

A Scientific Map for Subtle Energies

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Abstract: The principle challenge facing any “science of subtle energies” is the simple fact that subtle energy concepts and methods originate in *esoteric* traditions of healing and spiritual practice long eschewed by modern science. Given that a growing proportion of our society is sympathetic to both esoteric *and* scientific values, however, it is now possible to reconsider the phenomenology of esoteric practices within a scientific framework, *and* vice versa. In the author’s experience with Classical esoteric Yogas, a key feature of such practices stands out: the revelation of progressively deeper levels of experience along a *holarchic axis*. It is proposed that this axis can be represented by a simple but novel *backward-looking logarithmic timeline*. Drawn in strictly scientific terms, this timeline constitutes “a new scientific map”—the core of a *subjective cosmology*—embracing over sixty orders of magnitude. The electro-magnetic spectrum is found to divide this timeline into three distinct domains of roughly twenty orders of magnitude each. These three domains display unique features reminiscent of the gross (coarse), subtle, and causal (very subtle) energy categories found in the esoteric traditions. In addition, a fourth domain is posited as a *timeless context* representing descriptions of *simultaneousness* in the case of Yogic realization. The set of complex algebras developed within higher mathematics is found to have features suggestive of these four time domains and their associated esoteric categories. On this basis, a set of distinct *meta-levels of complexity* appears to characterize the predominant structures and mechanisms within the holarchy of the four time domains. This analysis may point a new way forward for the development of a *science* of subtle energies and energy medicine.

This paper introduces a new approach to subtle energies—one that has repeatedly drawn my attention over several decades. It has come into focus only slowly, in fits and starts, but quite spontaneously as a creative process with multiple synchronicities. Now that it has begun to take at least some degree of “shape,” I’m here opening this new approach to critical discussion. Science is a *socially* creative phenomenon—it requires dialog, debate, and a community of practice—it cannot be a solitary enterprise. What I present here is, as Kent Palmer² has dubbed it, only a “sketch of an insight.” To be of any real *use*, it will need much further development, and much of that will have to be done by—or at least with—individuals better qualified than I in various technical fields including mathematics, physics, biology, psychology, philosophy of science and—perhaps someday—engineering.

The approach described here draws explicitly upon the esoteric traditions. Thus it will raise many issues in the long-standing controversy surrounding all matters “esoteric.” As a result, I begin with a fairly extensive discussion of these controversies. Readers interested in going right to the “technical meat” can turn directly to Section II.

I. Background

What do we mean by “subtle?”

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Work supported by the Yoga Research & Education Foundation (<http://www.yref.org>). ² Kent Duane Palmer is philosopher and systems theorist—see http://works.bepress.com/kent_palmer/cv.pdf.

Since the term “subtle” as used here originates in ancient *esoteric* traditions, we begin by looking a bit more closely at this latter term. “Esoteric” is typically used in contrast to “exoteric.” Derived from the Greek words for “within” *eso* and “without” *exo* (in the sense of “outside”), these two terms have acquired a large range of meanings. Among these is a sense that esoteric relates more to *inward experience*—as in silent prayer or meditation, whereas exoteric relates more to *outer behavior*—as in the following of external rituals or observances. Thus, *esoteric* spiritual practices need have no connection with a specific body of *exoteric* religious observances, and vice versa. This is the primary sense in which *esoteric* is used in this paper. Although the term often carries the connotation of “secret” as in something known only to “initiates,” this is not the primary sense intended here. Rather the primary intended meaning is simply that of *inner experience* including *inner discovery, knowledge, or activity*.

There exist many kinds of “esoteric doctrine” that revolve around specific kinds of information—not all of which will necessarily be directly accessible to experience without either special training or special “gifts.” “Esoteric thought” can thus be characterized in various ways—one current within the contemporary academic study of Western esotericism (about which I’ll say a bit more below) is the six-component description given by Antoine Faivre.³ However, as illuminating as Faivre’s description is, especially with regard to *Western* esotericism, a more general meaning is intended here—primarily that of simply (pertaining to) *inner experience*.⁴

Since this paper as a whole describes a new approach to a deeper understanding of “subtle energies,” further discussion of what we mean by “subtle” will unfold as we go along and in Section IV below a tentative “definition” will be offered. But first, a bit more general background:

Challenges facing any “science of subtle energies”

Two major challenges confront any proposed “science of subtle energies.” The first and most obvious challenge is the simple fact that subtle energies have little, if any, standing within the scientific mainstream. The very existence of subtle energies is “not accepted.” Many kinds of energy phenomena *are* studied in mainstream science, but the vast majority of those described (by “believers”) as “subtle energies” are without any accepted “means of measurement.” More importantly, perhaps, they are lacking any accepted *theoretical framework* within which to even conceive of a means of measurement. The National Center for Complementary and Alternative Medicine of the National Institutes of Health thus refers to subtle energies as “putative”—only “supposed” or “presumed” to exist and there is no accepted way to study the many phenomena that have been claimed are associated with subtle energies. Energies considered “veritable” by virtue of there being methods of measurement to disclose them are, in effect, removed by that fact from the “subtle” (i.e. “putative”) category.

When even well-designed studies of subtle energy modalities employing “evidence based” or “outcomes” approaches show positive results, they are not accepted as evidence

³ Antoine Faivre, *Access to Western Esotericism* (SUNY Press, Albany, NY, 1994) pps 10-15.

⁴ Note: scholars of Western esotericism would most likely consider my usage here as “characteristically New Age.” See Hanegraaff’s discussion of this important terminological issue on pps 384-386 of *New Age Religion and Western Culture* (SUNY Press, Albany, NY, 1998) where he explains his scholar’s preference for Faivre’s definition.

for subtle energies themselves. Likewise, with studies relating to measurable effects of conscious intention or psychic phenomena—even when performed according to the *most* rigorous scientific protocols—the results are ignored or denied as being significant.⁵ Thus, we lack both an *accepted* scientific *definition* of what subtle energies might consist of *and* a *scientific map* of reality wherein subtle energies might be found.

The second, underlying, and less obvious challenge to a possible science of subtle energies relates to the “esoteric” historical and cultural roots of the term itself. The notion of “subtle energies” derives from ancient pre-scientific traditions of spiritual practice and healing that have been throughout history, with very few exceptions, marginalized at the very least and more often vigorously suppressed. In the “modern era,” modernity itself can be understood as a reaction suppressive of an attempted revival of esoteric thought in and as the Italian Renaissance.⁶ With modernity, esoteric thought was systematically *excluded* by *both* the dominant religious institutions, and by what we now think of as “modern science.” Thus, an historical perspective suggests how it is that the very notion of a “science of subtle energies” is seen as an oxymoron—the proposal is, on its face, self-contradictory—science and subtle energies simply do not “go together.” This second challenge goes a long way to explaining why dealing with the first challenge has seemed so intractable. Any “science of subtle energies” will necessarily confront head-on the dominant *cultural context* of science (modernity and its offspring) within which the very notion seems absurd.

Why is it that esotericism has been subjected to such a consistent history of suppression? This is a most important issue. However, a detailed exploration of this (reaching as it must deep into our collective history) is far beyond the scope of this brief essay. Suffice it to say here simply that the matter may rest on the tension inherent between freedom and control. Impacting both individuals and collectives, esoteric spirituality is most fundamentally about *inherent freedom and intelligence* whereas the history of human social relations can perhaps be understood as the story of the exploration and exploitation of mechanisms of *control*.

Additionally, and perhaps most importantly for science, esotericism is necessarily contaminated by the *subjective*⁷ which runs directly counter to the commitment science made at its start, and has reaffirmed repeatedly since, to strive at all times to be *strictly objective*. We need not fault science for erecting this barrier against the subjective—so many of us so deeply appreciate what science *has* accomplished in its brief history thus far. However, it seems increasingly obvious, given that subjectivity is *inherent* in our very humanity, that this commitment can, and perhaps must, now be modified in order to more certainly *humanize* our sciences and technologies.

