortex. In a sense, it is the particle's fields that are really spinning; the particle itself is just a void, a hole in the substance of space.

The void is immune to all the phenomena that I have modeled in my work. It is the only place in my model where there are no pips at all. Not one. Consequently, no magnetic fields, no electric fields, no gravity, not even the strong force can enter here. This place lacks everything.

Because a vortex particle is a hole in the contiguous vacuum, a hole that wants to slam shut, it represents a packet of potential energy. The larger the four dimensional "hyper-volume" of the hole, the harder it can slam shut, and the more energy is required to keep it open.

For all of human history, we have had it backwards. The vacuum is made of something, and matter is the lack of that something. The vacuum has substance, matter has none. In a sense, I suppose, this means the universe is rather like a photographic negative.

SECONDARY SPINS

Many years ago, I toyed with the idea that the direction of the primary spin determines if a particle is matter or antimatter. I now know that's not true. (More on what constitutes antimatter later in this book.)

I am still torn over whether it is the primary or secondary spin that determines if a subatomic particle is positively or negatively charged.

According to Vortex Theory, the neutron—which has a neutral charge—must have a primary spin, else it would not exist. But it is not required to have a secondary spin.

I suspect it has one but achieves neutrality because it is composed of both an electron hyper-torus and a proton hyper-torus entwined with one another. This double-torus hybrid structure would go a long way toward explaining how it decays into a proton and an electron, while throwing off the leftover energy as a stray neutrino.

Chapter 3

The Vacuum (A Product of Cosmology)

So far, I've described a few of my ideas concerning the structure of subatomic particles, but before I continue, I feel it is necessary to describe the environment in which they exist. I firmly believe that particles and fields are what they are, and behave the way they do, as much from the structure of their environment as from their own structure.

And so I will now talk about their environment.

THE VACUUM

The environment of subatomic particles is the vacuum.

Physicists have discovered that the vacuum, even when it contains no matter or electromagnetic waves from outside sources, is somehow

active on its own. An article in Science News referred to the vacuum as "...a turbulent sea of randomly fluctuating electromagnetic fields..."

Several words in that sentence stand out; turbulent, random, fluctuating. These are words generally associated with "action," with something that's doing something.

It has become clear that totally empty space has its own internal complexity, and that the vacuum itself is a thing to be reckoned with. Evidence is accumulating that the vacuum is an important part of the structure of the universe.

When treated in detail, the vacuum represents the small-scale structure of the universe. This small-scale structure is not just influenced by, it is a product of, the large-scale structure of the universe, and so that is where I will start.

Einstein himself gave me a good beginning for my model. He said that our three dimensions of space are actually shaped in such a way as to form a four-dimensional hyper-sphere. And that our visible universe is the three-dimensional surface of that hyper-sphere. His idea was that this would allow the universe to be finite, yet unbounded.

This was the reason for his interest in Riemann geometry versus Euclidean geometry. Bernhard Riemann was a mathematician who had already worked out the equations for non-Euclidean geometry in two and three dimensions. Einstein applied these mathematics to the structure of the universe and made the phrase "curved-space" a household word.

In addition to Einstein's work, I have based my model of the large-scale structure of the universe squarely on the Big Bang theory. I've stayed with the Big Bang because it has proven to be so useful to so many of the details and features of my model.

THE BIG BANG

The Big Bang was at least vaguely similar to an explosion. And like all explosions, it began very small. But through the release of a great deal of energy, it began to expand at a very high speed.

The Big Bang happened a very long time ago, and the debris from it is what we refer to as the universe. Everything that we see and have direct knowledge of is from the Big Bang. There is nothing known that was exempt.

My model of the Big Bang differs somewhat from the standard version. One difference is the greater emphasis I place on the four-dimensionality of the universe's physical shape. Other differences develop from the kinetic nature of its smallest component parts.

AN ANALOGY

There are several things we can learn by employing a visual analogy.

Please imagine a small stainless steel canister shaped like a ball. Make it about six inches in diameter and imagine it hanging from a thread attached to the ceiling. It hangs there motionless in the middle of the room, halfway between the floor and the ceiling.

The canister is filled with highly compressed air at, let us say, one hundred times normal atmospheric pressure. Which, of course, means there is enough air squeezed inside to fill one hundred identical balls at the normal air pressure in this room.

Let's also say that the canister is very hot. So hot, in fact, that it is only a few hundred degrees below the melting point of the metal the canister is made of.

Now let's say we can just snap our fingers and make the canister disappear, leaving the compressed air still in place and exposed to the room.

Snap!

We now have a six-inch ball of highly compressed, very hot air, that has no reason at all to remain compressed. Immediately, this ball of air begins expanding. If you run your imagination at very slow speed, you can watch it expand.

The expansion is not fully uniform. Mostly this is due to turbulence that existed before the expansion, or was created at the moment the expansion began by unbalanced forces that were themselves the product of an imperfect release. But the importance of non-uniformity will be saved for later. For the moment, let's pretend we have an expanding air-ball, plain and simple.

When the ball has expanded to just over one foot in diameter, it will have begun to develop a hollow place at its very center: a place where the air pressure is not highly compressed. This will be a place of partial vacuum.

When the ball has expanded to three feet in diameter, it will have a low density central region that is approximately two feet across.

A number of different things are happening all at the same time.

For one thing, the wall of air around the central lower pressure zone is trying to become thicker. Both the inner and outer surfaces of the wall are pushing away from the middle of the wall. This is because the wall is still composed of hot, compressed air, and hot compressed air naturally wants to expand. Consequently, the outer surface is trying to move outward even faster. The inner surface is also expanding, but in the opposite direction. Which means the inner surface is actually slowing down.

We will be concerned almost exclusively with the outer surface.

As measured at the outer surface, the speed of expansion is accelerating. Within microseconds, the speed has exceeded the speed of sound. At that point, things on the outer surface of the ball begin to change.

Previously, the air surrounding the ball was simply pushed away to make room for the ball to expand. But now the ball is expanding at a rate much faster than the speed at which the molecules that make up the air outside the ball are bouncing around. This bouncing around allowed them to react to the approaching wall. To communicate to one another to move farther away. But now that the wall is moving faster than they do, that is no longer possible.

They don't have the opportunity to move away. Instead, they accumulate on the surface of the ball. In fact, all the molecules that are

in the way of the expanding surface are now being swept up by it. They are absorbed and become a part of the surface. Once part of the surface, they are accelerated to match the velocity of the surface and are quickly indistinguishable from the molecules that were part of the surface originally.

SHOCK WAVE

What I've just described is called a shock wave. Shock waves differ from compression waves in that they are traveling faster than the speed of sound in the medium through which they are traveling.

Compression waves travel at the speed of sound—naturally, since they are, in fact, sound waves. They never travel faster, and they never travel slower than the normal speed of sound in the substance they are traveling within. Because of this, the dynamics of compression waves allow the molecules that lie in the path of a particular wave to participate in the motion of the wave without actually becoming a permanent part of it.

Granted, a fighter jet also produces a shock wave, and the molecules of air which encounter its shock wave do not become permanent parts of it. But fighter jets are designed to slice through the air with as little friction as possible. Walls are not. Especially walls billions of light years wide.

In the shock wave of our universe, the material inside and the material outside experience completely different conditions, especially as regards their temperature, density, and pressure. What's more, the inside and outside interact at a distinct boundary. This boundary is a sharp transition zone separating the two different environs.

(As a side note: An interesting feature of this boundary is that it's a one-way information barrier. The material outside can influence the material inside, but the material inside can't influence the material outside. Not until that material comes inside. Or said another way, things that are inside will respond sooner or later to changing conditions outside, but things that are outside can never respond to changing conditions inside—unless they come inside.)

IMPACTING MATERIAL

As I mentioned in the air-ball analogy, the molecules that strike the surface of the ball become a part of that surface. The effects which their impacts have on the surface are important in this model, and so, to guarantee clarity, I'm going to explain the impacts in more detail.

The impact of molecules imparts kinetic energy to the surface. However, because the air-ball is so hot, the total kinetic energy of each molecule that strikes the surface is less than the total kinetic energy of each of the molecules that form the surface. Consequently, the impacting molecules produce a cooling effect on the surface. The very outermost layer of molecules in the ball are relatively cool, while the interior, the bulk of the ball, is still extremely hot.

