The Theory of Field Interaction: An Introduction

Getting Back to the Basics: A Distinctly Different Approach Brings New Understanding of Reality and the World Around Us

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Science and physics are struggling in a number of areas, and we do not seem to be much closer to a satisfactory resolution today than we were 100 years ago. Clearly, the answer must not be in the mathematics or in the commonly accepted perspectives — otherwise, we would surely have found the answer by now. Sometimes, finding answers to persistent problems requires careful exploration even of areas that we might have thought were well settled and clearly understood. With a change of emphasis in the approach — going beyond the mathematics (which we already do have rather well in hand), as well as a careful reevaluation of what is truly known, some unexpected new clues have emerged. In the end, it appears that there may be more to some of the most basic concepts of classical physics (ones which have been very well characterized mathematically for hundreds of years now) than has previously been supposed. A whole new perspective of what is really behind momentum and inertia are proposed herein that, since they are so very basic in our understanding of reality, have proven to have some rather significant impacts on our understanding of a number of areas in physics — including some of the most troubling aspects of the currently accepted theories in mainstream physics. This is, of necessity, only an introduction to some of the most basic aspects of the concepts and their consequences, for the interconnectedness and complexity of nature and reality involve far more than could ever be adequately covered here — but additional discussions have also been made available elsewhere.

1. Introduction

In this paper, we will be covering two distinctly different areas. The first will be a somewhat philosophical discussion of how we need to approach the challenges before us, and why the most popular approaches (which are often promoted with religious fervor) won't get us to where we truly need to go. That section is crucial as an introduction to help the reader to understand why, even though we do not follow those accepted and heavily promoted patterns, we still insist that the presentation in the Section 3 truly is explicitly theoretical. Section 3 will then present a summary of some of the more basic ideas and conclusions that have come out of an extensive evaluation of a great many areas of physics over decades of time — searching for a better understanding of what is really happening out there in reality.

2. How We Need to Approach the Task

2.1. We Need to Change Our Approach — Mathematics Does Not Have the Answers That We Need

If we were to compare our understanding of the world about us – what is commonly called "nature", although I personally prefer to use the term "reality" — to what was known four hundred years ago (or even one hundred years ago), it would be very clear that we have made tremendous strides. Our lives have changed tremendously and technology permeates our lives in many ways that were not even possible before. Much of this is directly attributable to mathematics — specifically, how it has helped us to quantify and understand how to use many of the phenomena in the world about us to our advantage. However, even as we have learned to use some of the newer developments to our technological advantage, our understanding of the "how" and "why" behind a number of those newer concepts have languished in a mire of counterintuitive and irrational concepts, paradoxes, and other conundrums. Despite appearances, and claims to the contrary by many in the mainstream — all of this has left us thrashing about and making increasingly poorer progress in our basic understanding of reality.

Let's consider a bit of philosophy about how we need to approach physics and science.

One of the primary bulwarks of science, especially over the past four hundred years or so, has been mathematics, and it has become considered one of the very most (if not <u>the</u> most) important tools that we have. For many of the developments that we have been able to achieve, it certainly has been highly crucial. However, when we take a close look at what we need to do, in order to gain the truly basic understanding that is so important for us to have of reality, it has fallen somewhat short.

Some have called mathematics the "language" of physics — but if it is — when it comes to understanding the true heart of the phenomena in reality, it is a woefully inadequate one. Regardless of how well we may be able to take advantage of many of those newer developments with our enhanced technology, a critical understanding of such areas cannot come from only understanding "how much" and how to make good use of what we do know. It is absolutely critical for us also to understand phenomenologically the physical "why" and "how" correctly before we can properly build upon those concepts for the future. Mathematics can help us to progress in many ways; however, until we truly comprehend the full character of what is physically going on with what we are already familiar, there are some rather substantial limitations on how far we can go before we begin to get into some rather substantial trouble. It can be very hard to know just how far we can go before-the-fact (as well as even after-the-fact), at least, it will be — until we can figure out somehow what we might have missed. While we might be able to figure out that "something" is wrong "somewhere" — we would very probably not have any idea whatsoever of what it might be.

There are others who have referred to mathematics as the "queen" of science. Unfortunately, when mathematics is placed into such a commanding position, it will inevitably eventually let us down, for it is really more of a servant than it is a ruler or leader. It would be much better to think of mathematics as the "chief housekeeper". Mathematics is a marvelous and wonderful tool — and it has done a lot of good — but it is significantly overrated. Far too much emphasis has been placed on mathematics alone — as though it can somehow guarantee our eventual success as our prime evaluation tool. It seems as though many must feel that, with its orderly processes and well-established rules, it will provide all of the understanding that we really need. That is something that it simply cannot do adequately. Indeed, I have witnessed numerous times where, when someone asked "why" some particular phenomenon works the way that it does, those answering the question wrote some equation down and considered that the question of "why" had been answered. An equation can answer very well how we calculate "how much" — however, the true "why" is actually a phenomenological question, not a mathematical one.