The contemporary rise of an “esotericist-friendly” subculture

In the face of these two serious challenges, the possibility of a “science of subtle energies” *does* make sense to a growing number of people, such as many readers of this Journal. How could this be? What has happened to such people? Are they—are we—suffering from a

⁵ Dean Radin is widely recognized as the current leading authority on psychic phenomenon. He has documented robust “psi” effects in dozens of published studies using the most rigorous experimental protocols. Interested readers will find a wealth of material available by and about him.

⁶ See Faivre, fn 3.

⁷ Note: when I use the terms “subjective” and “objective” I don’t mean to imply that I take these to be in any way absolute categories of existence. Although these terms are common to both everyday *and* scientific speech, their *meaning and significance* will necessarily undergo revision as we move toward the kind of “nondual science” that I’m proposing here.

kind of cultural regression to a pre-scientific way of thought? It clearly cannot be because there is growing scientific evidence for the existence of subtle energies, there is no such evidence accepted by mainstream scientists. There are studies that do suggest, however, that a profound change *is* occurring within global human *culture*. This change can be seen clearly in the findings of sociologist Paul Ray.⁸ Using state-of-the art survey methodologies over the past 15 years, Ray has been following the growth of what he calls a “Cultural Creative” subculture within the developed nations.

Although Ray does not stress this point specifically—and it is beyond the scope of this article to explicate this in detail—this subculture has deep roots in global esotericism. This subculture did not become widely recognized *as* a cultural movement until the “counter culture” and “consciousness” movements of the late ‘60s became vocal minorities. However, the key characteristic of the Cultural Creatives that stands out for our discussion here is that, as a group, they are more accepting of esoteric ways of thought and practice, even if only a minority is overtly involved in anything that could be called a Yoga,⁹ or a “formal practice of esoteric spirituality.”

Cultural Creatives are decidedly *not* a monolithic group—Ray has identified how its members have participated in any number of distinct “movements” including those that are primarily social and political, others that are primarily oriented to personal growth, and still others that are explicitly “spiritual.”¹⁰ ISSSEEM is part of this non-mainstream cultural tradition. As such, its membership represents a specific sub-cultural “we” with roots in human cultural history that are now being increasingly revealed by a growing body of scholarship. This cultural tradition has, in effect, undergone dramatic growth during the past century, and now represents a potentially powerful and perhaps critically important stake-holder in resolving the massive crises now engulfing global humanity.

Recent Findings by Scholars of Esotericism

A new field of *academic* scholarship in Western esotericism has emerged in recent decades. This new current of scholarship first came to my attention through Elizabeth De Michelis’ ground-breaking account of how the tradition of Yoga was *deliberately revised* for a Western audience *before* being “exported” to the West.¹¹ This robust and ongoing scholarly endeavor, although not explicitly purposed as such, *can* be seen as exploring the deep historical roots of the Counter Culture. These scholars have found specific currents of thought in Antiquity that re-emerged in and as the esotericist revival of the Italian Renaissance—most especially Hermeticism, Neoplatonism, and Kaballah. A summary overview of these currents as they relate

⁸ See his latest findings at <https://www.wisdomuniversity.org/cultural-creatives.htm> and www.worldforum.org.

⁹ The word Yoga will be used in this paper to refer to a full spectrum of esoteric spiritual practices that culminate in *realization*. The term should not be confused with the various popular postural yogas which were originally forms of exercise that, however useful for balance and healing, were developed primarily as *preparation* of the body for esoteric meditation. Note too that whereas many discussions of Yoga focus on its forms that arose within a “Hindu” context, Yoga also figures prominently in Jainism, Buddhism, and Islam, and there are Christian traditions of Yoga as well.

¹⁰ See for example, table: New Movements since the 1960s, in *The Cultural Creatives: how 50 million people are changing the world* (Paul H. Ray & Sherry Ruth Anderson, Three Rivers Press, New York, NY, 2000) pps 115-116.

¹¹ Elizabeth De Michelis, *A History of Modern Yoga* (Continuum, London, England, 2004).

specifically to the emergence of the Counter Culture is found in an extensively documented and thoughtful work by Wouter Hanegraaff, the current leader of this budding field.¹²

Especially relevant for our discussion here is Hanegraaff's description of the centuries-long interplay between Western esotericism and modern science. The key observation is that esoteric thought has undergone extensive and repeated *reinterpretation* based on unfolding paradigmatic changes within the sciences as well as changes within the larger culture. Thus, after Galileo, esotericisms became more "cosmic," after Darwin more "evolutionary," after Freud more "psychological," and in the 20th Century, more focused on the new conceptual horizons opened by modern physics and higher mathematics. Likewise, esotericism has responded in specific ways to the cultural developments of the Enlightenment, Modernism, Romanticism, Idealism, etc. Thus has esotericism consistently seen itself "in the mirror of secular thought."

Other scholars are exploring the currents of esotericism in the ancient world and how over the millennia of the Bronze and Iron Ages into Classical and Late Antiquity there were *extensive and sustained* interactions *between* esotericisms "East" and "West."¹³ Yet other scholars are exploring the depths of "modern" *Eastern* esotericism. Here, some of the most impressive work is being done with the vast corpus of Tibetan literature carried to safety by the relatively small community of scholar-practitioners who managed to escape the Chinese genocide. It now appears clear that the Tibetan Buddhist and Bön traditions preserved *in living embodiment* many aspects of esoteric spiritual teaching and practice from Classical and Late Antiquity in what we might think of as *living time capsules*. These now are being widely studied and practiced in the setting of our contemporary scientific and secular culture. One has only to look at the extensive book lists from such publishers as Snow Lion, Shambhala, and Wisdom to see evidence of this major ongoing development.¹⁴ The net result: we now have *direct* access to a vast "treasure house" of ancient esoteric spiritual wisdom, numerous living teachers, and scores of "high teachings," *in English*.

Still deeper strata of the *pre-history* of esotericism are being explored by other scholars. A few prominent examples are the work on Upper Paleolithic rock art and shamanism by Jean Clottes¹⁵ and his colleagues; the works of Mary Settegast¹⁶ on the transition to agriculture in the Neolithic and a possibly *very early* date for Zoroaster; and a growing number of scholarly studies on the archeology and pre-history of South Asia such as the recent work by Himanshu Ray¹⁷ that

¹² W. Hanegraaff, *New Age Religion and Western Culture: Esotericism in the Mirror of Secular Thought* (SUNY Press, Albany, NY, 1998). See especially the excellent summary historical overview in Part Three: "Interpretation: New Age Religion and Traditional Esotericism" pps 365-524.

¹³ Here, one most impressive and groundbreaking work is Thomas McEvilley's magisterial *The Shape of Ancient Thought: Comparative Studies in Greek and Indian Philosophies* (Allworth Press & School of Visual Arts, New York, NY, 2002).

¹⁴ See also, as a particularly outstanding example of the sophistication to which these considerations have evolved, the recent compilation from one major tradition of Tibetan Buddhism, describing in detail the experience and the practice of every step in the process of esoteric spiritual realization: Daniel P. Brown, *Pointing Out the Great Way: the stages of meditation in the Mahamudra Tradition* (Wisdom Publications, Boston, MA, 2006).

¹⁵ Jean Clottes & David Lewis-Williams, *The Shamans of Prehistory: Trance and Magic in the Painted Caves* (Abrams, New York, NY, 1996).

¹⁶ Mary Settegast, *Plato Prehistorian: 10,000 to 5,000BC Myth, Religion, Archeology* (Lindesfarne, Hudson, NY, 1990) and *When Zarathustra Spoke: The Reformation of Neolithic Culture and Religion* (Mazda Publishers, Costa Mesa, CA, 2005).