Besides sharing their kinetic energy, the impacting molecules share their momentum. This causes the outermost layer of the surface to try to decelerate. However, with the bulk of the hot air-ball pushing outwards trying to get bigger, decelerating is out of the question.

The expansion continues to increase in speed, but the momentum sharing does produce a result. The result is a change in the density gradient of the surface. The surface is not allowed to gradually decrease in density the way the top of the earth's atmosphere does. The earth's atmosphere gets thinner and gradually trails off to a vacuum over a great distance. The surface of the air-ball becomes compacted into an unambiguous transition zone; a boundary that can truly be called a surface. This surface has a mild resemblance to the surface of a fluid. There are differences, but there are also similarities.

The distinction of a discrete boundary, instead of a tenuous boundary, is an important one, and is a fundamental principle of this model.

One point about temperature is that regardless of the temperature of the interior, the temperature of the surface will ultimately become and remain whatever temperature is equivalent to the average kinetic energy of the impacting molecules. Not just their vibrational energy,

but the thermal equivalent of the average kinetic energy of their impacts.

There are a number of subtleties, of course.

The depth of the impact zone, for example. Its depth will depend on several things; the mean free molecular path within the outer surface, the amount of turbulence created by impacts, and so on. But most subtleties can be gone into later when they become more important to understanding other phenomena.

THE REAL BIG BANG

At this point, we have gone about as far as we can with the explosion of air, but remember its form and its surface effects.

Now for the real Big Bang.

One of my fundamental postulates that has guided me through all my modeling is that "it is structure and structure alone that determines and creates every property of everything."

In my model, the entire universe is an expanding ball of material. It is this one feature that provides the universe its overall structure. This large-scale structure produces, as a direct consequence, the small-scale structure.

These two combined levels of structure dictate totally the nature, properties, and behavior of everything within the universe. Everything; from the littlest things, like individual electrons and protons, to the greatest things, like the apparent three-dimensional geometry of free space and the continuous progression of change that we experience as the passage of time.

All the different things that we take for granted as simply being "the-way-things-are," have a cause, and that cause can be traced directly to the structure of the universe. Nothing is exempt.

A FOUR-DIMENSIONAL UNIVERSE

There are similarities between the universe and the ball of air, but there are also many differences.

The most fundamental difference, and by far the most difficult to visualize, is that the Big Bang universe is four-dimensional, while the ball of air was only three-dimensional.

An important point I want to make is that our universe is not just four-dimensional in shape, but also in movement. The expanding ball of gas-like pandemonium that forms our Big Bang universe is fully dynamic in all four-dimensions. The importance of this will become more and more apparent as I continue to describe this cosmological model.

Another difference is size.

Obviously, the universe is bigger than the ball of air. But the universe is bigger in two ways. First, it's just plain bigger—many billions of light-years in radius. Second, it's bigger in a rather subtle way. Its grain, its coarseness, the minuteness of its tiniest details, is vastly smaller. This increases the amount of complexity it can hold in the same volume as compared with the ball of air.

Age: The universe is definitely older and consequently has had more of a chance to develop its internal structure. The simple turbulences of its earliest seconds have diverged and grown into complexities almost beyond understanding. Things have combined and recombined in so many trillions of different ways that it seems almost everything has been tried at least once.

Another difference between the ball of air, and the universe, is composition. Naturally, the universe is not made of air. The material that forms the universe, and I am thinking especially of the empty portion of the universe, the vacuum of space itself, is pandemonium, which is composed of countless pips, bouncing about almost like the molecules of air in the air-ball.

THE COSMOLOGICAL CONSTANT AND DARK ENERGY

The word "bang" in the phrase "Big Bang" is based on the notion that the initial velocity of expansion was given to the universe very suddenly, like a great explosion. One that's force lasted only a brief moment, after which the universe was left to coast for the remainder of its expansion. Thus, the universe would be fighting gravitational collapse with its own momentum as its only weapon.

My model of the Big Bang is different. I describe the expansion as undergoing an acceleration. Similar to the air-ball.

The strength of the acceleration of the universe's expansion is tied to the physical size of the universe. This is because the acceleration is driven by the pressure of the gas-like material of which it is composed.

Since the universe is four-dimensional instead of three, this pressure has varied over time as a function of the four-dimensional hyper-volume of the universe. Because of this, as the universe increases in radius, the pressure drops by the fourth power of the increase. When the universe doubles in radius, the pressure drops to 1/16th of its original value. The acceleration is directly proportional to the pressure. So 1/16th the pressure produces 1/16th the acceleration.

We are still accelerating, but we used to be accelerating a lot faster.

Though it clearly does not remain constant over time, this corresponds to what is generally known as the cosmological constant. This constant was first introduced by Einstein, then withdrawn as a blunder, and is now popular again. If you are familiar with it, I don't have to explain it to you. If you are not familiar with it, I will let you look it up.

A LUMPY UNIVERSE

For the sake of simplicity, we purposely imagined that the ball of air was round and without bumps of any significance. But the real universe is not like this. If you've ever seen a high-speed photograph of an explosion, you know that the material expanding outward will not do so

in the form of a nice neat spherical shell. If you haven't seen such a photograph, lookup the crab nebula. It is a star that exploded.

Now, I don't actually think the universe is as badly strewn as is the crab nebula, but this will give you an idea of just how unlikely a uniform expansion would be.

Consequently, in its large-scale four-dimensional structure, our universe will be irregularly shaped. These irregularities may be in the form of bumps or lumps. The kind of bumps I'm talking about would be far bigger than a galactic supercluster. These bumps may very well have had a hand in the distribution and early formation of galaxies.

Because of this, the preliminary results of the great three-dimensional galactic mapping project are not particularly surprising. They show the large-scale distribution of galaxies to be in the form of great curved walls and filaments. These walls and filaments are separated by vast empty places where few galaxies have formed.

SMALL SCALE STRUCTURE

But while the large-scale view of the universe is bumpy, the subatomic scale view is very different. This is due to the impacting material.

The impacting material is responsible for creating the place where particles live. As I have described, it provides a distinct boundary to the environment of subatomic particles.

This impacting material is an essential part of my model of the universe. Without it, the surface of the Big Bang becomes too diffused, too tenuous: a hodgepodge of non-contiguous space. But with it, the surface of the Big Bang, as viewed on the subatomic level, is contiguous, uniform, and consistent. Energetically chaotic, yes, but still a reasonable place for subatomic particles to live.

WHERE THE PARTICLES LIVE

3D WORLDS, IN A 4D UNIVERSE

Imagine the surface of the shock wave in false-4. Imagine an electron. It would be located in the body of the shock wave, just beneath the surface.

How do I know?

Well, pretend it is in the thin cloud of pips located outside the body of the shock wave. It would soon be accumulated on the surface of the shock wave along with the other material that hasn't enough time to get out of the way and gets swept up and becomes part of the body of the shock wave. The impact would smash and destroy it.

So it can't be outside. But what about deep inside the four-dimensional shock wave?

Well, if it were deep inside our four-dimensional universe, it would be free to move about in all four-dimensions. This would present a serious problem. We know from our own experience that we can move about in only three dimensions. What's more, no device made by humanity has ever shown any ability to move freely in all four-dimensions. Nor have we developed any means of transmitting information freely in all four-dimensions.

Everyone knows this to be true. But if the universe is really four-dimensional, why are we limited to only three of them?

This question has led me to a simple geometrical conclusion. That we, and all the things we are familiar with, are located at the surface of the universe.

The geometry is simple. Our expanding Big Bang of a universe is four-dimensional. All subatomic particles are located at the outermost surface of the expanding universe. And as any mathematician can tell you, the surface of a four-dimensional object is three-dimensional.

Therefore, we live on the three-dimensional surface of a four-dimensional object—our expanding universe.

STAYING NEAR THE SURFACE – PARTICLE FLOAT

But what can make the particles stay near the surface?

I've mentioned that subatomic particles as four-dimensional vortexes that are spinning at the speed of light.

All vortexes experience a decrease in pressure in the center of their rotation, caused by the spin's centripetal side effect. This is true of all vortexes, regardless of their type or size. It is true of hurricanes and tornadoes, bathtub vortexes, and even the vortex in your coffee when you stir it with a spoon.

Spinning at the speed of light produces an incredible centrifugal effect. So much so that all the pips in it are shoved outward, away from the center. So the hyper-toroidal vortex that is a proton, or neutron, or electron is actually hollow. Being hollow, they mass less than the pandemonium they exist in. And so, in pandemonium, all vortex particles float.