By the way, I, too, started out in all that I have done by going to the math (just as, most carefully and thoroughly, I had been taught to do!). However, it was only over time — and with much consternation — that it slowly became clear to me that the answer simply was not in the math!

We have had much of the mathematics well in hand now for centuries on many of the topics in physics and science — what we have been missing (for some time now) is a solid understanding of all that was behind the math. Even Isaac Newton understood well that he had only a part of the picture — for he realized that he could not explain the phenomenology of how and why things worked the way that they did, but he did know how to calculate what they did very well. He realized that the math would certainly give us a good start (and it most certainly has!). Unfortunately, there have been many, especially in the mainstream, who, enamored by the fabulous successes that have been realized, have lost sight of what is needed for us to get a full and complete picture of what is going on out in reality.

We have already made fabulous strides in a great many practical and useful ways because the math works! We have good, and even excellent, equations to cover the "how much" for most everything that we are familiar with — including even those areas where the ideas and concepts are thoroughly irrational, confusing, and lead to major paradoxes and conundrums. Whenever all that we really need is to know is "how much" — especially in complex systems and interactions, we can make absolutely superb use of the equations that we have. Moreover, those equations have been well tested and extremely well developed. We <u>know</u> that they give us excellent numerical results! Of that, there is no question.

The problem arises when we seek to get into the (seemingly) more abstract and deeper understandings of how and why nature (or reality) physically works the way that it does. That understanding is crucial for guiding our thinking as we strive to expand our knowledge into new horizons. When we do not properly and correctly comprehend what is really going on — including "how" and "why" — it is inevitable that we will end up veering significantly off-track from the truth of reality.

I am fully convinced that reality is fully rational, comprehensible, and coherent — no exceptions! I further believe that the basic principles are all actually rather simple and straightforward. Even so, all of the interactions and influences that go on between those basic principles in reality result in an overall picture that is highly complex and often difficult to fathom. Recognizing the full picture becomes even more challenging when one realizes that there still are, very likely, phenomena and principles that we have missed — ones that are well camouflaged, possibly even well hidden, and thus — ones that are rather difficult to discern out of all of that complexity. This has been strongly reinforced during a long career in research and development (R&D) and engineering. I have seen many times where something might have somehow seemed to be irrational or illogical at some point in the development — only to turn out to be fully rational and understandable once it was finally comprehended properly. The bottom line is that reality has <u>never</u> let me down — once (and <u>if</u>) we finally got down to where we truly understood the how and why behind a particular phenomenon — it was <u>always</u>, inevitably always, rational.

Unfortunately, over the past century or so, in physics especially, we seem to have proverbially "fallen on our face". Whenever we find ourselves loaded with paradoxes, conundrums, irrational and incomprehensible concepts — I sincerely believe that it has become most clear that we must have wandered off-track from the truth. The problem lies in knowing "where" we started to veer. If it were clear or readily evident — surely someone would have found it by now. Therefore, it seems that it most likely is hidden behind some obscure — yet significant — hows or whys that have been overlooked.

Part of the purpose of this paper is to help us to realize the nature of the problem, and then to strive to begin to fill some of those gaping holes in theoretical physics. It is to introduce the results of some rather extensive evaluations [using as careful of a (what I refer to as) "phenomenoscience" approach as I could muster] to try to discern and locate some of those key principles and concepts. It long ago became clear (as I have already sought to establish and support) that the answer is not in the mathematics (which are already well developed and verified for their numerical accuracy), so I will not be using much math in this paper — for it would only serve mostly to distract from the points that are being discussed. All of the truly relevant math should be adequately familiar to most anyone who has even a rather basic understanding of physics.

I feel that I need to raise one final point that does not appear to be understood by most. Mathematics is an excellent tool for proving when something has a fatal flaw, for the answers will not be correct. However, the converse is not the case. Unfortunately, even when the answers may happen to agree extremely well with what we observe in reality, that does not actually prove that the associated theories are "correct". It really only proves that the associated equations at least provide numerically equivalent answers. There are multiple examples in physics where there are at least two, totally different, conceptual approaches that happen to provide mathematics that result in identical answers. Whenever such occurs, it should be clear that only one (if any) of them can actually reflect reality. Moreover, and this is especially true when some of our equations are empirically derived (as we strive to ensure that our equations provide answers that are consistent with what we have observed) we can easily fudge our equations until we get the answers that we seek.

Good mathematics can enable us to make good and effective use of what we have — however, it does not provide sufficient insight for us to keep making good, and truly effective, progress into new levels of understanding.

If, as I have averred, the answer is not in the math — then we need to augment our mathematics with some critical additional tools. That is where phenomenoscience enters the picture.