¹⁷ Himanshu Prabha Ray, *The Archeology of Seafaring in Ancient South Asia* (Cambridge University Press, Cambridge, England, 2003).

once again highlight the extensive exchanges between “East” and “West” in the pre-historic period.

A major ingredient in the background of what follows here is the central influence of Eastern forms of esotericism within the Counter Culture. Hanegraaff points out that following the repeal of the Asian Exclusion Act in 1965 by the US Congress, there has been a steady flow of Yogis and mystics of many sorts into the United States and the other developed nations of the West. In numerous cases, these individuals have been living exemplars of traditions with roots in ancient and medieval esotericisms. Acting as “reverse missionaries,” these individuals have sparked extensive interest in the West—interest that is playing a major role in shaping what we might think of as the beginnings of a new *global* esotericism based on extensive, prolonged, in depth, and experientially-based exploration and “East-West” dialog.

One outstanding participant in this dialog has been Ken Wilber. He has focused on the extensive cross-fertilization that has been taking place between Western psychology, post-modern philosophy, and various forms of contemplative spiritual practice. Working outside the academic mainstream, his unique synthetic skills have combined with a lucid writing style to give voice to many important insights. Among these are his identification of the “pre-trans fallacy” and the development of the AQAL map that aims to coordinate the unique contributions of existing evolutionary and developmental theories and methodologies within a single framework.

Meanwhile, this “East-West” dialog has also been going on *within my own mind* for well over forty years. The following thus reflects the experience of *one* Cultural Creative who *has* been overtly involved in the daily practice of esoteric spirituality *and* who has also remained active in various ways within the mainstream scientific culture—as a lifelong student of science, as an academic laboratory researcher, and as a physician practicing “scientific medicine” with several thousand patients over twenty five years. Woven into what follows will therefore be a few anecdotes from that long dialog that seem particularly relevant to our aim.

How I got started with Yoga: as both postural *and* esoteric spiritual practice.

My involvement with subtle energies began in 1967 with a dramatic experience of transfiguration of His Holiness Yogiraj Sri Swami Satchidananda Saraswati.¹⁸ Ever since my subsequent initial study and practice of Hatha and Raja Yogas with Swamiji (as his students called him) my mind, already steeped by that time in science to the university level, has reached to understand the many kinds of experience developed through Yoga practice that are not part of our everyday discourse, and certainly not considered fitting subjects for scientific investigation. These have included a host of experiences including seeing vivid auras, waking visions, intuitive revelations, accurate premonitions, an episode of lucidity while in *deep sleep*, and a wide variety of meditative experiences. Meanwhile, Swamiji had an abiding interest in science from the time of his youth and he always encouraged me to pursue *both* my professional development in science as well as my practice of Yoga.

¹⁸ After giving a lecture sitting cross-legged on an oriental rug set on a table in front of the central lectern in the historic Arlington Street Church in Boston, the Swami said he would be chanting some Sanskrit mantras and going into meditation. Within minutes the outward appearance of the aging and bearded Swami was replaced by a radiant, angelic, *beardless*, and *youthful* face surrounded by brilliant white light totally filling my visual field. This occurred twice in several days and was attested to by at least one other person in attendance. I later learned that such “phenomena” had been a common feature of his lectures in New York City in the preceding few years and that the Swami decided sometime in 1968 to stop such displays because “some people found them disturbing.”

Eight years later, after a dramatic “conversion experience” on the way to work one morning in 1976, I began a 25 years period as member of the community of the American-born Yoga adept Adi Da Samraj—my second teacher—just as I was entering medical school. Within weeks I was drawn into a “service function” that revolved around my familiarity with scientific research and my active involvement in clinical medicine. Service to the teacher and his community is a central feature of this type of Yoga—known traditionally as Ishta Guru Bhakti Yoga. I subsequently served as Research Director of the Radiant Life Clinic of Adidam¹⁹ for the better part of a quarter century and was asked to investigate, evaluate, and report upon a wide range of alternative health practices and devices that our community experimented with, including a wide variety of subtle energy healing methods and instruments.

Triggered by an initiatory moment of non-separateness that took place approximately ten years later, in the Spring of 1986, I began an ongoing personal investigation of **how science itself might need to change** in order to accommodate the range of experiences I had been given to that time, after some 20 years of Yoga practice.²⁰ This culminated in the following year with a series of visionary intuitions of the structure of reality as what I described as “the timescale re-entrant fractal vortex.” I saw that somehow this structure must give rise to *three* distinct types of systems: dissipative (after Nobel chemist Prigogine²¹), autopoietic (after biologists Maturana and Varela²²), and “reflective”—which I hypothesized must exist to account for self-awareness. Meanwhile, I saw the whole structure as somehow “arising in consciousness” using both the language and the living “demonstration” of Adi Da in my own experience. I dubbed my exploration of this structure the “SummaProject.”

Early on I came to suspect that it might be possible for science to arrive at a sort of “SummaParadigm”—a “paradigm to end all paradigms.” I’d done a careful re-reading of Kuhn’s classic The Structure of Scientific Revolutions and saw that most of the “New Paradigms” that then were becoming fashionable failed utterly to meet Kuhn’s clearly articulated criterion that a paradigm be an *experimental result*, and not just a “new theory” or “new way of looking at things.” I also saw that one who has arrived at the culmination of Yoga practice known as “realization” could be viewed as just such an *experimental result* because Yoga practice *is* “experimental” in a fundamental sense (not just experiential). Thus I came to suspect that realized Yogis are living “new paradigms” of human possibility and began to frame my SummaParadigm in these terms. I presented some of these ideas in 1991 at a small in-house Adidam conference in Maryland,²³ and again in 1996 at the second Tucson Conference “Towards a Science of Consciousness.”²⁴

Over the past busy decade since Tucson, I took what occasions I could to further explore and discuss these ideas. I retired from medicine (and Adidam) in 2002 and began a process of “recovery.” In late 2004, I met Kent Palmer on-line via a Google search on the exact phrase

¹⁹ The name subsequently given to the community of practitioners around Adi Da.

²⁰ Not unlike the question that William Tiller asked himself almost twenty years earlier during his Oxford sabbatical, see p3 of Tiller, Dibble, & Fandel, *Some Science Adventures with Real Magic* (Pavior, Walnut Creek, CA, 2005).

²¹ I had recently read Ilya Prigogine & Isabelle Stengers, *Order Out of Chaos* (Shambhala, Berkeley, CA, 1984).²² Likewise, I had recently read Humberto Maturana & Francisco Varela, *Autopoiesis and Cognition* (Springer, New York, NY, 1980).

²³ Scott Virden Anderson, *The SummaParadigm: the Divine Emergence of Sri Adi Da as Experimental Result and Universal Paradigm for a New Humanity*, unpublished manuscript, 1990, revised 1996, 12 pages.

²⁴ My three poster presentations at T-II are posted on my website <http://www.yogascienceproject.org> under documents, Summa Project.

“nondual science.” The first thing he suggested I read was his ebook Reflexive Autopoietic Dissipative Special Systems Theory.²⁵ The resonance with my intuitions many years before were obvious enough to keep me reading despite Kent’s *extremely* dense technical writing style.

Since then, Kent and I have exchanged hundreds of emails and have met on several occasions at his home in Southern California. From Kent I’ve received a bit of an education in many aspects of philosophy, ontology, complex math, and systems theory that I’d never been exposed to previously. What follows owes a great deal to what I’ve learned from Kent. On the other hand, most of these ideas are my own and he should not be blamed for any of the many kinds of errors I may commit here.