Please feel free to howl with laughter at the suggestion that solid matter has less mass than pure vacuum, but I stand by this. The details of why I am sure this is true and how this explains much of the nature and properties of matter will have to wait. I have a lot of ground that must be covered first.

As I said earlier, the universe is not simply expanding, but the expansion itself is accelerating. However, because the universe is so incredibly large, the rate at which its expansion accelerates is incredibly small. (Although only in comparison to the overall size of the universe. Its actual value would seem huge to us. More on that later.)

Einstein himself pointed out that an acceleration is exactly analogous to a gravitational field. And that the two are indistinguishable from one another. Therefore, the subatomic particles will react as though they were in a gravitational field. One in which the force of attraction is towards the center of our four-dimensional Big Bang universe.

However, because they are less dense than the pandemonium around them, the subatomic particles will not sink down towards the center of the universe—just the opposite. They will float upwards towards its surface.

This tendency for subatomic particles to float upwards towards the surface of the universe has been in effect ever since the universe began its acceleration outwards. Which means it's been in effect since the beginning of the universe. Because it's been in effect for so long, I believe that all subatomic particles accumulated there long ago. And that today all subatomic particles live just below the surface of the universe.

Naturally, you must be wondering why I haven't said anything about them floating all the way up to the top and touching the surface. This is because they don't. But for the explanation of why they don't, I must again ask you to wait. It's coming. I promise.

TIME

The fourth-dimension, the one that we are not free to move around in, is the one perpendicular to the surface of the shock wave. It is the direction in which the universe is expanding, and so lies perpendicular to our available directions of self-directed movement as we relax and ride the shock wave.

We call this dimension "Time." It has a "Future" (where the surface will be) and a "Past" (where the surface was).

And just as the direction we call "up" varies from one place on the surface of the earth to another. So too, the direction of Time varies from one place on the surface of the universe to another. It's a similar situation. Both directions lie perpendicular to their surfaces, though the universe is a four-dimensional hyper-spheroid (approximately) and the earth is an ordinary three-dimensional spheroid (approximately).

One thing that puzzled me was what to call my model in order to keep it separate from other versions of the Big Bang, and from other non-Big Bang cosmological models. I wanted a name that was similar to the Big Bang, because it was based on that.

I decided that one of this model's principal distinguishing features was its structural treatment of the dimension of Time. Because in it, Time is described as the direction of expansion. After discarding "Big Time," and "Big Time Bang," I settled on "Time Bang."

One of the reasons I like the air-ball analogy is that it takes the reader outside of the universe where they can look at it from the perspective of a mythical god-like being, rather than from the perspective of an inhabitant. This is important because inhabitants are subject to relativistic effects, and can not get an accurate understanding of their universe by looking at it from within.

Not only does it change their spacial perspective, but also their Time perspective. Time ceases to be the rubbery time of relativistic physics. The reader is allowed to view things from the vantage point of someone who experiences Time in an extra dimension. Thus, the reader can examine, even dissect, the structure of the universe in all four-dimensions of spacetime, including our most elusive dimension of all, the one we actually use for Time.

A WORD ABOUT TIME

I call the 4th dimension in my model, "Time," because that's what Einstein called it. But many people seem to be confused by this. They seem to expect Time to be static and unchanging. Yet I describe it as active and dynamic.

I think this is because they believe the past is still there, waiting for them to go back and visit people in it. They think we can visit Shakespeare and Caesar, Mark Twain and Abe Lincoln each during their own time period. They believe this because they've seen it in movies and on TV. Not once, but hundreds of times.

But this universe doesn't work like that. The past is gone. Everything in it is also gone. No one is waiting for us to come visit. Because all the people in the past are gone too. It's sad, but it's true.

However, just in case there is someone who wishes to argue the point that our universe must possess a dimension of Time that is absolutely static, one in which nothing changes; like the still images that constitute a motion picture. I'm not going to fight you on it. If you

want, you can add a fifth dimension. It's certainly free for the taking. But I must be honest with you. In this universe, change is everywhere. The universe is dynamic on every scale and in all four known dimensions. Any dimension where nothing happens is of no interest to me. You may study it with my blessing.

THE PRIMARY FLOW

The extremely tenuous gas of pips that exists outside our expanding universe plays a number of important roles in addition to those already mentioned. For example, they produce an effect that subatomic particles experience as a continuous and uniform flow.

Here's how it works.

As the universe expands, the low-density material outside can't get out of the way and accumulates on the surface of the universe. The newly accumulated material becomes as compressed as the rest of the pandemonium in the Big Bang shock wave and takes on all the same properties. Thus, the surface is added to.

From the viewpoint of subatomic particles that are inside the body of the shock wave, this new pandemonium, layered on top of the old pandemonium, causes the surface to become somewhat farther away. But the particles have a natural tendency to move towards the surface. Given the option, they will move closer to the surface. And as the surface becomes thicker with new material, they will do just that.

This adding of new material is a constant process, and so their movement up towards the surface is also constant. As the particles move, they push their way through the new pandemonium of their environment. Thus, all subatomic particles are constantly heading into the wind.

Because it's both constant and universal, I named this the "Primary Flow."

THE TEMPEST

Another important role of the impacting material is that it provides us with an incredible level of chaos.

It's easy to say that the environment at the surface is dynamic. After all, there is a constant influx of fresh material. New pips that have never been a part of the Big Bang are contributing themselves and their kinetic energy to the surface of the universe. But this is much too weak a picture.

The surface is under a constant bombardment, a perpetual rain of pips. These randomly impacting pips splash into the surface of the universe with enough kinetic energy to work the surface into a froth. This is the "spacetime foam" that theoretical physicists have decided exists in the structure of the vacuum at the Planck scale (approximately ten to the minus thirty-five meters).

I will describe this tempest more fully in a later chapter, but for now be aware that this randomly energetic chaos exists, and that it is massively violent.

THERMAL INVERSION

Because the universe is very old, it has been running into the impacting material for a very long time. So long that the surface long ago achieved a stable temperature. This temperature is a product of the speed at which impacting material strikes the surface, and by how much compressing this causes to the pandemonium.

The temperature of the surface is very hot, but the deep interior of the universe is hotter still, which means that the surface is actually

cooler than the deep interior. This might seem counter-intuitive. Let me explain.

I mentioned how the upper atmosphere of the earth gets thinner and thinner until it fades with distance almost into nothing. The impacting material compresses the pandemonium somewhat, preventing it from becoming thin and tenuous. It compacts the pandemonium enough that it forms a "surface." A distinct boundary between inside our universe and outside. Between two regions with completely different conditions.

However, the impacting material does not compress the surface of the universe to the same pressure as the deep interior. If it did, it would stabilize the expansion at its current rate, preventing any ongoing acceleration. And we know from observation that this has not happened.

That the surface is cooler than the deep interior means there is a thermal gradient. Exactly how strong a thermal gradient is not yet clear, but a few things can be said with confidence.

I have also mentioned that because the expansion of the universe is accelerating, the surface of the universe experiences a situation indistinguishable from a gravitational field. Because of this, the thermal gradient is a "thermal inversion."

It's upside down, as far as stability goes.

This is because the cooler pandemonium is "above" the hotter pandemonium. A situation inherently unstable. Undoubtedly, there will be places where the cooler pandemonium is moving downward through the hotter pandemonium, and the hotter pandemonium is moving upward to take its place.

This thermal inversion holds an immense amount of potential energy; the release of which drives powerful dynamic systems on the subatomic scale. This is what provides the power to maintain the several spins which constitute subatomic particles.

More details will be provided on how vortex particles are fed energy later in this book, in the chapter on Feed Theory.

WHERE ELECTRONS LIVE

In my model, protons exist close to the surface of the universe and electrons exist much farther from the surface. This is a product of their differing vorticities and hyper-toroidal shapes.

How close are protons to the surface? Maybe three times their own diameter. Maybe ten. I'm not sure.

How far from the surface do electrons exist? The Bohr radius provides most of the answer to that question.

The Bohr radius is a physical constant, approximately equal to the most probable distance between the nucleus and the electron in a hydrogen atom in its ground state. It is named after Niels Bohr, due to its role in his model of the atom. The Bohr radius is 8,500 times larger than the diameter of a proton.