2.2. What is Phenomenoscience?

Let's start off with a definition:

Phenomenoscience: The carefully measured study of the actual phenomenological basis of real-world phenomena — in search of a true and accurate understanding of the actual physical "how" and "why" everything works as it does. The focus is on the actual physical phenomenological reasons behind the ways that the processes in reality actually function and interact in the ways that they do. With such a comprehensive understanding as a background, the developmental aspect of phenomenoscience then involves the process of using whatever existing, properly confirmed, phenomenoscience concepts may be available to help guide the search for a valid conceptual basis for other processes, ones whose phenomenological operations are not yet properly understood by science.

Providing a definition is relatively easy, however, providing a comprehensive explanation of what its proper implementation entails is not. Nor is it easy to implement correctly. Part of the problem is that reality is so very complex, particularly in the plethora of interactions that are a part of almost everything that we may wish to understand. Moreover, not everything in reality is as evident and clear as we might wish for it to be. Another major problem (and this is one that cannot be overstated) is that with all of the conceptualization that has gone on in physics and science over the centuries, a great deal of it has unfortunately been done with far less care and caution than it should have been. As a result, there are a great many errors that have been introduced thereby, far too many of which have not yet even been identified or corrected by the mainstream. Thus, there are a great many errors, assumptions, misnomers, and outright exaggerations that have been promoted as validated "fact" that actually have no true basis in reality, or which are actually still unclear, or that are at least lacking in proper validation. Unless we can get a reasonable grasp of what is really correct and valid from among all that we think that we "know", we cannot possibly hope to get to the truth in a reasonable manner.

Any attempt to provide a thorough discussion of the topics related to phenomenoscience would be well beyond the scope of this paper, so what we will provide will be little more than a rather terse introduction. I have attempted to provide a more complete introduction elsewhere [1], yet even that treatise is not truly comprehensive in nature, for there is so very much involved. In brief, it can be described as having three main phases:

1. Foundation Stage (and most critical!): First and foremost, we need to ensure that whatever information we may believe that we already do have and comprehend is actually correct. This means that, whatever our current understanding for all of the "known" phenomena in reality may be – we need to ensure that it is, in fact, truly as correct, accurate, and complete of a description of how and why those aspects of reality actually work as is possible.
2. Second stage (I've sometimes treated this as two stages): Part 1: Once we are comfortably confident that our foundation is reasonably sound, we need to take those foundation principles and interactions and then build on them. The goal would be to see how much of the rest of the "known" phenomena of physics and science they might perhaps make phenomenologically clear, or at least, clearer. Part 2: The expansion stage, involves taking clues from reality (or elsewhere) to seek to expand our knowledge and understanding of reality, to resolve dilemmas, fill in some of the holes, or answer open questions. This stage is extremely challenging, but if done properly, it should serve well to keep the outcome appropriately in line with reality.
3. Third stage: This critical stage deals with follow-on efforts to confirm any of the new conclusions or concepts that may have ultimately emerged out of the previous approaches through such supplementary techniques as targeted experimentation, mathematical development, or any other confirmation procedures that might be warranted.

All of the above require extreme attention to details and a dogged determination to "get it right" as much as possible. It is not a trivial effort and it requires careful, thorough introspection over a prolonged period of time. Sometimes, some of the most useful insights may come from what might seem like minor or trivial details. The goal is to gain all of the insights possible. Accuracy of concept is crucial, so is extensive and continuous crosschecking, for a basic tenet is that reality will always prove to be rational once we have it correct. Not everything will be evident or straightforward, so one of the primary tests is that a true principle will fit and make sense in every case where it properly applies.

Here is one quick example of an insightful (and sometimes rather significant) comprehension. "Time" is a critical parameter that we encounter quite regularly in a wide range of phenomena. Even though we use it regularly and extensively, there seem to be very few who realize that we have never, ever actually measured time. We cannot measure time; we only mark it. We find some sort of reasonably consistent and/or predictable process — and then we set it up to count intervals or cycles somehow. It actually works quite well, but we need to recognize that rather than measuring time, we are really only marking its passage. For most of the ways that we use time in our processes and evaluations, this works just fine and presents no real shortcoming. However, there are other situations and questions where such an understanding can have a significant impact on our thinking and comprehension of what we are actually measuring; and thus, on our perception of what is actually going on. Such understandings as this can only come out of careful phenomenoscience.

In summary, the primary goal of phenomenoscience is to: 1) Understand how reality works; and 2) to ensure that any new concepts that might arise from our efforts to develop and expand that understanding are as closely and firmly associated, as well as properly correlated, with reality as is possible

2.3. Our Approach

Our approach is based on the recognition that it is just as important for us to recognize that we need to make some critically needed adjustments to our approach, as it is that we identify whatever we may have missed.