The Holarchic Axis of Experience: A Fundamental Discovery of Yoga

An outstanding feature of the Yogic forms of spiritual practice, or “sadhanas” as they are known, is that over time, experience itself is revealed to have a holarchic structure. The term “holarchy” was originally coined by Arthur Koestler in 1967 and developed extensively by Ken Wilber in recent decades. It seems preferable over *hierarchy* since the latter is semantically loaded by its original meanings associated with religious ranking and top-down control systems. What is this “holarchy” revealed by Yoga sadhana? A basic sense of this can be had directly by considering experience *in this very moment*: there appears to be “a world out there,” *within which* the body arises, *within which* a complex process of experience is taking place. These three realms of experience are *nested*, as it were, one within the other in what is a *holarchic* structure.

As a practitioner of Yoga settles progressively over time into the practice of meditation, deeper and deeper levels of this nested complex are experienced. Gradually, the levels themselves begin to stand out as quite distinct, even as two or more may be experienced arising *simultaneously*. Thus, Yogic practice “itself is a revelation process of the hierarchical structure of all experiencing.”²⁶ In recent decades, Ken Wilber has discussed this structure extensively.²⁷

This “holarchy of experience” then defines an *axis* from “outer to inner” or from “distal to proximate.” The basic idea here is that the levels of the holarchy are experienced as arrayed along what Wilber has described in terms of a proximate-distal axis—as the Yogi experiences deeper *states* in any moment, they are felt as “more proximate”—closer in to oneself, we might say.²⁸ The classic description of this axis in the Yoga Sutras of Patanjali²⁹ is in terms of a line between “Seer” and “Seen.” Another way to view this axis is as an abstraction of “the arrow of attention”—in any moment of attention, we can think of a line of attention with the object (“Seen”) at the distal end and us, the subject (“Seer”), at the proximate end. In the following section, I describe how my attention was drawn to consider this *axis* as most fundamentally *temporal*.

Why the Focus on Time?

²⁵ http://works.bepress.com/kent_palmer/4/

²⁶ Adi Da Samraj, *Transcending the Cosmic Domain* (Dawn Horse Press, Middletown, CA, 2004), audio CD of talk given August 16, 1995.

²⁷ NOTE: Wilber has drawn an important distinction between these “*state structures*”—referring to states that can in principle be experienced in any moment—and “*stage structures*” that are developmental and are not revealed via the 1st person methods of sadhana. This point will be taken up again in Section IV.

²⁸ See for example Ken Wilber, *The Self*, Chapter 4 of *Integral Psychology*, Collected Works edition, Vol 4 (Shambhala, Berkeley, CA, 1999)

²⁹ maybe 4th – 8th Century AD, dates hotly debated and hard to pin down, as for many ancient Indian authors.

Early on in my practice of Yoga, I noticed a connection between Swamiji's injunction, "go within" and the idea circulating in the counter-culture at the time epitomized by Ram Dass' Be Here Now. With continued practice of meditation, it became apparent that the process of meditation can perhaps best be understood as a process of *settling ever more deeply into the present*. Another major influence on my thinking in this regard comes from the principle textbook of modern Yoga, The Yoga Sutras of Patanjali, in which Yoga is defined aphoristically as "stilling the waves of the mind." As one trained in science, I naturally thought of these waves in terms of frequency and wave-length (or period).

Meanwhile, the various sciences focus on processes that span a huge range of frequencies—or perhaps more accurately, "characteristic transaction times"³⁰—from the billions of years considered in stellar, galactic, and cosmic evolution, through the millions of years for biological evolution, down into the years, minutes, and seconds of body processes and experience, and then further down into the inconceivable "depths" of micro and quantum time for chemical, atomic, and sub-nuclear processes.

Fascinated by these time-varying processes as they relate to Yoga and the body, while still an undergraduate in 1967 and at the very beginning my practice of Yoga, I did a self-directed elective in psychophysiology to see if in hooking myself up to a multi-channel recorder (on the 7th floor of the William James building at Harvard) I might detect via its various measures (respiration, heart-rate, EKG, galvanic skin response, surface EMG, and EEG) any *sings* of the Yogic practices I was learning to do with breath and directed internal energies. Not finding anything reproducible with this brief self-experiment, I concluded tentatively that more sensitive instruments or methods of analysis might be needed.

In the early '70s I worked at UC San Francisco down the street from the laboratory of biofeedback pioneer Joe Kamiya and learned of the extensive literature already in existence at the time looking at the biological effects of meditation.³¹ These and related experiences later in medical school sensitized me to how *experience may be related (in some way) to measurable physiological bodily processes—each with its own set of characteristic time functions or periodicities*.

As I began my study and practice with Adi Da (then Bubba Free John) in the late '70s, given the above experiences and reflections, I was particularly intrigued by a brief statement he had made at the beginning of a talk he gave in 1975 titled "Sex, Laughter, and God Realization."³²

It is not true that anything has already arisen. All of this arises spontaneously, by virtue of its own Law, as a modification of the Real... Everything arises in the moment, now. Everything arises as a modification of your own Condition. Not only your thoughts, then, your body also, your sense of yourself separately, this is something also arising. It hasn't already arisen, it arises in this moment, the sense of me arises in this moment, just as thoughts arise in this moment, just as the body sense arises in this moment—you do not enter into this moment from a conceived point of view then, a limited point of view.

As I continued my study and practice of Yoga that included reading in many traditions, I was struck repeatedly by how frequent the references are to experiences of "timelessness"

³⁰ As suggested by Garvin McCurdy, personal communication.

³¹ This literature was being systematically cataloged in Kamiya's lab—what may be an evolute of this bibliography is now available online at <http://ions.org/research/medbiblio/index.htm>.

³² Transcripts of this talk available on-line are missing these introductory remarks.

(sometimes perhaps *interpreted* as “eternity”) when speaking of authentic spiritual awakening, or “enlightenment” across the ages.

Thus, when I began my Summa Project in 1987, what we might call “the mystery of Now” was foremost in mind, and ever since I’ve been drawn repeatedly both to meditate upon, and look for ways to understand scientifically, this fundamental mystery. In recent years, there has continued to be great interest in this issue both on the meditative side—for example in the remarkable work of Eckhart Tolle—and on the scientific side from such luminaries as John Wheeler and Julian Barbour. I’ll discuss this further below. In any case, what I outline here is what you might think of as the results of my years of spontaneous interest in probing deeply into the nature of Now—both as a Yogi, and as a would-be scientist.³³

II. The SummaTime Scale

In this section the SummaTime Scale (STS) is described and a few of its “technical features” that have thus far come to light are presented. In the following section, an *esotericist interpretation* of these features, with special emphasis on those that might open new vistas for a “science of subtle energies,” is proposed.

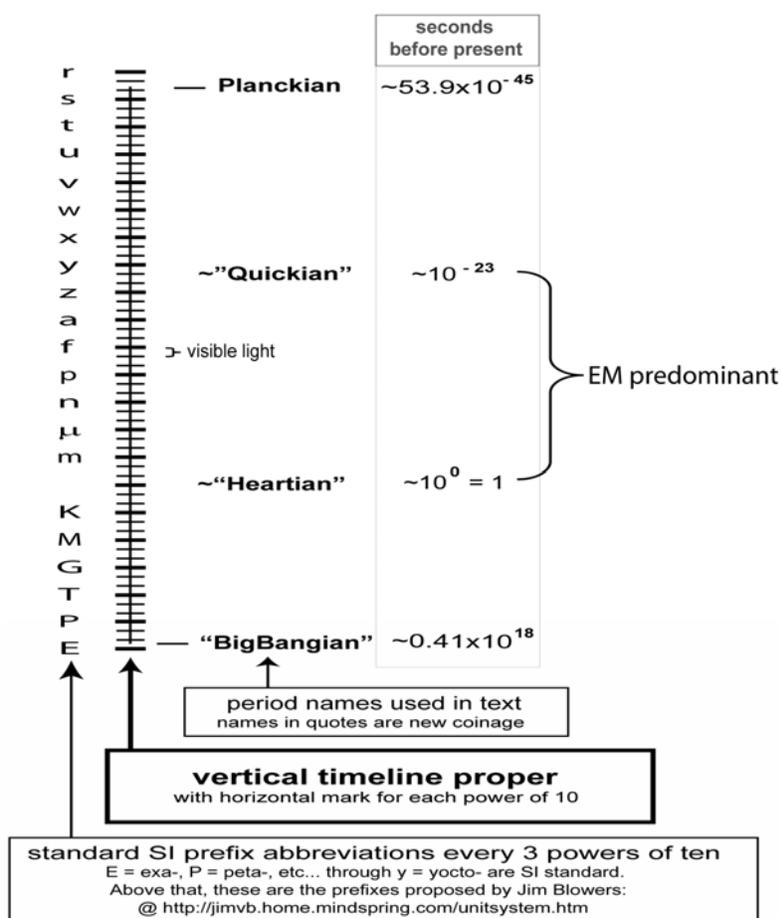


Fig 1. The SummaTime Scale (STS)