(Or said more scientifically, its value is $5.29177 \times 10{-}11$ meters.)

Unfortunately, there are two different ways I can interpret its value. The simpler interpretation is that electrons exist 8,500 proton diameters from the surface of the universe. Which might be true, but I am torn between that interpretation and the following one. It's possible that electrons exist 8,500 times as far from the surface of the universe as protons do. Which means we will only know which is correct once we verify how far both protons and electrons exist from the surface.

Curiously, electrons, because of their charge, get as close to protons as they can, but because they exist so much farther from the surface of the universe, as viewed in False-4, they can never reach them. They try, and try, but always they fail. It's almost as if there is a different surface for them, one they can never penetrate.

That's it. That is the only reason electrons never get inside the nucleus, and can never touch a proton (except, of course, under the most extreme circumstances, such as the collapse of a neutron star).

If they could, they would.

I would like to pause a moment to thank you for reading my book.

If you are enjoying it, please consider giving it a review on Amazon (or elsewhere). Reviews help readers discover new books, as well as let Amazon know you feel this book has some merit. If you're especially interested in helping me, tell a few friends about this book—in person or online. Word of mouth is the best sales pitch.

Thank you,

Stephen

ORIGIN OF THE IMPACTING MATERIAL

Where did the impacting material come from and why is it in its thinly dispersed state outside our universe, and being swept up by the surface of our universe as it continually expands outward?

It is not there by happenstance. Nor is it there as a bizarre quirk of coincidence. No. Not at all.

Consider the distant future; what will our universe become when it has expanded so far that it is thin and tenuous and lost most all of its

energy? After it is no longer able to support stars and planets and life. After it is spent and dead. It will become like the impacting material. Not similar to it, but like it exactly. This is our distant future. And it is inevitable.

When that distant day comes, there might possibly be a new expanding universe—young and strong and full of possibilities—pushing its way through what remains of our old dead universe. If that happens, we will be the impacting material that accumulates on its surface.

This is speculation, or course. I do not know that another universe will come along and expand into us. However, this picture seems logical, and would explain why we are currently pushing through impacting material which has the properties that it has.

I suspect, but do not know, that the impacting material we are expanding into today is what remains of a universe that thrived and then died before ours. Just as we may feed energy into a new universe that comes after us.

What's more, I suspect, but do not know, that there has been, and will be, an endless train of universes. Ours is just another in the parade.

But what mechanism of nature is spitting them out? And why separated by so great a time? I cannot imagine.

WHERE IS THE EDGE OF THE UNIVERSE?

Whenever someone hears for the first time that space is not infinite, they always ask the same question. Where is the edge of the universe? This is usually followed by lesser questions like; what does it look like? And can we ever go there?

I can answer these questions with confidence because I have personally been to the edge of the universe and seen it. You have too.

According to my model, every point in three-dimensional space is located on the outermost surface of the constantly expanding Big Bang. Every point; those around me, and those around you. What's more, every point inside your body lies on the edge of the universe as well.

To say this with a bit of overkill. Every electron, proton, and neutron, in every atom, in every molecule, in every cell, in every organ, in your body, sits less than an angstrom from the outermost edge of the universe.

In fact, everything we know and see sits on the edge of the universe; whether it's a bird, a stone, a plant, or a planet. All the history that ever was, and presumably all the future history that will ever be, will occur there.

Does this sitting-on-the-edge make you feel precarious? Like you might fall off? Or does it give you a feeling of vulnerability? Knowing how every bit of your body is completely exposed to the impacting material? Exposed to the view of any hypothetical four-dimensional outsiders who just happen to be passing by our universe?

For us, the universe is, and has always been, limited strictly to the surface. To change this, even within a small region for a short time, will require a technology advanced almost beyond comprehension.

The ability to alter or manipulate the structure of space could open the way to communication and travel at speeds faster than light.

And while it is difficult for us to imagine, I do not doubt for one moment that if we are given sufficient time, we will develop such a technology.

The future is deep and there is room enough in it for anything.

Chapter 4

The Tempest & Virtual Particles

THE IMPACTING MATERIAL CREATES THE TEMPEST

The impacting material strikes the surface of the universe randomly and energetically.

A single impact packs such a wallop that despite the pip's tiny size, the kinetic energy is sufficient to produce compression waves in the surface that are almost as large as a proton. Trillions of times larger than the pip that made the impact.

And I don't mean pleasant little waves that waft subatomic particles around like butterflies on a summer day. I mean waves that grind and crush. Waves that will rip a subatomic particle in half without missing a beat. Waves that can slap a virtual particle into existence one picosecond and slap it right back out of existence in the next.

I'm talking about killer waves.

Waves that squeeze and stretch and smash. Waves that can sling subatomic particles around so hard they look like they're break dancing.

For the particles involved, this goes way beyond Brownian motion. This is Brownian death—and rebirth.

These waves are The Tempest.

The only thing I can compare them to are the waves in an ultrasonic cleaner. An ultrasonic cleaner looks like a little bathtub. When you put your jewelry in the fluid bath and turn it on, it creates sound waves in the fluid so powerful that they form tiny bubbles on everything inside. But these bubbles contain vacuum—not air. And because they contain vacuum, they immediately collapse with explosive force. The machine cleans objects by beating their surface to death.

That is the kind of Tempest we have at the surface of our universe.

EXAMINING A SINGLE IMPACT

Let me describe the event of a single impact.

The incoming pip is best considered as a ballistic object, and the surface, which is made of pandemonium, as I have said many times, is a compressible gas. On impact, the first effect is the creation of a tiny cone-shaped hole in the surface of the universe. Since the incoming pip's relative speed is greater that the speed of sound in pandemonium, this is its sonic boom.

As the pip slows to match the velocity of the pandemonium, the pointed end of the cone becomes more rounded. As the sonic boom continues to expand, the cone-shaped hole transforms into one that is hemispherical.

At some point, the impacting pip will lose all its original momentum and begin bouncing around in the same random patterns as the rest of the pandemonial pips. At that point, it will have become part of the pandemonium and is indistinguishable from all the other pips.

The sonic boom produced by the impact was so energetic that it was a shock wave. However, with continued expansion, its energy density

dropped rapidly, and soon it became an ordinary compression wave. Like a sound wave.

This energy density drop will occur even faster that it would in our own experience. This is because it occurs in pandemonium, which is a four-dimensional gas, and so follows an inverse cube law rather than our usual inverse square law.

As a side note, all impact waves will have nearly the same wavelength, because all impacting pips strike the surface at nearly the same speed. This is true because they are not actually approaching the surface; the surface is approaching them. Remember, the surface is the outermost edge of our expanding universe.

Also, the wavelength of these impact waves is, I believe, incredibly short. Possibly less than the diameter of a proton.

HOW FREQUENT ARE IMPACTS?
AND HOW CLOSE TOGETHER

Figuring out that the impacts occur at random is, of course, easy. But estimating the rate at which the impacts occur is not as simple. The bottom line is that the rate of impact events must balance several considerations.

It must be rapid. Rapid enough to account for the uniform flatness of the surface of the universe. There is an abruptness to the boundary layer between the inside and the outside, a sharp pandemonial density gradient.

But it must also not be too rapid. It must be infrequent enough to produce the Tempest. The primary feature of the Tempest is that it is not smooth, it is rough. This roughness is on approximately the same scale as subatomic particles. Therefore, the average peak-to-peak separation distance of the random waves that make up the tempest is

something on the order of the diameter of a proton (give or take an order of magnitude or so.)

But over what amount of time? A second would seem like an eon on the scale of vortex particles.

If we measure time based on how long it takes a vortex particle, such as a proton, to rotate twice (since it has to rotate twice to show the same face). For convenience, let's give it a name. Perhaps "One Full Proton Rotation" or OPR for short.

We will also need a vortex particle-sized unit of area for the surface of the universe. (This "area" is a 3D cube, since the surface of our 4D universe is three-dimensional.) Let's use the volume of a proton for this.

Using these new units of measure, I estimate the following: Within the volume of a proton, and during a time period of 1 OPR, I would set a preliminary lower limit of approximately 0.1 impact, and an upper limit of approximately 2.

Granted, these are just rough estimates, but they are based on what we know about vacuum energy. And from what we know about the randomness of subatomic particles, I would also say that the lower limit has far more room for flexibility than the upper.

After all, the small-scale randomness can also contain large-scale randomness. Let me explain what I mean by that.

