Infinite Particle Physics

Chapter 9 - Assessing, Testing, & Utilizing The Theory

Much Remains To Be Done

This book is the barest start to a full-fledged theory of the microcosm. The most obvious omission is a theory explaining the ECEs themselves — their origin, the derivation of their "charge", and their "inertia". Also, I have not clarified the manner in which *clusters* of defects move through the lattice; does each defect have its own hovering LD oscillator (probably), or is there a common hovering oscillator for the whole cluster (a possibility)? Then, I have stopped far short of supplying structures for all the mesons and baryons revealed in accelerator experiments, or showing scenarios for all their creation & decay modes. Much remains questionable in applying my synchronized charge-exchange scheme for calculating nuclide mass-deficits to larger nuclides, or proving conclusively at what point in the periodic table the clustered nucleons form perimeter alpha-groups, or gather into multiple planes, nor have I offered mass-deficit proof of the perimeter nuclide structures I associate with alpha & beta decays. Also, I have not explored the excited states of nuclides, etc., etc. I am confident that these problems can eventually be solved. Let us hope that this book will attract you, and others, to this daunting task, for much remains to be done!

Testing The Theory

Some Thoughts About Duty & Disproof

Scientists (and outsiders), who offer their peers (scientists) a new theory, are duty-bound to scrutinize their precious brain-child for elements of vulnerability, and suggest experiments which will either prove, or disprove, them. There is a homily, often stated, that "there is no way to prove a theory right, but endless ways to prove it wrong"! Some even say that it takes only one discrepancy between prediction and experimental fact to invalidate a theory — but this is over-zealous, because it usually takes years of effort to find out whether experimental facts, themselves, are valid, and the interpretation of so-called "facts" is colored by the prevailing paradigms by which they are evaluated, and such facts may need to be reassessed in the light of some new way of perceiving the phenomena. But, even more to the point, no theory is so well defined, when first propounded, that it can be killed with a single well-placed shot! It may take years of effort, by many minds, to clear away the deadwood and irrelevancies, so that the true nature of a theory is revealed.

Another factor of importance is the *scope* of a theory. Those of narrow scope may hinge on a single phenomenon, and may be invalidated by a few corroborated experiments. Others, such as this one, may cover such a wide range of physical phenomena, that they have to be evaluated bit by bit. If discrepancies are found, one may need to decide whether to scrap just that one bit, to throw the whole thing out, or to keep the sound elements, and try to replace the defective ideas with better ones. This judgment will naturally depend upon how crucial an aberrant detail *is* to the theory. For example, if someone could prove conclusively that "empty" space is truly *empty*, then we would simply take all the existing copies of this book, and burn them. As for bits that may or may not crash my theory, let me suggest a few:

Do Muons And Muon-Neutrinos Have A ±1/2e Charge?

The current inference, from literally thousands of experiments, is that *muons* have the same charge as electrons and positrons, and that *muon neutrinos* are neutral particles. What reasons can I give to warrant a re-appraisal of these inferences? I have suggested two bits of evidence for half-charge muons: first, the complete absence of the decay mode $\mu^- \rightarrow e^-$ + gamma, which one would expect if the two particles had the same charge; second, the anomalous depth of penetration of solid targets by muons, compared to other particles of equal momentum, which suggests that muons interact with matter in a novel way.

The case for half-charge muon neutrinos is much stronger — the observed deflection of protons when they are grazed by energetic muon neutrinos. This is currently interpreted as a neutral current interaction, effected by the interchange of a Z^0, but the IPP interpretation seems more basic, and less complicated. IPP interprets the protons deflection as simply an electrostatic deflection produced by a "slowed-down" half-charge void. The slowing down is due to the ability of a void to accept undedicated shrinkage during one of the p1 states of the proton's charge-exchange cycle, thereby acquiring enough transient mass to move the more massive proton.

Notice, that a half-charge void can't gain mass in interacting with an electron, because the electron lacks charge-exchange states. This explains why half-charge voids are unable to ionize atoms, and thereby leave ion trails. With a rest mass of fractions of a milli-eV (see argument on page 8-10), low-velocity voids simply deflect away, or around, electrons. Highly relativistic voids, while possessing enough mass, pass through atoms too fast to produce noticeable effects.

Why Half-Charge Muons & Muon Neutrinos Are Basic To IPP

1) The most obvious defect in a space lattice is a *void*; if we identify a full-charge electron as a replacement defect, then a *void* must be assigned a half-charge.