³³ I described additional details of my personal history with this timeline in “Tale of the Scale” and “Putting Subtle Energies on the Scientific Map” at <http://yogascienceproject.org>

Overview description:

The STS (Figure 1) is “a *backward-looking logarithmic timeline*” like those routinely used in geology, paleontology, and evolution³⁴ except *extended* as far as possible into the “present” *and* framed in terms of seconds (rather than the more typical years or millions of years). It bears some resemblance to a diagram of universal *size scales* first sketched by Nobel Prize Winning physicist Sheldon Glashow as “The Cosmic Uroboros.”³⁵ Figure 2 is a version of this diagram as re drawn by Primack & Abrams.

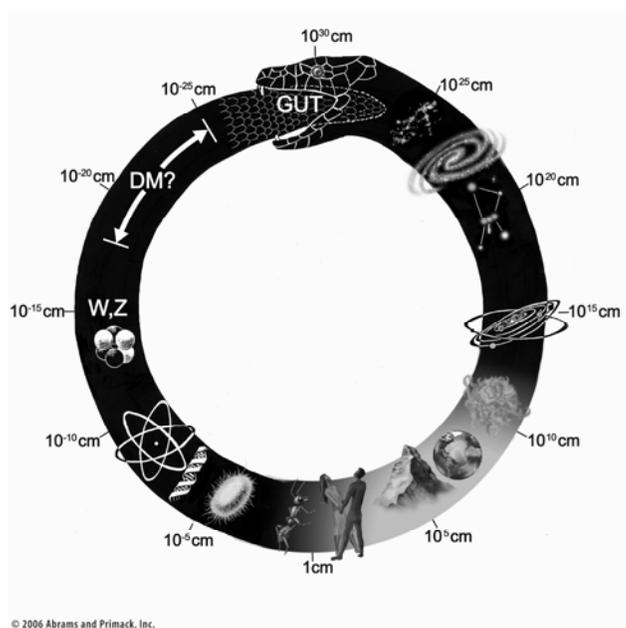


Figure 2. The Cosmic Uroboros. From Joel R. Primack & Nancy Ellen Abrams, *The View from the Center of the Universe* (Riverhead Books, New York, NY, 2006). It can be viewed on-line in color at <http://www.viewfromthecenter.com/files/images/uroboros-color.jpg>. Used by permission.

The compelling reason to use a “backward looking timeline” in units of time “before present” derives from my experience as a Yoga practitioner and meditator described in Section I above. Time “before present” relates our experience *most directly* to every “present” moment: whatever phenomenon stands out in our experience, science tells us that that phenomenon *actually* arose at some point *in the past*. This is seen most dramatically with astronomical observation—the light from that star we’re looking at in the sky may have left the star *millions* of years ago. We perceive a star there “now,” but the “present existence” of that star is only *inferred* from the light we are receiving from it in the present. The same, however, holds true for events much closer at hand, except that their “past” is much more recent—maybe only two

³⁴ See, for examples the Wikipedia entries on “geologic time scale,” “timeline of evolution,” and “logarithmic timeline.”

³⁵ Sheldon Glashow’s, sketch (reproduced in T. Ferris, *New York Times Magazine*, Sept. 26, 1982, p. 38) can be viewed on-line at http://www.aaas.org/spp/dser/03_Areas/cosmos/perspectives/Essay_Primack.shtml, about two thirds of the way down the page.

seconds ago for the moon, fractions of a second ago for that flower over there on the table, even shorter fractions of a second ago for that last thought I just had.³⁶

The STS extends from the Big Bang, currently estimated at ~13+ billion years ago, here converted into seconds (abbreviated s) as $\sim 0.41 \times 10^{18}$ s; to the human heart beat at ~1 s; on down through the photon-proton transit time of $\sim 10^{-23}$ s (also approximately the upper limit of electromagnetic radiation—gamma rays); to the Planck time of $\sim 10^{-45}$ s. When converted into standard scientific units, notation, and *logarithmic* format, the STS spans 60+ “powers of ten.” We might think of this as representing “the whole of time” or “the full-spectrum of possible time scales.” We can also think of this as a spectrum of *cycles*—every point on the STS represents a specific cycle duration. Thus the Big Bang point can be thought of as representing the “cosmic cycle,” the 1s point a “heart cycle,” etc.

For convenience in referring to events taking place in the various regions of the STS it helps to have a kind of shorthand terminology. Thus I’ve coined some terms based on the common usage of “Planckian” (P) in physics: “BigBangian” (BB), “Heartian” (H), and “Quickian” (Q).³⁷ For the domains of approximately 20 orders of magnitude *between* these marker times I can use the shorthand BB-H, H-Q, and Q-P.

An important distinction is that the STS is drawn specifically in terms of *time* as we *experience* it presently rather than according to the objective view typical of science. Although I have found several other discussions in the literature of this *time span* as a whole,³⁸ they are not cast as “backward looking” scales, nor do they make reference to a possible connection with anything even remotely “esoteric” in the sense I’m using in this article.

And finally, we should note that whereas William Tiller’s “first multidimensional representation of uniquely different bands of reality in spectral terms”³⁹ was portrayed as a frequency spectrum reminiscent of the STS *and given an esotericist interpretation*, he quickly moved on to more technically sophisticated scientific models. He has not, as far as I’m aware, explored the possibility of this “representation” being expressed as a *backwards looking logarithmic timeline*. Feedback regarding the STS to date suggest that it is likely *compatible* with Tiller’s still evolving model,⁴⁰ but this will be an important topic of discussion going forward, especially for physicists and mathematicians qualified to understand it sufficiently to evaluate and/or participate in the development of Tiller’s “new paradigm.”⁴¹

³⁶ At least that is the way that I conceive of how specific kinds of events are “presented” to awareness. Notice that this is an *esotericist perspective* on perception and cognition—clearly not equivalent to that of our current “cognitive neuroscience.” Exploring that difference is an important aspect of this whole project and one that may need much further discussion going forward.

³⁷ Note: in previous versions of the STS, what is here dubbed (somewhat whimsically) “Quickian”—to suggest the limit of life and its associated electromagnetism—was previously dubbed “Quantian” however, several reviewers pointed out that the quantum realm, strictly speaking, extends all the way to the Planckian.

³⁸ See especially a recent article: “Scale Unification—A Universal Scaling Law For Organized Matter,” by Nassim Hamein, Michael Hyson, and E.A. Rauscher @ http://theresonanceproject.org/pdf/scalinglaw_paper.pdf. Also of interest is work over the past decade of Indian physicist B. J. Sidharth @ http://eprintweb.org/S/authors/All/S/B_Sidharth.

³⁹ Fig. 1.1.on p5 of *Some Science Adventures with Real Magic*, Tiller, Dibble, & Fandel (see fn 20 above).