Look at the falling rain. Individual raindrops strike the ground in random locations. But taken on a large scale, there is usually uniformity. Each square foot of the drive-way gets about the same amount of rain per second, at least normally.

On the other hand, sometimes the rain falls in sheets. These are areas of increased raindrop density. These sheets can be seen wandering across the drive-way, driven by the wind. Such variations in raindrop density are random, but on two completely different scales. One small scale, and one larger.

Whether the impacting material strikes with plain randomness, or larger randomness built on top of smaller randomness, one fact remains, the bombardment is more or less uniform above the scale of

atoms, and this uniformity extends over the entire surface of the universe.

VIRTUAL PARTICLES

The real beauty of Vortex Theory is that it opens the door to explanations for a number of the most peculiar properties and behaviors of subatomic particles.

Take the spontaneous creation of virtual particles, for example. In Vortex Theory, an electron/positron pair are just mirror image vortexes. Their creation being the result of a momentary concentration of momentum in the random turbulence of pandemonium. Their annihilation on reunion is therefore only to be expected.

Also, the cloud of virtual particles that surround every "real" particle can be explained in the same manner. In this case, the "real" particle is the one that persists. Or said with more accuracy, the one that keeps being recreated because of residual vorticity in its region, after it is destroyed and recreated and destroyed and recreated and destroyed, endlessly, billions of times per second.

This persistence is what makes it "real."

RIOT THEORY

An isolated subatomic particle is never alone.

It is in the midst of a cloud of virtual particles. But also the lone particle **itself** is a cloud of temporarily existing particles in which all

the spins cancel out—except one. And that one spin is the actual spin of the particle that is, so to speak, "real."

All the particles in this "cloud" are constantly and violently buffeted by the random pressure fluctuations of the Tempest. This cluster of temporary particles are interacting with one another, and are being destroyed and recreated at random. Even the particle that is, so to speak, "real" is destroyed and recreated over-and-over again, billions of times per second. And never in exactly the same spot.

Within Riot Theory, a particle is not stable because it remains unchanged over a long period of time, but because it is spontaneously recreated over-and-over again, no matter how many times it is destroyed.

But why is it recreated in the same form?

Because of the residual, and yet powerful, vorticity which lingers ghost-like in the pandemonium while the particle does not exist. This vorticity contains the momentum of its hyper-toroidal shape and allows it to reform just as it was. (Although sometimes it accidentally makes two copies, or even more rarely, more than two. Hey, it's a riot.)

The entire cloud of particles and all its activity taken together as a whole is what we call a single subatomic particle. And all this activity **is** the wave function. Thus, a single particle is a riot of interacting temporary particles.

This process is how quantum tunneling is achieved, since the subatomic particle is just as likely to be recreated on one side of a barrier as on the other.

It also explains the curious results of the famous quantum experiments involving the interference of a single electron with itself. It was the cloud of temporary particles that passed through both holes and interfered with itself.

No mystery there.

This is also why the location and momentum of a subatomic particle can only be known as a statistical probability. Which is part of the reason the uncertainty principle was invented. And until we are able to create a microscope that uses streams of pips to image with, it is why all the ramifications of the uncertainty principle will remain true.

This also explains superposition. A subatomic particle will seem to be in every possible state that it can be in, because even over a timescale shorter than a picosecond, it actually is in every state.

By experimenting with variously separated pairs of holes, clues can be gathered as to how wide the cloud of a subatomic particle typically is, and how wide it can become under various extreme conditions. Such as inside a powerful magnetic or electric field.

Questions that can be answered using 4D CFD software include:

Can the impacting material really cause the universe to form a meaningful surface, as I have described? Can it really produce a thermal inversion as I have described? What are the emergent properties of pandemonium, such as pressure, temperature, and specific heat capacity? How closely do pips, as a four-dimensional gas, follow the ideal gas law modified for four-dimensions? And how does the tempest affect the stability of vortex particles as it constantly destroys and recreates them?

VIRTUAL PARTICLE ANNIHILATION

Virtual particles are unstable for two main reasons. The one reason is that many are not actually complete when spontaneously created

from the energy of the Tempest, but are broken or damaged or misshapen.

Another reason, however, is that the sporadically random events which create them sometimes create a complete vortex particle pair. An electron and anti-electron, for example. Complete. Not broken or misshapen.

This pair has opposite electric charges, which pull them back together with a powerful force until they touch. And, of course, once they touch, their opposing directions of spin tear them apart into a chaos of many turbulences which quickly cancel each other out; so the energy of the particles is reabsorbed into the pandemonium.

In nature, most complete virtual particles are electron/anti-electron pairs. Not all, just most. This is because the Tempest—sometimes called zero-point energy or the energy density of the vacuum—very often brings together enough accidental vorticity to create them. Nearly two thousand times as much accidental vorticity is required to produce the next larger stable particle—a proton/anti-proton pair.

It's hardly surprising that neutron/anti-neutron pairs are vastly more rare than proton/anti-protons. This despite the fact that they require almost exactly the same amount of energy. This is because the neutron's double hyper-toroidal structure is so much more complicated.

CLUES TO NEUTRON COMPOSITION

How neutrons decay, and how they can be made, provide us with twin clues as to their composition.

How they decay: When a neutron gets thrown out of its nucleus and it becomes a solitary particle, it has a half-life of roughly ten minutes.

When it decays, it becomes a proton, an electron, and an electron neutrino.

How they can be made: When a sufficiently large star runs out of material with which to perform fusion, it will become a supernova, and then its remaining core will collapse, under its intense gravity, into a neutron star. It does this by squeezing the core's material so tightly that its protons and elections are forced to touch one another. Indeed, they are pressed together so tightly that they transform into neutrons. A neutron star is composed of 99.999% neutrons.

These two facts tell us, quite blatantly, that a neutron is composed of a proton and an electron somehow joined together into a single particle.

My impression—based on my model—is that a neutron is composed of the hyper-torus that is proton, plus the hyper-torus that is an electron entwined together; linked, joined, twisted somehow into a single more complicated hybrid vortex particle.

This structural form also encapsulates some extra energy, which, during decay, is thrown away in the form of an electron neutrino. Presumably, during the forming of a neutron star, this energy must be provided, by some other means, to each neutron that is created.

That a neutron is stable only while inside a nucleus, suggests to me that this hybrid particle can only remain stable so long as it is acted upon by the Bernoulli effect of its fellow nucleons, but once removed from this Bernoulli effect—once it is outside the nucleus, isolated and alone—it becomes meta-stable. Soon it will fall apart into its component pieces.

A question I ponder is: Why do we not see, in nature, two or more lone neutrons—without any protons—sticking together and providing stability to one another? I understand such nuclei of two and four neutrons have been created artificially, but have not been found in nature. Is this because it never happens naturally? Or perhaps it happens, but we've never observed it?

If it never happens, then perhaps it is the protons that produce the overwhelming bulk of the Bernoulli effect, which holds nuclei together, and neutrons produce less of this binding effect.

This seems worth investigating.

POSSIBLE HYPER-TOROID TOPOLOGY SWITCHING

I mentioned in a previous chapter that hyper-toroids can be subdivided into three groups based on their topological similarities. And that I suspected that a hyper-toroidal vortex of one group can change into another of that same group, but probably not between groups. I said this because the three groups are topologically unique. That is, each is of a separate genus, as defined in topology.

For us ordinary people, this means each has a different number of holes through it. And the arrangement of holes is a product of the particle's fundamental spin combinations. Thus, to change the number of holes, you must change the spins. But to change the spin combinations requires destroying the particle.

Because vortex particles are repeatedly destroyed and recreated by the Tempest, they may be recreated in a topologically related form.

Indeed, the particle we know as a proton may have two or three different hyper-toroidal vortex forms it gets recreated into. Possibly choosing which form at random or maybe cycling through each in a specific order.

It's even possible that the neutron actually exists in two related hyper-toroidal forms. Oscillating back and forth between the two. And that we measure it to have no charge simply because each of its two forms has a charge that is opposite to the other. Thus canceling each other out over time periods too short for us to measure.

It's possible, but this is a speculative idea. Perhaps 4D CFD will prove it true or false.

UNLEARNING OLD RULES

One of the stumbling blocks someone who is trained in the traditional physics of today will have in understanding Pandemonial Dynamics is the need to unlearn several fundamental concepts.