2) An excess defect is clearly the alter-ego of a *void* — an ECE which must be removed, and hidden somewhere, to produce a *void*. It also has a half-charge.

3) These two defects obviously belong in the same lepton family, because the only way a half-charge particle can convert (decay) into a full-charge particle is by combining with, or departing with, another half-charge particle.

4) These two half-charge defects are identified as muon & muon neutrinos, because the electron family already has its assigned members, the replacement defect, and the void-pair, a neutral particle, by virtue of being composite.

Is Experimental Verification Of Muon's Half-Charge Crucial To IPP?

Yes! But I'm confident that physicists will perceive its half charge, once they accept that muon neutrinos are half-charge.

Are Neutrons & Antineutrons Indistinguishable?

All *neutral* baryons, from IPP's perspective, have equal numbers of opposite charge *c-void* defects. Thus, if there *are* differences between neutrons and antineutrons, these differences will have to be *structural*. In Chapter 2, I discussed two modalities of structural differences that might differentiate matter from antimatter — slants & +/- charge asymmetry. However, in Chapter 3, I found arguments that persuaded me that all nucleons have T-slant form. Thus, I had to give up the intriguing idea of antimatter having opposite slants to matter, because both slant-forms of nucleons are necessary components of nuclides, and there is obviously no antimatter in our nuclides. Although all nucleons, including neutrons, have charge asymmetry, I could find no persuasive reason that would limit a neutron to only half of the possible charge-asymmetric possibilities. It seemed obvious, rather, that all the possible asymmetric forms were accessible through variations in the charge-exchange cycles. Thus, my investigations forced a conclusion that there could be no distinguishing differences between neutrons and antineutrons; hence, they were identical! And you will recall that this identity led to a crucial argument for the dominance of matter (or antimatter) in my creation scenario for the universe in Chapter 8.

Can We Verify Neutron-Antineutron Ambivalence By Experiment?

Perhaps this IPP conclusion could be tested by repeating, or re-appraising, experiments run at LBL and other places, where antineutrons have been observed to decay into antiprotons and positrons. Of course, if neutrons and antineutrons are identical, one should not only expect antiproton/positron decays, but we should expect *half* of all decays to be of this type! Yet we see these antimatter decays only in accelerator experiments, where both matter and antimatter are created. Why are they never seen among neutrons from reactors, or from neutrons ejected from nuclei? With such compelling evidence of decay asymmetry, it is easy to see why physicists reached a conclusion that neutrons and antineutrons are different species!

In Chapter 8, I argued that it is the *ambience of matter* that causes an antimatter/matter-neutral neutron to decay invariably into proton, electron, and antineutrino in our universe! I suspect that the only way this hypothesis can be tested is to inject ordinary neutrons into an extensive antimatter environment, adjusting neutron velocities to the size of the antimatter zone so that some of the neutrons will decay within the antimatter matrix. If the antimatter zone were surrounded by a suitable particle detector, we could then look for low-velocity positrons, as a telltale of an antineutron type decay. I am unskilled in these matters, so I don't know whether this is currently feasible.

Are Electron Neutrinos Composite Particles?

In IPP, electron neutrinos are assumed to be void-pairs. Could an experiment verify this? The only possibility, as I see it, would be to shine a strong laser beam coaxially with a relativistic beam of electron-neutrinos which plunge into a neutrino detector capable of detecting both types of neutrinos. If light is capable of ionizing void-pairs, as I have asserted in my red-shift analysis in Chapter 8, page 8-8, we should notice an increase in muon-neutrino detections when the laser is on. This setup has the best chance of working, because the photons and neutrinos would move at nearly the same speed, thereby allowing the maximum interaction time.

Are Electron Neutrinos & Antineutrinos Identical?

Physicists have applied labels to the ongoing controversy as to whether these have separate identity (Dirac neutrinos), or whether they are equivalent (Majorana neutrinos). Physicists currently assume antineutrinos can be distinguished by their opposite spin direction, but, from the IPP perspective this distinction is very artificial. My bet is that this controversy will eventually tilt in the direction of Majorana, thereby reinforcing the IPP postulate that *all* particles made up of equal numbers of opposite-charge defects are matter-antimatter neutral. (However, muon neutrinos, being lone *voids*, will exist in both valences: *minus voids* = muon antineutrinos, *plus voids* = muon neutrinos.)

Is A Photon's Energy Non-Localized?