⁴⁰ Especially with regard to the “innermost” domain of the STS, as will be pointed out below.

⁴¹ A forum for such discussion has been created under the auspices of ISSSEEM: the Theoretical Frameworks Independent Exploration Group (TF-IEG). Interested readers should contact the author or refer to his website for more information.

The STS is a *Synchronic Map* of an “Instantaneous” *PlanckPrint*

An important distinction must be drawn between *two kinds of “past”*—we might call them “historical past,” and “past present.” Technical terms for this distinction are *diachronic* and *synchronic*.⁴² The STS, showing as it does the “past present,” is a *synchronic* map of “time before present now,” as opposed to a *diachronic* map of historical past as often used in “timelines of history” along which events that have taken place “over time” are marked off. This is a key distinction to keep in mind as we go forward since there are distinct advantages and limitations to each type of map.

To help clarify this, try the following thought experiment: consider, “when *in my present experience* is the Mexican-American War of 1846?” You’ll have to reply, “it isn’t in my present experience at all—it is just something I’ve heard about or read about—an event in history.” This historical conflict is *not observable* to you *in the present* by any kind of telescope imaginable. It is only known to you by virtue of observations and experiences of it having been recorded in various ways that *are* available now as historical records of one sort or another.

On the other hand, if you consider, “when *in my present experience* is the quadruple star system known as epsilon Lyra?” you might point to the correct constellation in the night sky and say, “right there, right now.” The fact is that the light you are seeing *left* epsilon Lyra around the *same time* as the Mexican-American War but epsilon Lyra *is* observable to you *in the present*, even though what you are observing is an event of light emission by the star system in the past. The *kind of past* represented by the STS is of this kind—we might call it “past present.”

To take another example, we currently think that the Big Bang is as long ago as any phenomenon can be, and yet it is also “present” to us in any now moment in the form of the Cosmic Background Radiation currently permeating our bodies with low-energy radio waves. Our present can be thought of as a specific time-location *in relation* to “Big Bang” or “Universe” time as suggested by the BB end of the STS. Likewise, however, our present “time location” exists *in relation to all the other possible cycle times* shorter than the Universe time, all the way down to the Planck time.

As a final example, we exist *in relation* to the entire span of time cycles in somewhat the same way as we may ourselves be children, grandchildren, parents, and grandparents *all at once*. Our existence in any moment encompasses all possible time scales. The synchronic nature of the STS implies, therefore, that we exist across the entire STS in every moment. Likewise, every phenomenon exists across *all* time scales *at once*.⁴³ Thus, any given phenomenon exists across all domains of time simultaneously, regardless of the time characteristics of its processes. This is a critical feature of this way of looking at things: let’s call this the Principle of Cosmic Synchrony or PCS.

The Principle of Cosmic Synchrony (PCS): any and every phenomenon exists across *all* time scales at once.

What do we really mean by “at once?” The STS is one way to give a scientific answer: as a *synchronic map*, the STS represents an “all at once” Cosmos. Because it reaches *all the way* down into what we think currently is a “shortest possible time”—the Planck time—the STS

⁴² I gather these terms were coined by Ferdinand de Saussure, Course in General Linguistics (1916).

⁴³ This may turn out to relate to Mach’s Principle which states that the inertia of a mass results from its being acted upon by all other masses in the universe.

depicts, in effect, *a snap shot of the entire Cosmos with a Planckian shutter speed*—a presumably ultimate kind of “at once.” I’ll call these “snap shots” *PlanckPrints*—an instantaneous configuration of the cosmos across all time scales that might be thought of as an “operational definition” of “simultaneous.”

Definition: A “PlanckPrint” is represented by the STS as a configuration of the entire cosmos at a specific Planck time.

This notion is inspired by Julian Barbour’s description of “Platonía.” As elaborated in his 2001 book The End of Time, Barbour makes a case that time does not exist. Instead, the universe consists of a vast ensemble of configurations of the entire universe in inconceivably short “slices” of time lasting the $\sim 10^{-45}$ seconds duration of the Planck time. I’ve come to think of something similar, couched in terms of the STS, as “PlanckPrints.” In his reflections, Barbour has concluded that this is *all* there is—reality as “Platonía” is not moving, evolving, or changing in any way. Rather, experience “in and of time” represents a selection, or an “ensemble,” of these configurations in Platonía, somehow tied together according to rules that remain to be elucidated.

There is a great deal more that can be said about PlanckPrints (PP).⁴⁴ PlanckPrints are *unique* to a specific *observer* since the configuration of the Cosmos will appear differently depending on the “body in question.” The STS thus includes this key feature of our subjectivity—our PlanckPrints are necessarily unique by virtue of the uniqueness of our bodies within which an observer-specific flow of PPs is arising.

Three Domains of Time

Inspection of the STS reveals that it divides rather neatly into three domains of ~ 20 powers of ten each: an *outer* domain that encompasses our immediate environment out to the furthest cosmos (BB-H), an *inner* domain that is largely within the body (H-Q), and an *innermost* domain down to the Planckian (Q-P). These domains each have distinct qualities and characteristic types of structures: the outer domain is characterized primarily by material processes, the inner by biological processes taking place in a vast range of frequencies that correspond to the bulk of the electromagnetic (or “photonic”) spectrum; and an innermost domain comprising a dark or “sub-photonic” region that we will explore more extensively below.

Notice that Primack & Abrams also distinguish three domains in the Cosmic Uroboros.⁴⁵ They define a central region (light shading in Fig. 2 above) as “the range of sizes that we routinely relate to as humans”—with domains for larger and smaller on either side. With the STS, a somewhat *different* range is naturally defined as “the middle domain” by the predominance of electro-magnetic phenomena.

⁴⁴ Several items of particular interest here: on the Yoga side, the extensive discussion of “simultaneousness” in the advanced stages of Mahamudra meditation in the later chapters of Daniel Brown’s *Pointing out the Great Way* referenced in fn 14 above; on the Science side, the recent publication by Stephen Hawking and Thomas Hartog of *Populating The Landscape: A Top Down Approach*, in *Phys. Rev. D* 73, 123527 (2006) (available on-line at <http://arxiv.org/abs/hep-th/0602091> in which is proposed a *cosmology based in the now of the observer*.)

⁴⁵ See the image @ <http://www.viewfromthecenter.com/files/images/uroboros-color.jpg>.

Three Meta-levels of Complexity

Here my presentation gets more technical and in order to help explain some rather complex ideas about complexity, I will say a bit more about my 1987 “visionary intuitions of the structure of reality.”

On the Science side, as suggested above, I’d followed the emergence of the “sciences of complexity” going back to my days in college where I first heard the terms “general systems theory” and “cybernetics.” I was in med school when I learned that Ilya Prigogine had won the 1977 Nobel Prize in Chemistry for his work on “dissipative complex systems.” I was fascinated by Mandelbröt’s work, first brought to public attention with his Fractal Geometry of Nature in 1982 and later brought to an even broader audience by such videos as “Nothing But Zooms”⁴⁶ and the wildly popular open-source computer software Fractint.⁴⁷ In 1984 a group of prominent thinkers came together to establish the Santa Fe Institute whose “original mission was to explore the notion of a separate interdisciplinary research area—complexity theory—referred to at SFI as ‘complexity science.’” I was an early subscriber to their Bulletin.