For example, there is no "Latice" underpinning the vacuum. Also, there are no 17 or so separate quantum fields. None of the 17 exist. Not one.

There is only fluid-dynamics. Nothing more.

These things are constructs we have built to explain the data we have accumulated over decades. To our delight, they fit the data, and fit the data, and fit the data, until they did not. Using them, we have mathed ourselves into a corner that we cannot get out of. At least not using those old models.

Mind you, they have done a wonderful job of carrying us far in our understanding of the universe, but their time has run out. They have served their purpose. Now they must be abandoned. And they must be abandoned completely.

I will say it again; there is only fluid-dynamics. And nothing more.

Chapter 5

Tilt Theory

I apologize for the occasional redundancy in the essays in this chapter. I've worked to remove some of it, but some remain.

THE TIME-AXIS

Imagine a raindrop. Cartoonists draw raindrops in a teardrop shape. But real raindrops, when photographed using high shutter speeds, are shown to be oblate spheroids somewhat flattened on the bottom. This is because air flowing past a globule of water alters its shape such that the globule becomes flattened, and the orientation is such that the flat face is into the wind.

Subatomic particles don't have air flowing past them, but they do have the Primary Flow. The effect on a particle's shape is almost

nonexistent, but the effect on its orientation is significant. Subatomic particles move against the primary flow with their flattest face into the wind.

I have described subatomic particles as being roughly similar in nature to smoke rings—although four-dimensional smoke rings. If you have seen many ordinary smoke rings, you already know that smoke rings move with their flattest face into the wind.

Smoke rings are, of course, radially symmetrical. A smoke ring can be rotated on an axis running through the hole in its center without changing its apparent shape.

While it's true that sometimes the three-dimensional views and cross-sections of the various hyper-toroidal shapes, as they are drawn on paper or sculpted in modeling clay, are clearly not radially symmetrical. But I must emphasize that these representations are incomplete. Only four-dimensional representations of these shapes can be complete, and we have no way to visually represent the shape of four-dimensional objects in the completeness of their four-dimensionality because our experience is limited to our three-dimensional world.

But regardless of our own shortcomings, when considered in the fullness of their four-dimensionality, all hyper-toroidal shapes are 100% radially symmetrical, without exception. This is a result of their being shapes defined by rotation. It is an inescapable mathematical fact.

All hyper-toroids have one or more flat face that will orient them into the wind. This is an important frame of reference for describing the orientation of the particle.

This axis is perpendicular to the particle's largest cross-section, which by definition is also its flattest face. Because of this, this axis remains always parallel with the general forward motion of the particle. Or said more simply, this axis points into the wind.

Thus, insofar as the chaos of the tempest will allow, the particle's orientation is stabilized with respect to its immediate environment, as well as to its neighboring subatomic particles, and to the large-scale structure of the universe.

This axis, which runs through the center of subatomic particles and is perpendicular to the surface of the expanding big bang, but parallel with the dimension we call time, I have dubbed the Time Axis.

An understanding of the Time Axis is fundamental to all movement within this universe.

RUNNING INTO THE FUTURE

While all subatomic particles appear spherical to us in our normal three-space, their full four-dimensional shape is actually somewhat flattened, causing them to have a discernible top and bottom. A common smoke-ring, for example, is much wider than it is thick.

If we use my previously mentioned directional conventions—up, toward the outside of the surface of the universe, being the future; and down into the deep interior, being the past—then as subatomic particles ride along inside the shock-wave of our universe, they are speeding flat-faced into their future, always holding the same face to the future and the other face to the past. Again, like an ordinary smoke-ring.

And like a smoke ring, the primary spin of subatomic particles imparts to them a constant and steady motive force, causing them to behave like little jet engines trying forever to fly straight up through the surface of the universe and out into the great beyond. The only thing preventing them from succeeding in this is the pinched flow pattern caused by their own vorticity between them and the surface, which acts like a repulsive bumper.

This jet engine-style motive force is a universal property of all three stable subatomic particles—electron, proton and neutron—as well as most members of the zoo you have assembled of unstable particles and particle fragments. It is built into their physical structure and cannot be

separated from them; in the same way that charge and magnetic moment cannot be removed.

Some early particle physicists accidentally discovered this in their calculations. Roger Penrose mentioned a theoretical calculation by Dirac in 1938, the results of which almost always said that 'subatomic particles take off running at close to the speed of light.' (The Emperors New Mind, page 190, by Roger Penrose, published by Penguin books.) They misunderstood this to mean across the room and straight out the door. Needless to say, they struggled long and hard to remove this incessant movement from their equations. But unnecessarily, because their equations, at least in this regard, were correct.

In our four-dimensional universe, no particle is ever truly at rest. Even when a particle appears to us as being at rest, it is actually running into its future just as hard and fast as it can. As fast as its little speed-of-light primary spin will carry it.

Even an ordinary smoke ring behaves this way. In creating one with a puff of air, you push it forward, but it does not slow to a stop due to friction with the air. Instead, it is propelled continuously forward by its primary spin. Only when it runs out of primary spin does is slow and dissipate.

For a subatomic particle, this propulsion may seem meaningless—since the surface of the universe holds it back so effectively—but it is far from meaningless. And here's why:

Picture a subatomic particle and its Time-Axis—the imaginary line drawn through the particle's center extending from its future into its past. The jet-engine-like motive force every particle generates is always aligned with this time-axis. If its time-axis is tilted even slightly compared to the local surface of the universe, the motive force will cause the particle to slide sideways across the surface. And the more it's tilted, the faster it will slide.

Mind you, the particle really only knows how to run at one speed—the speed of light. But as its tilt is increased, less of the motive force is wasted pushing up against the surface of the universe and more gets to

be used for running sideways. Thus, the more you tilt the jet engine-like exhaust, the more lateral movement you produce.

All particle movement ever seen or measured by anyone is of this type. For there is no other. If your hand is moving, it is because all the particles composing it are tilted ever so slightly compared to the particles composing the rest of your body. The same goes for those in a thrown ball, a falling drop of rain, or an orbiting planet.

All motion is by tilt.

Since a subatomic particle's velocity through our observable three-space is based entirely on the tilt of its time-axis in four-space, it follows that all accelerations are produced by changing a particle's tilt. Which also means that most of the forces in this universe that we think of as being linear are not linear at all. Gravity and electromagnetic forces, for example, change a particle's velocity only by applying to it a torque.

But applying torque to a particle composed entirely of multi-axis spins is no easy feat. Each spin imparts to the particle a gyroscopic stabilization, and therefore a massive resistance to torque. This resistance to torque, we call inertia.

This is why it takes energy to get something moving, and then more energy to get it to stop. Energy to change tilt, and more energy to change the tilt back to its original position.

Curiously, because the inertia of vortex particles is caused by the gyroscopic stabilization of their spinning ring-vortex structure, it is only tied to the mass of pips indirectly.

ISAAC NEWTON'S THREE LAWS OF MOTION

And now for the obvious:

From everything I've just said, it follows that Isaac Newton's three laws of motion can be rewritten for Tilt Theory.

1) A particle not tilted compared to other particles around it will remain not tilted compared to them, and a particle that is tilted compared to other particles around it will remain tilted compared to them, unless its tilt is changed by the application of a torque by some outside torque provider.

2) The change in a particle's tilt produced by an outside torque provider will be directly proportional to the torque acting on it and inversely proportional to the combined gyroscopic stabilization of its various structural spins.

3) When two objects interact, the amount of torque on each is equal and opposite.

This last law can be reworded into a more obvious truism: There are no isolated torques. All torques occur in mirror-image pairs.

As a side note: there exist a few forces in the subatomic world that are truly linear; forces that do not produce torque. When applied to a particle from any direction, these will produce a displacement of that particle's location but will not make a lasting change in its direction of travel. This is because when the force is removed, the direction of travel will once again, as always, be controlled by the time-axis tilt.

Forces known to accelerate particles—torque-based forces—include gravity and electromagnetism, but not the strong force, which only displaces. Although, while in its powerful grip, a particle can inadvertently become tilted through the buffeting it receives from nuclear thermal agitation.

PIP ABSORPTION PROVIDES TORQUE IN DISCRETE QUANTA

The absorption of a pip into the spinning surface of a subatomic particle produces just such a torque. What's more, because the spin is always at the same speed—the speed of light—and the inertia being overcome in accelerating the pip up to the spin speed is always the same—pips all mass the same—because of all this, the amount of torque produced occurs in discrete units, which always have the same value. Or quanta.