In this paper, we are going to discuss topics where their mathematics have been well established and verified for centuries. While the mathematics may help to provide some clues, the answers that we are seeking are not in the math, moreover, where many have been so very heavily trained to focus on the math, it is likely that some would be distracted from the critical points by its use. We will be covering elements of classical physics here, so the associated math should already be reasonably familiar to most, thus we will not be including it directly.

Perhaps more important however, is the fact that there has come to be far too much emphasis on math in so-called "modern" physics — and that is a major part of the problem! Phenomenoscience cannot be reduced to an orderly set of rigid rules in the same way that mathematics can. Thus, it is harder to teach others how to use it correctly, and it is also easier for someone to use carelessly. It is a sad fact that there have been a myriad of less than careful conceptualization efforts over the centuries that have brought about major detours and great difficulty to physics and science in the past (and there are many that still are!). Nonetheless, phenomenoscience is still a highly critical part of what we must do to get and stay on track with the truth. It has already been neglected for too long, so we need to pay particular attention to it until we can get it back in balance with the mathematics that we already have. Thus, our focus in this paper will be specifically on a phenomenoscience-centered approach.

3. A New Perspective

What we will be presenting here is not just a random or chance topic. It emerged, seemingly somewhat on its own, out of a series of phenomenoscience efforts to try to understand some critical principles better. In phenomenoscience, there are typically a great many ideas that fail in one way or another — what follows is a particularly insightful one that did not. There is not even remotely enough space to give justice to most of the details, so we will be presenting only enough to hopefully help the reader to gain a reasonable, introductory understanding of some of the driving clues behind the concept.

Here then is some solid, phenomenoscience based, theoretical theory — a rather brief and cursory introduction to the Theory of Field Interaction.

Side note: The ideas and perspectives being discussed here are, of necessity, brief and terse in order to fit them into a reasonably sized paper. From that, one might get the impression that what is presented here was a straightforward development process, with measured steps leading inexorably forward. Nothing could be further from the truth. There would be little value in detailing all of the many ideas that have been considered and discarded because they didn't work (even if I could even remember them all — which I can't!). What follows is a somewhat brief summary presentation of a rather bold-seeming concept that, even after decades of subsequent review and evaluation, has only enlightened and clarified. I have yet to find a valid conceptual test that it has not passed admirably well, and it has also managed to inject reason and intuitive sense into a number of areas that lacked any rational, realistic explanation before. Moreover, none of the existing mathematics related to the known, measurable outcomes would be changed one whit from their current forms. In short, by all that I have been able to do — it WORKS!

3.1. Some Applicable Background

Our discussion in this part of the paper will be very purposely limited to momentum and inertia in order to keep the scope of this paper within reasonable bounds. The applicable equations are all a part of classical physics and extremely well established, so there is no need to repeat any of them here. One item that fascinated me when I was still in school was that in the back of one of my physics textbooks was a table that showed that there were close analogues between all of the basic mechanical and electrical equations. I no longer have that textbook, so I cannot cite it; however, there are several websites that provide information on those analogues that is even more complete, and they are sufficient to corroborate and support the point [2-4]. Moreover, it is also informative to note that those same analogues are used extensively, and quite successfully, in engineering — particularly for characterizing systems that include both electrical and mechanical components or systems. It enables them to use just one type of modeling equations to cover both types of systems. The main point of the comments in this paragraph is to emphasize that there is a very close mathematical parallel between the forms of the mechanical and electrical equations. For this ,as well as indications from other considerations, from a phenomenoscience perspective, there is no reason not to consider using one system to provide clues for how and why the other system might possibly physically operate.

Getting down now to the most applicable specifics, I know of only one phenomenon in all of physics that exhibits operational characteristics that are fully equivalent and parallel with what we observe with momentum and inertia. It is an electrical type of analog, where not only are the equations directly correlatable, but the phenomenological responses are also equivalent. What's more, we can also see enough to figure out phenomenologically why the electrical analog actually works the way that it does. This makes it an ideal candidate for seeking clues that might help us to understand what might be behind momentum and inertia.

3.2. A Direct Momentum and Inertia Analog

Just as momentum and inertia are a basic part of every good basic physics course, there are some analogous electrical circuit corollaries that are generally a part of most courses covering basic circuitry. That is because both sets of information are important for understanding many of the other phenomena associated with each area of focus. The key is that while it is possible to comprehend why the electrical analogs work the way that they do (and the related principles help in understanding a variety of other related areas as well), up until now, we haven't had such an understanding available for the mechanical analog.

What we are going to be looking at in electrical circuits is the interaction between current flow (moving charges) and magnetic fields. All moving charges (electrical currents) always have an associated magnetic field. Conversely, all magnetic fields are always associated in some way or another with moving charges. There are no exceptions to either of these statements. Therefore, it is clear that there must be a very close association between moving charges and magnetic fields — where it appears that magnetic fields somehow help to move the associated charges. Let's take a few moments to review the very well known momentum/inertia like characteristics associated with electrical circuits.