Meanwhile, I had followed closely the development of the “New Paradigm” and “holographic theory” movements within “the counterculture,” the work of David Bohm and Karl Pribram, and the emergence of young Turk and critic of the movement, Ken Wilber and his Revision Magazine. In the mid ’80s I read Maturana and Varela’s 1973 Autopoiesis and Cognition in which they coined a new word—autopoiesis—originally conceived in an attempt to characterize the nature of *living* systems. To me as biologist and physician, it was clear that living systems present special challenges for any “science of complex systems.” The term has since generated a huge amount of interest. However, it should be noted that, there is still no consensual formal definition of an autopoietic system and consideration of autopoiesis is still rather suspect in academe.⁴⁸

On the Yoga side, as mentioned previously, I had an initiatory experience in 1986 that catalyzed a new and ongoing process of inner exploration. Here the motivating questions were, “what *is* this ‘sense of self’ and what *is* the nature of the reality in which this ‘apparent self’ (as Adi Da called it) is arising?” This became the core issue of my daily study and intensive meditation practice. In the Fall of 1987, a spontaneous reply was forthcoming in the form of what I think could best be described as “a visionary intuition”—while wide awake one morning, not really as a visual image, but more as an *intuited* form—I “saw” that reality is a fractal vortex in which every “apparent self” is a “self-similar” sub-vortex—never having a truly “independent existence,” but rather always intimately connected with the rest of the reality vortex *as a whole*.

Furthermore, I intuited that the reality vortex is *structured in time* in such a way that it is “scale-re-entrant”—in other words, like the Cosmic Uroboros, the *deepest inner* part of the vortex of the apparent self opens upon the *outermost vastness* of the cosmos—as with a spherical vortex, the “inside” is actually continuous with the “outside.” Finally, I “saw” that in addition to “dissipative” material complex systems and “autopoietic” living complex systems, in this fractal vortex of total reality, there must be a *third* kind of system needed to account somehow for “mental” complex systems—for which I used the term “reflective.” So that is how I first came to

⁴⁶ Which featured multiple high-resolution video zoom sequences deep into the Mandelbröt set produced at the National Center for Supercomputer Applications, released by ArtMatrix in 1988 in VHS.

⁴⁷ Freeware, latest version is #20, for Windows, and dated 2006. Official homepage at <http://spanky.triumf.ca/www/fractint/fractint.html>.

⁴⁸ Ben Goertzel, personal communication. Meanwhile, astronomer Eric Chaisson specifically dismisses any consideration of autopoiesis as “unnecessary”—see his *Cosmic Evolution*, (Harvard University press, Cambridge, MA, 2001) p122.

the basic notion elaborated here of there being three distinct *types* of complex systems. I've been trying "to make sense" of all of this ever since—that was 1987.

Fast forward now to Fall 2004: I'd just finished writing up some ideas for how a small "Yoga Research" non-profit that had fallen into my lap might move forward on a Yoga Science agenda.⁴⁹ In the course of writing I'd concluded that "nonduality" might be a good term to explore. With "Yoga Science" in mind, it occurred to me to Google "nondual science." I got two hits, both to the work of Kent Palmer. As I've described above, his work was not only powerful reinforcement for my intuitions of 1987, but as a professional systems theorist, he had done years of deep exploration of my "three types of complex systems" that he called the "Special Systems"⁵⁰ and for which he had used very similar names: Dissipative, Autopoietic, and *Reflexive*. Furthermore, he had explored these ideas extensively with a number of mathematicians interested in physics and systems theory⁵¹ and come to the conclusion that there were "interesting connections" (to say the least) with several specific mathematical structures—the "complex algebras" most prominent among them.⁵²

Although I'm no mathematician and not really equipped to actually work with such sophisticated math, I can still appreciate some of its basic features. Complex numbers in modern mathematics are an extension of the complex numbers that I knew a little about from high school physics and math. Ordinary complex numbers consist of two parts, one "real" and one "imaginary." Complex numbers figure prominently in the inner working of the "complexity science" story outlined above. For example, the Mandelbröt Set exists "in the complex plane" and is generated by computer programs using complex numbers.

The "first extension" represents a sort of "double" complex number—it is known as the "quaternion." It consists of four parts, one "real" and *three* "imaginary." An algebra for these numbers was discovered in a memorable Eureka! moment on the part of the mid 19th century mathematician William Rowan Hamilton. Although quaternion algebra is hard to work with, it figured prominently in the work of James Clerk Maxwell—more about that later.

The "third extension" represents a "double" quaternion—known as the "bi-quaternion" or "octonion." It consists of eight parts, one "real" and *seven* "imaginary." Doing algebra with these kinds of numbers is extremely unwieldy, and yet they have found some application in mathematical physics—according to wikipedia "in string theory, special relativity and quantum logic."

There are yet higher order complex algebras. The next one in the series is known as the sedenion, consisting of one real part and *fifteen* imaginary parts. To my knowledge no *applications* have yet been found for the sedenion although a recent MIT graduate appears to be developing ways to work with these exceptionally complex mathematical objects.⁵³

⁴⁹ This piece, "Yoga Is Greater Than Science" is posted on my website under Documents, Yoga Science.

⁵⁰ His way of summarizing what is "special" about them is along the following lines: whereas systems are "greater than the sum of their parts," and meta-systems (the environments in which systems exist) are "less than the sum of their parts, Special Systems are "exactly equal to the sum of their parts."

⁵¹ Ben Goertzel, Onar Aam, and Toby Smith.

⁵² For a relatively concise discussion of this topic, see Kent's paper in his series of "working papers" on Nondual Science, Mathematical and Physical Anomalies in Nondual Science at <http://www.nondual.net/nds05a03.pdf>, or <http://holonomic.info/nds05a03.pdf>. If you get a "failure to connect to web server message," try again later – Kent's server can be temperamental.

⁵³ His name is Robert de Marrais and his work can be readily found via Google, is way over my head, and uses the term "zero-divisors" in reference to the sedenion class of algebras.

With each of the “doublings” we’ve noted so far as we go from complex, to quaternion, to octonion, to sedenion, there is a progressive *loss* of a key algebraic property: with the quaternion, commutation; with the octonion, association; with the sedenion, division. My hunch is that this is an important feature of the complex algebras—it seems to add “degrees of freedom” as we step up the series. I’m hoping future Yogi Mathematicians will shed further light on this. In the meantime, the loss of division in the sedenion seems highly suggestive of the timelessness that I’ll propose here below is the SummaContext—beyond the octonion we can no longer identify any kind of “divisions” or separations. In light of this, I’ve added a *fourth* domain of time—an *atemporal* domain associated with the sedenion in Table 1 below.

Aligning Time Domains and Meta-levels of Complexity

So, how are these complex algebras connected to the STS? The three STS domains appear to correlate with distinctly different types of *processes* or *systems dynamics* each with an associated “division algebra.”⁵⁴ This was an insight that Kent and I shared over lunch on 4/14/07. For the preceding five months I’d been exploring my notion that the three domains of the STS might correlated with the “gross, subtle, and causal” categories of traditional esotericism. I had drafted “The Subjectoscope”⁵⁵ article and Kent had been kind enough to give me some extensive feedback on it. In preparing for our get-together, it had occurred to me to wonder, “Hmm, Eric Chaisson has a well-developed theory of cosmic evolution based on dissipative systems, and the EM spectrum clearly defines a *middle* domain of the STS, I wonder if my three domains might line up with Kent’s Special Systems? Could electromagnetism somehow be *autopoietic*?” I mentioned this to Kent over lunch and he replied, “I think I’ve seen somewhere that the quaternion can be used for Maxwell’s Equations. That would be some evidence supportive of your idea.”

When I got home a couple of days later, I discovered that in fact Maxwell had used a quaternion formulation in some of his *original* publications on his famous “Beautiful Equations” as noted above. This notation had been criticized as being “too cumbersome,” and he subsequently used simpler ways of expressing the underlying ideas. However, he did not have long to live, and soon others came up with an “improved vector formulation” that has been used almost exclusively ever since.