Due to the violent buffeting of the Tempest, this happens at random all the time. Each pip absorbed or expelled is a quantum of energy. It is one unit of Planck's constant. These random events will produce a series of accelerations in random directions, at random time intervals, but they average out over time to zero net movement.

However, if there is a net pandemonial flow past the particle in one direction or another, that the particle is capable of responding to based on the geometry of its various spins, the resulting absorptions and expulsions will produce a torque.

This net flow of pandemonium can be parallel with the particle's Time-Axis—which is an electric field. Or it can be perpendicular to the particle's Time-Axis—which is a magnetic field.

More on these fields later in the chapter on electromagnetism.

HOW PIPS RELATE TO PLANCK'S CONSTANT

Since the perceived mass of a subatomic particle is based on its time-axis tilt being gyroscopically stabilized, it should not surprise you —though I feel certain that it will—to learn that the kinetic energy of a single pip traveling in a straight line is equal only to its mass times its

velocity. Not one half of its mass times its velocity squared, as is the case for vortex particles. Thus, individual pips are not completely Newtonian in their behavior.

Let me say that again, just to make sure you heard it. The kinetic energy of a pip is equal to its mass times its velocity. That's it. Full stop. It is NOT one half of its mass, and it is NOT times its velocity squared. No.

For a pip, the equation is KE=mv.

Why this is true will become clearer as we proceed. For the moment, I ask only that you remember it, even if you do not yet believe me.

Questions answerable using 4D CFD software include:

How does a particle absorb and emit pips, resulting in a torque?

Model the absorption of pips into the spinning surface of a subatomic particle, and show that it produces torque in discrete quanta?

REVIEW OF TILT & TORQUE

Tilt theory is very simple, really. It states that everything in the universe is traveling into its own future. Not in a poetic sense, but actually physically traveling. That this traveling is a function of the expansion of the universe, which is driven by the pressure within the bulk of the universe. That the direction of travel is perpendicular to the three dimensions of space we are accustomed to moving around in, and is the dimension we called Time.

The theory gets its name from its primary postulate: that all movement within three-space, the movements that we can observe or experience, are caused by tilt, and nothing else. That inertia is the resistance to a change in tilt. And that the tilt of every particle is locked in place by the gyroscopic effects of particle spin.

Anything that alters the tilt of a particle will alter its direction of travel into the future. Or said another way, it will alter the location where it will be in the future. Therefore, a change in tilt is an acceleration.

Changes in tilt can't be produced by a simple linear force. To produce tilt, a torque must be applied.

Torque is an important concept in tilt theory. Any force that cannot produce a torque on a particle can not make a lasting change in the particle's forward path that will continue into the future after the particle is beyond the range of the force. It may be able to alter the particle's motion while it is near the particle, but only while it is near.

Chapter 6

Frame of Reference

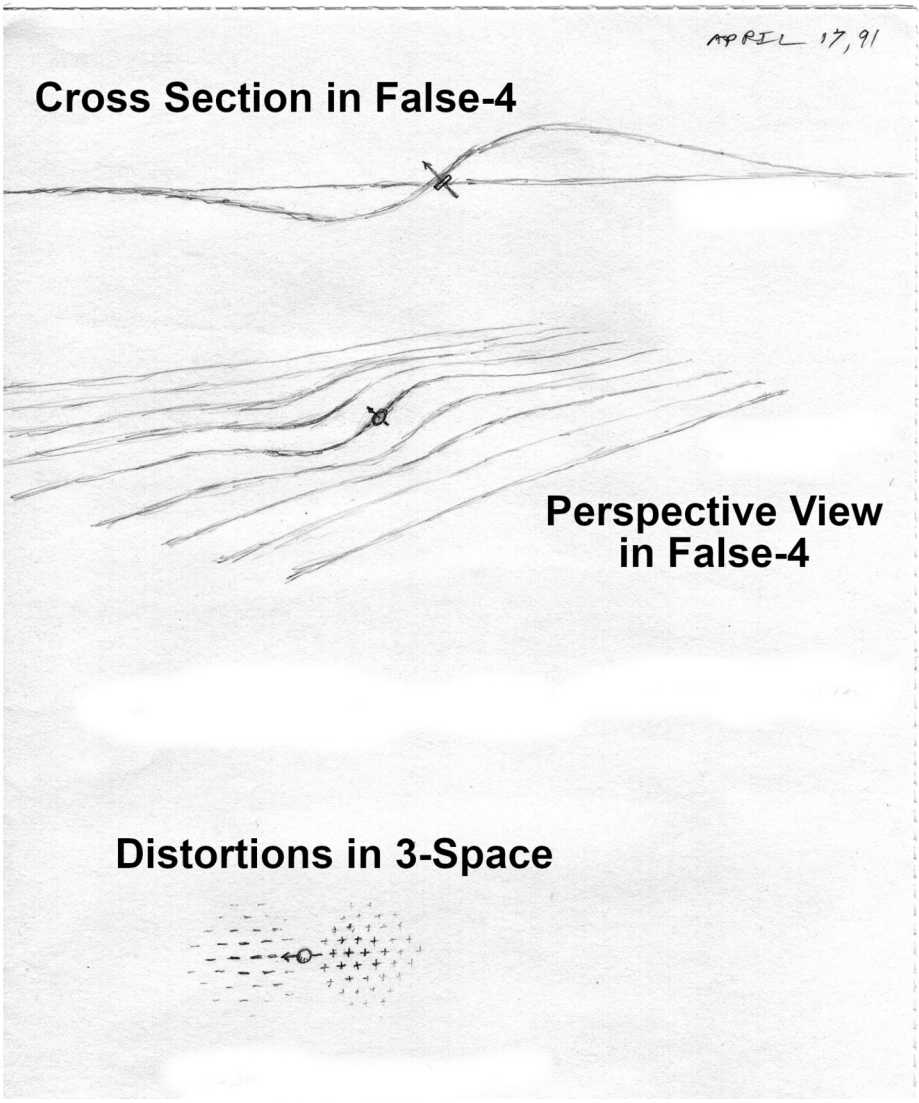
SURFACE DISTORTION

When considered on a scale vastly larger than that of the tempest—for example, on the scale of a microbe, or a baseball, or a planet—the surface of the universe is more or less flat and smooth. However, any motion will change this.

As any object—such as a microbe, or a baseball, or a planet—moves laterally just below the surface of our four-dimensional universe, it distorts the surface from its usual flatness.

The shape of this distortion, if drawn on a sheet of paper in a cross-sectional diagram in False-4, would be similar to that of a sine wave. This diagram would represent only two dimensions of "space" and the one dimension of "time." The object creating the distortion will be near the center of the wave. [See the following diagram.]

Surface Distortions due to a small object at high Tilt



This surface distortion is tied to the object's tilt, but it is important to understand that the surface distortion will scale with the size of the object creating it. It can be as small as a single subatomic particle or as large as an entire galaxy. It will also scale to the velocity of its movement. Faster movement will produce a larger sign wave.

Another important point is that this is relative movement. Relative not to the large-scale structure of the universe or even to the nearest other objects, necessarily. No, as far as this wave is concerned, the only meaningful frame of reference is the plane of the surface of the universe in the immediate vicinity of the object in question.

This surface distortion has many features worth studying, however, the part that is of the greatest interest to us is that portion that is closest to contacting the object creating the distortion. This is the part of the surface that will most closely match the object's tilt. These two things; the object's tilt and the tilt of the surface work together to create the object's frame of reference.

The mathematical simplicity of the relationship between objects that are tilted relative to one another can naturally be calculated using simple trigonometry. Not approximated, but absolutely and totally with nothing left out.

While the overall shape of the universe is that of a lumpy spheroid, on the scale of galaxies, it may appear more like waves on the ocean.

Every object that is traveling in its own direction has its own tilt and its own tilted surface of the universe.

ALL PARTICLES CARRY THEIR OWN FRAME OF REFERENCE WITH THEM

If we accept that every object tilts its local surface of the universe to become perpendicular to its direction of motion into the future, and that every object defines its frame of reference based on its current orientation to the surface of the universe. Then we are faced with the

prospect that every object carries with it its own frame of reference, and within that frame of reference, it is not moving.