We tend to think of electricity as having an instant turn-on. As soon as we flip a switch to apply voltage to a circuit we expect it to turn on right away (some of us are old enough to remember when it took some time for some things to start working because they needed to heat up — but with today's electronics, that is seldom the case anymore). Heating up is one thing, but there is another effect that is still very much present, though it normally transpires so rapidly that we still don't notice it — nonetheless, it is still there, and it is readily measurable. All circuits have some inductance, which is a direct result of having magnetism-related effects in a circuit. Since it is not possible to have moving charges without an accompanying magnetic field, such are always present to some degree, although there are many circuits where such may be very small. When a source of voltage is connected in some manner to a circuit that has very low inductance, the current will indeed reach its nominal value (as related to the voltage level and circuit resistance effects) so fast that it is essentially instantaneous.

On the other hand, in a circuit with high inductance (for example, one that has a large magnetic coil in it) there is a marked change in the rate of increase of its current at turn-on, and also a marked change in what happens when the voltage source is later removed as well. While it is still rather fast by our terms, it is an effect that must be taken into account with very fast circuits. In a high-inductance circuit, the current does not immediately flow as soon as the voltage is applied. Rather, it builds up from its initial no-flow condition to its final current flow (which, as in a low-inductance circuit, is related to the voltage level and the combined circuit resistance effects) over a discreet, measurable period of time. The higher the inductance in the circuit, the longer it takes for the current to build up to its full value. A similar situation happens when the voltage source is disconnected, only this time, even though the voltage is no longer connected, the current continues to flow for some discreet period of time (comparable to the initial buildup time) and only gradually ceases its flow. Once again, how long this process takes is directly related to the level of inductance in the circuit.

This is very much like the momentum and inertia of mechanical systems, where the amount of inductance in an electrical circuit is analogous to the amount of mass in a mechanical system. With a very small and light mass, it is easy to get it moving quickly, for inertia and momentum are directly related to the amount of mass. The greater the mass, the more noticeable their effects become. A very large mass — even if it were to be mounted on free-wheeling wheels — not only takes significantly more effort to get it moving, but it also takes significantly longer (at a comparable force level) to do so. The higher force requirement comes about because the larger mass requires more momentum to get it moving at any given speed, and that momentum is derived from whatever force is being used to either get it moving or otherwise change its motion. This mass-related reluctance to change is what we refer to as inertia. Since, at any given level of force or other motivation for change, the greater the mass might happen to be, the more momentum there is that must be either imbued into or otherwise modified, and thus, the longer that it takes to effect any given change.

With the mechanical system, the momentum has always (at least to my knowledge) been taken as a simple condition related to the state of motion of the mass. That description and perception fits perfectly well with the formula for momentum:

$$p = mv \tag{1}$$

where
p = momentum
m = mass
v = velocity

This accepted mainstream concept also appears on the surface to be reasonably intuitive and logical, so it does not tend to raise any alarm bells.

Now, let's take a closer look at what happens in an analogous electrical circuit, and why it works the way that it does. High inductance in a circuit means that when that circuit is fully running, there are substantial magnetic fields and correlated effects associated with that circuit. For example, when a coil is placed into a circuit, its configuration intentionally causes the magnetic fields (which are associated with the current flow through the wires in the coil) to reinforce in such a manner that the overall strength of the magnetic field is amplified substantially. This also means that it subsequently also requires more energy to activate those fields fully. Thus, when a high inductance circuit is first energized, it takes longer for the current to reach its full rate because so much of the energy is being diverted to the buildup of all of the associated magnetic fields, whose intensity must always be in lock step with the rate of current flow (as influenced by the circuit configuration). Because the configuration of the circuit causes the magnetic fields to be significantly stronger overall for the same current flow, that means that with the same rate of energy input from the voltage source, it takes longer for the final current flow conditions to be attained.

Note, for simplicity, we will only be referring to a direct current situation here. The principles are the same with alternating current, but the constantly changing voltage makes understanding what is going on more complicated, and thus, less clear. Once the full current rate in any given circuit is reached (and so long as nothing is draining energy from the associated magnetic fields through some other means), the fact that high inductance effects are present in the circuit no longer has any real effect on the flow of current through the circuit. It has reached a steady-state condition where those fully energized magnetic fields neither impede nor enhance the current flow further (other than the basic fact that those magnetic fields MUST be there for the current to flow).

The other side of the influence of that high inductance comes into play again when the voltage source is disconnected. In a low inductance circuit, disconnecting the voltage will result in a virtually instantaneous cessation of current in the circuit, for there is no longer any motive force to keep it moving. However, in a high inductance circuit, the current flow continues, and it takes a significant amount of time for it eventually to cease flowing. That is because, even though the primary motive force of the voltage source has been removed, there is still significant energy stored in the magnetic fields associated with the high inductance in the circuit. That energy will keep the current flowing (for that is what the primary purpose of the magnetic field in reality appears to be) until all of the stored energy in whatever magnetic fields associated with the circuit have been fully dissipated (and that stored energy has been returned to the moving charges — by keeping them moving).