You will recall, in Chapter 1, that our analysis of the creation process of photons led us to conclude that a photon had the same diffuse character as matter, namely that its shrinkage stretches to infinity. We used this property to infer that the diffraction and interference effects of light passing through minute single or dual holes in metal was due to the ability of these fringe zones of the photon's structure to pass through the metal lattice without attenuation, but with propagation delay. It should be possible to test this hypothesis by making two-hole targets of identical geometry from two metals that differ greatly in density, such as aluminum and platinum. If the hypothesis is valid, we should see differences in the resulting patterns, since we can infer that the propagation velocities of the photon's fringes should differ in the two metals.

IPP Masses Should Match Experiment Better With Time

One of the virtues of IPP is its concreteness. Specific geometrical structures can be imagined for each of the hundreds of particles found in particle experiments. These can differ from each other only in the arrangement and numbers of c-void defects, in slants, and in spacings, and all these spacings vary only in increments of a unit dimension, the lattice constant, ü. There is, of course, the complication of charge-exchange states, but each of these states must conform, also, to these geometrical constraints. Finally, there is the huge advantage over QCD — that the masses of all these structures can be calculated, and that these calculations may have, ultimately, a precision approaching 0.01 MeV.

There have been steady improvements in the standardization of particle mass measuring processes, so that the inferred mass values of a specific particle, measured in various locations, have been converging. Yet there still exist spreads of several MeV in the data for many particles, and the process of extracting a narrowly defined mass from this data is still a subjective judgment. However, we can probably look optimistically toward further refinements in techniques, and much more accurate mass values.

IPP's Mass-Calculations Need Refinement

However, before these vastly improved mass values can be used to test the validity of Infinite Particle Physics, my crude derivation of the constants & equations for mass calculations needs a thorough scrutiny by others. I am not at all sure that I have chosen the best particles from which to derive the constants for my equations, nor am I confident that my equations provide the soundest extrapolation to defect-spacings larger than those of the nucleons. The inability of Equation 4-3 to calculate the correct mass value for the neutral kaons certainly points to some error in my procedure.

Also, you will recall that I have wondered why the dwell-times of the various charge-exchange states of a particle appear to be identical, when one would expect changes with different charge-exchange distances. With so much going on in the microcosm, it seems incredible that the system I have stumbled upon works at all, and for it to work so well seems a miracle! What makes me feel certain that further improvements can be made in IPP mass calculations is that, where particle masses are very accurately known, my calculations, even in this crude state, are often within 0.01% of the experimental value.

Ideally, these equations & constants should be determined from first principles, by mathematical analysis. Would it be possible, for example, to calculate the amount of *shrinkage* produced by an electron's dynamic distortion pattern? If this is possible, it would yield a figure for the amount of *mass-energy per unit of shrinkage*. Then, providing the amount of shrinkage can be determined for various defect-pair clusters, the constants for my equations could be derived in a more direct & satisfying manner.

Testing The Theory With Excited States Of Nuclei

If Infinite Particle Physics is valid, every induced change in the bonding mass-deficit of a nuclide will correlate with a specific alteration of spacings between the component nucleons, or with specific changes in the individual charge-exchange cycles, or in their phase relationships vis-à-vis each other, or all three. It may not be easy to ascertain what structures correlate with the various excited states, but the bonding changes resulting from each possibility should be calculable, eventually, with increasing sophistication in our understanding of the interactions between individual bonds of complex nuclide structures. Any excited state which decays solely by rearrangement will evolve a photon whose energy can be measured very accurately; this provides an unambiguous reference against which the Theory's calculation can be compared.

Can Experiments Confirm That Small Nuclides Are Planar?

One immediately sees a difficulty in using electron scattering to discern planar nuclide shapes, in that, from IPP's perspective, all three mutually orthogonal planes will be represented equally in any sample. Hence, electron scattering experiments will show a nearly spherical scattering profile, unless some method can be found to separate these three planar groups. How about a *Stern-Gerlach Apparatus?* Would the separated streams show cardinal-plane isotope separation?

Since only neutral atoms can be separated by this method, shouldn't we infer that the electron cloud around atoms is shaped differently by different charge patterns on the nuclear surface? How can these patterns be different, unless the nuclei have some proclivity for distinct orientations in space, and/or there are several fixed relationships of different charge distribution on the nuclide plane which interact with, and cause alterations in the patterns of the electron orbitals? And would not cardinal-plane isomers of odd Z nuclides be a plausible manifestation of this? (Odd A, and even Z nuclides could also have nuclear plane charge asymmetry, through proton entity displacements.)