We can think of this as these objects dragging their frame of reference along with them. Or we can look at it from their point of view. They think, "It's the rest of the universe that is in motion. Not me. I am perfectly stationary."

Since it is measuring its own motion by comparing it to the surface of the universe nearest to itself, its opinion is not wrong. By this comparison, it truly is not moving. Even though it may be sitting on a table, which is on the earth, which is orbiting the sun at 18.5 miles per second.

Remember, a particle's frontal wave is what keeps the particle from contacting the surface itself. It does this by pressing upward against the surface. But if the frontal wave becomes tilted, the pressure it places against the surface will be tilted. The surface will respond to this tilted pressure by becoming tilted as well.

When something alters the particle's tilt and therefore its direction of travel, the particle's new tilt adjusts the tilt of its environment, such that its personal environment again travels along with it, and again it thinks it is not moving.

Therefore, any particle that is not actively in the process of accelerating is—by its own measure—completely at rest.

THE MICHELSON-MORLEY EXPERIMENT

This all leads to the error in interpreting the results of the Michelson–Morley experiment. And mind you, the only error was in the interpretation of the results. Their experiments were well thought out and well conducted.

So what specifically was the misinterpretation?

They assumed that the substance of the vacuum, which they referred to as "aether," would be moving through their location with a velocity vector that would be in one of the well-known standard dimensions of three-dimensional space. And that this would produce a measurable difference in the speed of light. Specifically, that light would travel slower if it was traveling upstream—against the aethereal wind. And faster if was traveling in the same direction as the aether—with the aethereal wind at its back.

They could not have anticipated, nor did they have any way of knowing, even long after the fact, that the aether was traveling in the direction we call Time. And would always travel in that direction, regardless of their own velocity.

It left no clue, not even a hint of what it was doing.

Einstein and Minkowski realized that the space of our universe was actually four-dimensional. That "Time" itself was also a dimension of space. At some point someone even started calling the unity of these three dimensions of space and one dimension of time, "spacetime," in order to emphasize that they were one contiguous zone.

But even Einstein never made the connection that the aether is a perpetual wind that always blows parallel with Time.

Still, this is the reason Einstein was right when he said there are no absolute frames of reference. Regardless of velocity, every observer is right in claiming that his own frame of reference is correct for himself. But an observer is wrong in claiming that his own frame of reference is correct for someone else that is traveling with some velocity other than his own.

This is also the reason why the speed of light is always measured as being exactly the same in all frames of reference. The motion of anything that travels at a fixed rate through pandemonium (and that includes light) will do so at its standard rate through whatever environment it finds itself traveling through at the moment, regardless of that environment's tilt.

Thus, it is perfectly normal to expect different observers traveling at different velocities to measure the speed of light as exactly the same. Because within their personal frame of reference, it is.

And now, at long last, I can reveal to you the mystery of the remaining two people this book is dedicated to. None other than Albert A. Michelson and Edward W. Morley.

I am greatly indebted to them, arguably even more so that to Dr. Max Planck. It was because of their famous experiment, and more importantly, to the widespread misinterpretation of the results of their experiment, that I was provided with the opportunity to work on these theories through the 1980s and 1990s with no competition whatsoever.

Had others with better training, better equipment, and better funding feel it was reasonable to work on these ideas, I would surely have been outpaced, out-thought, and out-written, long before I was even born.

Thanks, guys. You three made it all possible.

__ PART 2 __ EXTRAPOLATIONS __

Chapter 7

Strong Force & Weak Force (and why there are no waves of these forces)

In my model, due to friction, the gas-like pandemonium around every vortex particle swirls in imitation of the vortex particle's structural spins. Close to the particle, it spins fast—a little less that the speed of light. At increasing distances, it spins slower.

THE STRONG FORCE

Inside the nucleus of atoms, nucleons—protons and neutrons—experience what's known as the nuclear binding force, or simply the strong force. This force causes them to cling tightly together even though—as is the case of protons—their electric charge is trying with all its might to shove them apart.

The nuclear binding force is the strongest force yet discovered.

Within the gap between two nucleons, inside a nucleus, the pandemonium of both nucleons is swirling in the same direction.

Indeed, in all the gaps between all the nucleons in a nucleus, the pandemonium is swirling in the same direction.

This is difficult to imagine, I know, since this is the vorticity around the ring axis of their four-dimensional hyper-toroidal shapes. But I assure you, it is so.

Because of this, within all these gaps, there exists a drop in pressure, which draws all the particles tightly together. This pressure drop is a direct and unavoidable result of Bernoulli's principle. "Whenever the speed of a liquid or gas is increased, its internal pressure is decreased."

Nucleons are literally sucked together as a side effect of their primary spin.

And while this is a simple fluid-dynamic effect, this pressure drop is being created by a "gas" that's flowing at the speed of light. Which accounts for the incredible power of the nuclear binding force.

The geometrical relationship between the particles and the zone of partial vacuum between them also accounts for the very short range in which the nuclear binding force can make itself felt. Approximately 3 x 10^{-15} meters.

What's more, if the particles get too close together (Approximately 5 x 10^{-18} meters) they experience a repulsive force. This is because the spinning "gas," which must have a certain minimum amount of room to squeeze through between the particles, becomes overly compressed, producing a high pressure zone. A zone in which the pressure is high enough to over-ride the attractive force of the Bernoulli effect.

To say only that the nuclear binding force is a product of the Bernoulli effect would suggest that the flow patterns within the nucleus are simple in form. Nothing could be further from the truth. I believe the nucleus to be a constantly changing arrangement of particles held together by flow patterns that themselves are violently shifting at an astounding rate. The complexity of structure and behavior inside the nucleus may rival that of atoms and molecules.

It is also possible—and I am speculating in this paragraph—that some of the changes are repeated over and over in a cyclic pattern, much like a dance, and that some dance patterns are much less stable than others. The ability to induce some of the far less stable patterns

may someday provide us with the ability to vastly reduce the temperatures and pressures needed to create nuclear fusion in a controlled manner.

THE WEAK FORCE

I suspect that the weak nuclear force is simply the repulsion that vortex particles experience when they get too close together and their vorticities become overly compressed, producing a high pressure zone between them. I described this effect back in the early 1990s, but did not connect it to the weak force.

This repulsive effect will cause them to push away from each other, sometimes with enough force to throw something out of the nucleus. Once the particles are outside the nucleus, they decay into whatever stable particles they can, given their energies and vorticities.

Why do I suspect this?

Several reasons:

1) The strong nuclear force acts over a distance about the size of an atomic nucleus (approximately 10^{-15} meters). But the weak force acts over a far tinier distance. Roughly $1/1000^{th}$ the range of the strong nuclear force—when nucleons are literally banging into one another. (approximately 10^{-18} meters.)

2) The weak force is approximately 1/100,000 the strength of the strong nuclear force.

3) The weak force shows up mostly in the decays of elementary particles and in neutrino interactions, for example, beta decay. In beta

decay, a neutron decays into a proton, an electron, and an electron antineutrino.

In other words, the weak force is all about splitting things up or kinking things apart. It is a repulsive force.

Some questions that can be answered using 4D CFD software include: Does the primary spin of a vortex particle always produce a void in its center, as suggested by my theory? Or only for some particles? Or perhaps never?

Also, it would be helpful if we can produce a full mapping of exactly how pandemonium flows around all the various vortex particles when in isolation. Not just the flows near the particles, but out farther away, forming their fields, both electric and magnetic.

WAVES

While there are electromagnetic waves and gravitational waves, there are no waves of the strong force or the weak force. These forces cannot be propagated as waves, because the first is a Bernoulli effect, and the second is a constriction of pandemonial fluid-like flow.

Congratulations.

Having read to this point, I feel comfortable that you understand enough about my ideas that I can reveal to you some of the more advanced essays I have created on this topic.

Naturally, I strongly recommend that you continue reading the remaining text in this book; plenty more advanced material lies ahead. However, if you wish to learn even more beyond that, feel free to visit the following website.

www.planckparticle.com

On that site, you will find a variety of essays on Pandemonial Dynamics.

Also on that site, the first 98 pages of this book, Planck's Particle, are available in PDF form, which you may freely download and share with anyone you like. These 98 pages are labeled as "Sample Chapters."

In addition to the English version, I have also translated the "Sample Chapters" into a variety of languages, which may also be freely downloaded and shared.

Once again, thank you for reading my book.