The key bit of understanding from all of this is that the phenomenon that causes electric circuits to have momentum and inertia-like analogous features is that energy is required to build up the associated magnetic fields in order to get the current flowing. That energy is then stored in those fields, which work to keep that current flowing so long as the voltage source is applied. Once the voltage source is disconnected, the energy in those fields is also what keeps the current flowing until it is all once again dissipated. These are very specifically the phenomena that actually cause the momentum and inertia-like effects in electrical circuits — the energy must be instilled into, then it is stored in, and finally at the end it must be dissipated from the magnetic fields associated with the current motion, especially through the high inductance portions of the circuit.

Let's now apply that bit of understanding to the analogous mechanical phenomena of momentum and inertia to see what new insight it might provide.

3.3. A New Perspective on Momentum and Inertia

First a quick side note: After a great deal of analysis and evaluation, some very consistent characteristics related to the two basic types of field forms have been recognized. One is exemplified by such phenomena as charge and gravitational fields, where the lines of force radiate out in all directions from the source. Without elaborating further here, a close check will confirm that such fields characteristically always tend to exhibit a resistance to motion – whenever they are present, the stronger they might happen to be, the harder they must be "pushed" to get them moving. Because of this characteristic, I have come to refer to such fields as "static fields" (meaning that they tend toward stasis). The second characteristic field type is well exemplified by magnetic fields. In their simplest configurations, their lines of force are circular or oval, but the critical clue appears to be that the lines of force always close on themselves. Even in complex cases (such as in motors and such for example) where their lines of force can become extremely convoluted, those lines of force all still ultimately close on themselves to form closed loops. Again, without elaborating here, all such fields are found to always be associated with motion of some sort or another – thus, I have come to refer to all fields that have closed lines of force as "dynamic fields". (Note that one other inherent characteristic of "closed" lines or loops is that, because they are closed, they are inherently capable of defining their own "center".)

When the concept that I am about to present first occurred to me (quite some time ago now) it seemed to be an enormous leap of faith – particularly since it involves ideas which, though they are presumably right in front of us, are also hidden from direct observation. Nonetheless, even after decades of testing and evaluation against a wide range of phenomena, I have yet to find any inconsistencies or problems, while simultaneously it has answered or clarified a wide range of ongoing paradoxes and conundrums. Thus, I suggest that it be carefully considered and evaluated – and not be dismissed out of hand simply because it might seem to be distinctly different from the currently accepted concepts. Without further ado, let's take a look at what might perhaps seem to be a radically different idea.

What if– instead of momentum and inertia simply being a result of the state of motion of a mass (as seems to be the prevailing concept today) – there is actually an associated dynamic field wherein the infusion, storage, and eventual dissipation of energy (which manifests itself to us as "momentum") is the actual phenomenon behind momentum and inertia. This would be very similar to the way that the electrical analog that we have already summarized appears to work. However, there is also a very significant problem that then presents itself. We can readily "see" and measure the effects of the magnetic fields, so it is very clear that they are there. With masses, while the momentum and inertial effects are also extremely evident, there are no such externally discernable fields evident, so if such were to be the case, they would have to be effectively hidden from direct observation.

What if (and this originally seemed to be a rather large "IF") there might happen to be another (and previously unrecognized) form of dynamic field, one that, instead of radiating out as a magnetic field does (for example), also happens to be self-limiting, in that it encloses itself within a self-defined, limited-size envelope of its own making. I have come to refer to that configuration concept as an "SL dynamic" field (where SL is short for "self-limiting"). Furthermore, I have come to refer to this particular SL dynamic field concept as a "momentum field" – which specifically indicates that it is actually thought to be the phenomenon that gives rise to the momentum (and also inertia) effects with which we have become so very familiar. The highly familiar classical mathematical equations related to momentum and inertia would apply to this phenomenon without any modification whatsoever. The only real difference is in the interpretation of what those equations truly reflect physically, and thus, in what they truly represent phenomenologically in reality.

Instead of simply representing a state of motion for a mass (which has also been somewhat of a puzzle for the Massless photon – which also carries momentum), it would now represent the strength of an actual, though somewhat hidden, dynamic field. The equation for momentum would then simply be seen to provide insight into the strength of the momentum field that would be required for a given combination of mass and motion. The math fits either condition equally well.

Now, where the math is unchanged, and if the only area or phenomenon where this concept would have any impact were momentum and inertia, having such an alternative concept would be of little or no benefit – for it would only create one more dilemma without a resolution. Once again, phenomenoscience comes to the rescue, for it turns out that there are potential applications and insights that arise in a rather broad range of other areas and phenomena. That is where I have spent a significant amount of effort over the intervening decades.