Have these separated emerging streams from a *Stern-Gerlach Apparatus* ever been subjected to high-energy electron bombardment, to see whether the electron scattering patterns have different statistics for each stream? Another possibility for differentiating these emerging streams would be to see if they were immune to splitting of energy levels in a uniform magnetic field (Zeeman Effect).

One obvious problem is the probability that the cardinal-plane isomers may be randomized by passing through grain-boundaries, so the electron bombardment should be very close to the Stern-Gerlach outlet. Also, success depends on space-lattice "grains" being large!

Do Large Nuclei Have Multiple Planes Spaced-Apart By Neutrons?

I will assume for this discussion that you have been persuaded by my presentation in Chapter 4 that large nuclei may prefer a multiple plane configuration over gathering into a single plane. Can this be validated experimentally? If the *Stern-Gerlach Apparatus* experiment works to separate small nuclei into cardinal-planes isomers, it should also work for large *planar* nuclei. Thus, there may be a possibility of proving that these large nuclei gather into multiple planes, by the *absence* of substantial silhouette differences in the separated Stern-Gerlach streams.

Can Lepton Masses Be Calculated?

Since I have proposed specific structures for the four common leptons (electrons, muons, electron & muon neutrinos), and for numerous hadrons, but have offered calculating procedures only for the masses of hadron particles, there exists a lacuna in my presentation which competent mathematicians may be able to fill. Can mathematicians use the mass/structure correlations of hadron particles to quantify the relationships between mass and lattice shrinkage, and charge-displacement and lattice shrinkage? Can these findings then be used to determine the displacements resulting from the four lepton structures, and, from these, calculate the lepton masses, to see if these agree with experiment?

Can We Discern The Grain-Size Of Polycrystalline Space?

If we speculate that dark matter results from hexagonal close-packing at the grain-boundaries of polycrystalline space, there should be some outside chance that someone can calculate what size these grains would need to be to account for the 80-99% dominance of dark matter over normal baryon matter. Could we possibly corroborate this deduction by trying to discover laboratory phenomena which would be affected by repetitive changes in the crystal axes of the space crystal, or by grazing zones of hexagonally close-packed ECEs, using as our reference (inferred from the background microwave radiation redshift) that we are moving through absolute space at 370 km/sec. Perhaps, the number of "jostles/sec" could be used as a basis for calculating the probability that a group of segregated cardinal-plane isomers would return to random alignment, or, perhaps, something equally far-fetched will pop into your mind. Incidentally, this polycrystalline jostling should be another contribution to Heisenberg's Indeterminacy, perhaps disturbing particle trajectories more than the ambience of plus and minus *voids*.

Can We Use Rockets To Validate That Space Is Absolute?

If my surmise is correct that the passage of a nuclide through a specific orientation of grain-boundary is the cause of internal transitions, then we may have, in this phenomenon, a means of determining when a nuclide is stationary in absolute space. Suppose we place a quantity of an I.T. nuclide with short half-life in a space probe, equipped with a gamma detector in contact with the I.T. nuclides, along with a radio link reporting its output to earth.

Then, we launch this probe in a direction *precisely opposite* to presumed direction of our drift relative to the microwave background radiation, with a variable speed capability somewhat in excess of the 369.5 ±3 km/s. of our drift speed relative to the cosmic background radiation (CBR). If space is absolute, we should notice a substantial increase in the half-life of the internal transitions of these nuclides as the rocket approaches a condition of rest relative to absolute space, because the number of grain-boundary encounters per second will be orders of magnitude less.

Notice that this test would also validate the surmise that grain-boundaries are the destabilizing-agent responsible for I.T.

A much cheaper, but less sensitive test of absolute space would be to measure I.T. half-lives at diametrically-opposite points in the earth's orbit, when the orbital speed adds to, and subtracts from, our speed relative to the CBR.

Are M-Slant Nucleons Unstable?

In the first decade of my study, despite finding plausible structures for most mesons and baryons, I could find no plausible two-axis structures for the strange meson resonances (so called, because among their decay products is always found a single kaon). Instead, I was forced to consider three-axis structures, which seem to fit quite nicely, *if* their three defect-pairs assumed an M-slant configuration. These structures seemed highly suspect, at that time, because I was still uncertain as to the slant-form adopted by nucleons. However, when my study of nuclei gave persuasive evidence that nucleons are invariably T-slant, I began to suspect that nucleons are not found in the M-slant form, simply because this configuration is unstable! Perhaps someone can find decay evidence that these strange mesons *are* three-axis structures, and by analogy to the two slant forms of the neutral K mesons, discern why T-slant and M-slant nucleons have such different stability!