Wherever there might happen to be two sets of concepts that appear to be synonymous from a mathematical perspective, one promising approach to resolving the dilemma can be to take a close look at any and all other areas where any insights or impacts arising out of those ideas can be compared. In particular, any differences in the interactions arising out of the two approaches can be compared, especially on the rationality of the outcome, or on whatever paradoxes or conundrums might arise (or yet remain) from careful application of either or both of the ideas. The results of my efforts have been that:

1. I have yet to find or encounter (or recognize) any unresolvable paradoxes or conundrums arising from the application of the concepts that I have only so very briefly introduced.
2. At the same time, those ideas have provided some very insightful and rational resolutions to some of the mainstream paradoxes and conundrums that have plagued physics for decades (additional insights are still continuing to grow).

I feel that the results of these extended evaluations provide some very significant evidence that these ideas warrant some rather careful thought and evaluation. Note that, with all of the correlated phenomena that I have been referring to, the capability of their associated mathematics to provide numerical results that are consistent with what we have observed in our experiments are unchanged. So once again, even for all of these other areas and phenomena, the answers are NOT in the mathematics! Moreover, there are also cases where the associated insights do provide some very important clues that help us to understand where and how to revise our application and interpretation of that math. This, in turn, enables us to resolve paradoxes and conundrums that we have not been able to make sense of previously. While there is far too much that would need to be covered even to begin to provide adequate elaboration in this paper, I will strive to provide a few hints in order to give the reader some idea of the potential of the Theory of Field Interaction.

In the case of particles, they are no longer visualized as little "balls" of substance (or anything equivalent). Instead, a momentum field could perhaps end up being the phenomenon that actually defines the apparent extent of the "particle". (As I went through school, the common models for particles were such common objects as billiard balls or air hockey pucks – which led to a very natural seeming visualization of particles as the equivalent of very small "billiard-ball-like" bits of matter.) The field-interaction concept would turn a particle into a more complex-seeming combination of at least one SL dynamic field with one or more static fields (such as "charge" or "mass"). I would love to elaborate on that further here, but there is no space – however, there is more detailed discussion available elsewhere [5-7].

In the case of photons, which also carry momentum, it has come to appear that it is actually a momentum field that truly constitutes the heart of the photon, and which also explains the quantization as well. This also changes the picture of what is happening inside the photon – to where it would be the momentum field that also creates the ongoing disturbance that we have come to know of as the electromagnetic field. With this picture, in an intriguing turn of events, it is the ever-present electromagnetic field disturbance that acts, in turn, to camouflage the presence of the momentum field in the photon quite thoroughly and effectively. There is, once again, quite a bit more to the picture than could satisfactorily be presented here (see reference [3]).

3.4. Summary

There is so very much to the Theory of Field Interaction that we can only barely introduce some of its most basic tenets and concepts here. By way of introduction, here are brief summaries of but a few of the concepts that have come out of it thus far.

1. There appear to be more SL dynamic fields than just momentum. From among known and familiar phenomena, I have been able to identify at least two more.
2. As already noted, the actual enduring heart of a photon appears to be the momentum SL dynamic field. The associated electromagnetic field, with which we have become so familiar, actually appears to be a result of a disturbance in the background environment that is caused by the passage of the momentum field through the area.
3. There does appear to be a background environment that many may tend to think of as Aether-like. Because I personally feel that the reasons, evidences, and characteristics do not match well with much of what has been promoted for the Aether, I prefer to refer to this background as the "Quessence".
4. A photon is but one example of what I more generically refer to as a "quantum". Quanta are distinguished by their being composed <u>only</u> of SL dynamic fields (plus whatever disturbance that they may also create as they pass through the Quessence) – no static fields. I have been able to identify what I believe appears to be at least one other quantum from among the known phenomena.
5. Particles also appear to be composites of multiple fields. They also must <u>always</u> have at least one SL dynamic field (for that would be what gives them their integrity) and at least one static field (for that is what would make it a particle instead of a quantum). It then appears to be an interplay of the multiple interacting fields (and their parameters) that enables so very many potential (and usually, very temporary) types of "particles", as has been copiously manifest in reality. There are actually only two particles that are known to be fully stable on their own – the electron and the proton. Each of those two stable particles appears to be composed of a highly stable combination of (at least) two interacting SL dynamic fields and (at least) two static fields.

There is certainly more, but that will have to do for now.

3.5. Some Identified Impacts

Inertia is a rather basic concept in classical physics – as a result, any new insight into such a basic concept could reasonably be expected to have the potential to provide significant added understanding or clarity to a variety of other concepts as well. Indeed, application of these ideas appears to provide resolution for at least some of the paradoxes and conundrums that have arisen in physics. All of this has come about through a continuous series of evaluation efforts aimed at checking out whether or not the concept appeared to have any validity – careful efforts that at this point in time have been literally ongoing for decades. (I never felt that it would be wise to present untested concepts that went significantly contrary to "conventional" mainstream physics without first performing some very careful and extensive evaluations to make sure that they truly made sense and had no hidden traps.) These concepts have managed to accomplish all of the above quite admirably, so now I feel that it is time to spread the word. Here is a partial list of just some of the phenomena that have thus far been identified as gaining significant clarification or better understanding:

1. **Photons.** Not only is there more to the photon than meets the eye, but with that understanding, the seemingly peculiar way that a single photon (or a single particle for that matter) can interfere with itself in a dual slit experiment setup becomes clear and understandable.
2. **Particles.** Just as with the photon, it appears that there is more to a particle than meets the eye. This insight not only helps to understand where the plethora of particles arises from, and what makes so many of them unstable, but it also even helps to provide significant added insight into the structure of an atom – and the forces involved.
3. **Relativity.** The understanding of what is behind the observations and equations associated with relativity take on a completely different set of meanings than anything else that I have ever seen before. The resulting understanding fully supports the proven aspects of the mathematics. Moreover, in doing so it also helps us to know HOW to apply those mathematics properly, so that the phenomenon fits the math in a rational manner – without any mysterious mass changes, time dilation, or length contraction.
4. **Redshift.** Redshift also takes on a totally different interpretation, which, in turn, leads to a rather different understanding of both the "expansion" of the universe and of the cosmic microwave background radiation.
5. **Multiple other phenomena.** Items such as matter and antimatter, neutrinos, strong and weak atomic forces, the nature of the background environment (think Aether-like) are among other topics and phenomena that, when combined with additional phenomenoscience, have also begun to take on whole new meanings and understanding – as well as much greater clarity and rationality.

Once again, there certainly are more, but that will have to do for now. All of the ideas listed (and more) are covered to some degree in the references [5-7]. Common elements are discussed to varying degrees in both [6] and [7], but there are also significant areas of coverage that are found in only one or the other. Thus, they actually complement each other

4. Conclusion

Particularly over the last century or so, physics (and to some degree, science in general) have gotten well off-track from the truth of reality, largely because of too heavy of a reliance on mathematics as the principle tool. Mathematics constitutes an excellent housekeeper, but it is far from sufficient for fulfilling the role of the "Queen" of science. Anytime that we begin to fall short of comprehending the true physical, phenomenological "how" and "why" of the phenomena in reality, it can be guaranteed that it will only be a matter of time before we will inevitably begin to veer off-track from the truth. While mathematics is an absolutely superb tool for proving a concept is incorrect when the answers do not come out right, the converse is not true. Good numerical agreement between the mathematical answers and observations can only establish that those answers are in good numerical agreement with reality – it does not prove that the concepts that led to those answers are actually correct.

We must get back to where we understand the actual physical "how" and "why" behind the phenomena correctly and reasonably completely, or we will not be able to get ourselves back on track with reality. The crucial approach that we need to promote to accomplish this is well embodied in careful phenomenoscience. Phenomenoscience does not really reduce well to a formulaic approach, so it requires a great deal more care to implement properly; nonetheless, it is an essential part of what is needed to get back on track with the truth. Because it has been neglected so very heavily for so long, it now needs to receive additional emphasis for a while.

The careful use of phenomenoscience has brought about the recognition of a few basic key concepts related to momentum and inertia, which have begun to reveal a whole new perspective to many of the aspects of reality that have been growing increasingly counterintuitive and illogical over the past decades. While there is more yet that needs to be done to establish their validity fully, the concepts that have been only summarily introduced in this paper deserve a close look and careful evaluation, for they truly appear to promise a dramatically clearer understanding of what is really happening in reality and the world around us.

References

[1] T. B. Bon, "Phenomenoscience – The Key to the Proper Development of New Concepts in Science", http://tbbon.net/doc/Phenomenoscience.pdf.

[2] "Analogous Electrical and Mechanical Systems", http://www.swarthmore.edu/NatSci/echeeve1/Ref/LPSA/Analogs/ElectricalMechanicalAnalogs.html.

[3] "Mechanical and Electrical Analogies", http://www.vias.org/matsch_capmag/matsch_caps_magnetics_chap1_20.html.

[4] "Wikibooks Engineering Acoustics/Electro-Mechanical Analogies" http://en.wikibooks.org/wiki/Engineering_Acoustics/Electro-Mechanical_Analogies (general information).

[5] T. B. Bon, "The Theory of Field Interaction", http://tbbon.net/ (contains multiple documents, chiefly [6] below).

[6] T. B. Bon, **The Theory of Field Interaction** e-book (406 pp), http://tbbon.net/doc/interaction.pdf (for general audience).

[7] T. B. Bon, **The Theory of Field Interaction – An Alternative Approach** e-book (51 pp), http://tbbon.net/alternate.html (a work in progress, for a bit more technically advanced audience).