Does IPP Have Technological Implications?

Technology often *leads* theoretical understanding, because inventors are skilled at following subtle clues, and resistant to repeated failures. Nevertheless, quantum theory has played an increasingly valuable role in invention, and has been vital in the development of semiconductors, computers, lasers, nuclear energy, biochemistry, etc. What can knowledge of IPP add? Its value is primarily in bringing an understanding of the microcosm to people of lesser mathematical aptitude, a category which includes the bulk of the inventive people of the world.

What will come of this is hard to foresee, because an invention, by definition, is something we have not yet been able to imagine. However, I can start the inventive process by suggesting three far-fetched possibilities, which *could* initiate two new fields of technology, and, perhaps, put some rather shaky pursuits in a more favorable light. These are:

Could Cardinal-Plane Isomers Be Separated & Be Useful?

To see the potential of this idea, we must be willing to accept a series of *plausible*, but, so-far, *unverified* notions:

1) That nucleons of nuclides up to perhaps element 26 all lie in a single cardinal-plane.

2) That processes can be developed which will separate the atoms of a particular element into cardinal-plane groups.

3) That electron orbitals of an atom are sensitive to the orientation of the nuclear plane, and, for even-Z elements, are disposed symmetrically in the two directions normal to the nuclear plane.

4) That bonding of atoms with like-oriented orbitals will exhibit greater regularity, density, and unusual conduction band-gaps, by virtue of this regularity.

5) That there are useful products, currently made by vapor-deposition, whose value will be enhanced sufficiently by the improved properties to justify the added cost of the cardinal-plane separation process.

If this idea works, its applications would probably be limited to epitaxial deposition of low-Z elements, like diamonds, silicon, etc.

I can see two possible snags (and you can probably see more!):

1) Perhaps the most perfect, or densest, structures may require adjacent atoms to *alternate* between two, and even three, cardinal-plane isomers.

2) If space is polycrystalline, the repetitive jostling of passing grain boundaries may quickly randomize the cardinal-plane separated groups before they can be utilized.

Can We Turn Ordinary Neutrons Into Anti-Hydrogen?

If this works, and suitable containment means can be devised, we would have an economical process for creating the ideal rocket propulsion fuel — anti-hydrogen mixed with hydrogen! All that we require to accomplish this (along with a ton of skepticism) is:

1) A fission reactor to produce copious quantities of neutrons

2) A collimator to produce a beam of neutrons

3) A moderator to slow them to a suitable velocity

4) A sufficient zone of anti-hydrogen, or anti-protons, surrounded by a high enough positive charge to repel the positrons produced by the anti-neutron mode of neutron decay, and with magnetic, or laser, confinement to prevent anti-protons from reaching the container walls. Under these conditions the released positrons will bounce around, losing energy, until they eventually combine with the existing, or decay produced, anti-protons to form anti-hydrogen.

5) A solution to the rocket propulsion problems of containing anti-hydrogen in matter containers, and modulating its outflow in synchronism with the release of hydrogen.

Two *huge* uncertainties to this proposed scenario are:

1) Whether the deduction is correct that antineutrons are identical to neutrons.

2) Whether the antimatter decay mode is induced simply by the ambience of antimatter.

And, even if everything listed above is feasible, the cost may be prohibitive for anything except national-pride-enhancing ventures!

Are There Ubiquitous Low-Frequency "Cosmic" Oscillations?

My third idea may possibly bring some insight into the process of tapping "cosmic energy", which is thought to be an ancillary benefit of "enlightenment". This concept draws upon three as yet unproven notions:

1) That the atomic orbitals of even-Z elements, like C, O & S, are symmetrically arrayed above & below the nuclide plane.

2) That space is polycrystalline.

3) That, in moving through polycrystalline space, the nuclide plane changes its orientation such as to remain always in alignment with a cardinal plane of the simple cubic lattice of each crystalline "grain" it passes through.

Should these three assertions prove to be true, you will see that each carbon, oxygen, and sulfur atom in our bodies will be shifting the orientation of its electron orbitals each time it passes through a grain-boundary of space. If we assume that these orbitals generate charge patterns which are not radially symmetrical, we see that every even-Z atom in our body, and in our world, will be the source of an alternating electrical field whose frequency is set by our speed through absolute space divided by the average dimension of the space grains. This will obviously be a source of "cosmic energy"!

Whether we humans can learn to use this cosmic energy is a matter for others to contemplate.

I've had my moment of fantasizing — now it's your turn!