In any case, what this suggests is, I think, an original idea in the now thirty five year history of “autopoietic systems:” **that the *photon* is the archetypal autopoietic system.** To my knowledge, this idea is novel and unexpected (and, of course, quite possibly wrong or not particularly useful). However, the association between light and life does have a long and august history. Countless examples could be found associating the two, especially within the esoteric traditions. Modern biologists understand that that life as we know it on earth is dependent ultimately on sunlight.⁵⁶ And there are other indications that light may play a much larger role in our biology than is generally thought in academic circles.⁵⁷ On the other hand, we do not

⁵⁴ For this key insight, I credit Kent Palmer—see especially his Reflexive Autopoietic Dissipative Special Systems Theory, @ http://works.bepress.com/kent_palmer/4/. For a more introductory treatment by Kent Palmer, see fn 51 above. Wikipedia has introductory articles on many related topics including hypercomplex numbers, Caley-Dickson construction, Clifford algebras, quaternions, octonions, and sedenions.

⁵⁵ Posted on my website, Documents section, under Yoga Science Project.

⁵⁶ Chemoautotrophic bacteria being at least one possible important exception.

⁵⁷ Here I’m thinking of the pioneering work in “biophotonics” of Fritz-Albert Popp and the work of Mae-Wan Ho, *The Rainbow and the Worm: The Physics of Organisms* (World Scientific, Singapore, 1998).

generally recognize photons as being “alive” in any sense and so it thus remains an open question as to how useful will it be to think of photons as “autopoietic.”

My hunch at this point is that an argument could be made, based on the framework outlined here, that photons *are* the “fundamental particles” of life because *every* photon “has room within it” for the Q-P universe of information and archetype further discussed below. Is it possible that photons can thus have some sort of “interior of their own?” Some recent work on the “interior structure” of the photon may support this line of speculation.⁵⁸ Furthermore, Fritz-Albert Popp has described features of “bio-photons” he has observed that are *not* thought to be characteristic of the ordinary photons of physics—might these relate to “interior features” unique to *bio*-photons in living systems? A recent comment by William Tiller⁵⁹ is suggestive (at least to me) along these lines.

A third conceptual leap in complexity thinking is to hypothesize an association between the innermost domain of the STS and Kent’s Reflexive Special System and the octonion. How can we begin to understand this? On the Science side, this domain of the STS stands out to me as the realm of mathematical physics. I suspect that few outside the field of fully appreciate just how complex the subject is.⁶⁰ One thing appears certain: it appears almost totally incomprehensible to the non-mathematician. What we hear from the men and women working in this field is that, at this “level,” reality seems to consist *literally and only* of mathematical abstractions, equations, and probability functions. They also report, however, that they are increasingly in near total and unanimous amazement at the extraordinary degree to which their abstractions can predict, with degrees of accuracy unprecedented in the history of any previous scientific theory, the *findings* of experiments carried out around the world.⁶¹ How are we to understand all this? What I’m proposing here is a way we non-specialists might begin to “wrap our heads around” these truly remarkable findings of modern physics—at least a bit. (In this sense, the STS may turn out to be most useful as a sort of “educational tool.”)

The Santa Fe Institute has recently announced that its original mission to develop and disseminate a general theory of complexity has been realized. It turns out what they mean by this is that “numerous complexity institutes and departments have sprung up around the world.” Mission accomplished: to establish a new interdisciplinary field. However, until this writing, when it occurred to me to Google “hyper-complex systems” and I got nearly 400 hits,⁶² I’d not seen any clear evidence that *distinct degrees* of complexity have been identified. I’ll continue my homework. It could be that a different terminology has been developed that I don’t know

⁵⁸ See the papers by Anthony H. J. Fleming posted at <http://www.biophotonicsresearchinstitute.com/Journal.htm>.

⁵⁹ William Tiller, *Toward a Reliable Bridge of Understanding between Traditional Science and Spiritual Science*, in *Measuring the Immeasurable*, multiple authors (Sounds True, Boulder, CO, 2008), pps 287-312. Especially, “This new level functions in the physical vacuum within the “empty” space between the fundamental particles that make up the electric atoms and molecules.” P293

⁶⁰ A good test is perhaps to see how far one gets with Roger Penrose’s recent and much lauded book *The Road to Reality: A Complete Guide to the Laws of the Universe* (Knopf, New York, NY, 2005). I did not get very far.

⁶¹ The original classic work to make this point is Eugene Wigner, *The Unreasonable Effectiveness of Mathematics in the Natural Sciences*, *Communications in Pure and Applied Mathematics*, 13, 1 (Feb 1960). More recently, Max Tegmark has proposed that “the universe is made of math.” See, for example, his article *Mathematical Cosmos: Reality by Numbers*, *New Scientist*, 14 September 2007. The more technically inclined should look at his formal paper, *The Mathematical Universe*, @ <http://arxiv.org/pdf/0704.0646>.

⁶² Google of “hyper-complex systems” yields 397 hits. But when I add “autopoiesis” there is but one: “*Psychoanalysis and Biology: an Epistemological Re-Discussion*,” Bianca Maria Sanches Favaret PhD, *International Forum of Psychoanalysis*, 2002, 11:202-208—available only by subscription. As far as I can tell, the paper makes no direct connection between the two.

about. What seems likely in any case, however, is that even if these distinct meta-levels of complexity *have* been identified elsewhere, they have not previously been related to the categories of experience inherited from the esoteric tradition, nor to the time domains of the STS that are the focus of our discussion here.

As a final note, by this analysis, all *four* of the meta-levels of complexity are found in *every* PlanckPrint. Thus, every “phenomenon” (put in quotes since I won’t here delve into a more detailed analysis of what we mean by the term) has complex, hyper-complex, ultra-hyper-complex, and “*infinitely*” complex aspects. This point will come up again later in Section III below.

Here is a summary table for easy reference:

STS Domain*	Character	Degree of Complexity	System	Algebra
BB—H	Matter	complex	dissipative	complexion
H—Q	Life	hyper-complex	autopoietic	quaternion
Q—P	Mind	ultra-hyper-complex	reflexive	octonion
atemporal	Sentience?	“infinitely” complex	ur-context**	sedention+

Table 1. some technical features of the three STS domains and their “setting”

*BB = BigBangian; H = Heartian; Q = Quickian; P = Planckian.

** overarching, all-embracing, all-permeating

III. An Esotericist Interpretation of the STS

To summarize the features of the STS discussed thus far:

- It is an abstract representation of *looking, back through time, from the perspective of now*.
- It is a *synchronic map* representing a PlanckPrint snap shot of an “all at once” and “entire” cosmos.
- It embraces *three domains of time* each of which display a number of distinctive characteristics including a *meta-level of complexity*.
- It is presumed to be *set within a timeless context* (which is here considered as yet a *fourth* meta-level of (“infinite”) complexity).

In this section, I’ll give an interpretation of these features in terms of the “findings,” if you will, of esoteric spiritual practice.

The first feature of the STS reflects its *design*—it was deliberately set up this way because of how such an abstract representation seemed most directly to *translate into scientific language* the classical Seer-Seen axis of Patanjali’s *Yoga Sutras* that I was long familiar with. As the years have passed since and I have reflected on the significance of this design in the context of ongoing study and practice of various *other* schools of esoteric spirituality, the sense of appropriateness of the design has only grown.

The discovery of the second feature served to further confirm the design. This was the realization, in mid 2006, that the STS was decidedly not a diachronic map, as I had originally thought without understanding that there was an alternative. The original inspiration for the STS was Toffler’s *Third Wave*. As described at some length in “The Tale of the Scale,”⁶³ in early 1995 I looked to see if there might be a *logarithmic* relation between the time intervals implicit in Toffler’s historical analysis. What I discovered—a straight line on loglog plot—seemed to me

⁶³ Posted on my website under documents, Yoga Science Project, page 2:

<http://yogascienceproject.org/wp-content/uploads/2007/04/Tale v0.02.pdf>

an unequivocally affirmative answer. So I asked myself, “can I *extrapolate* the plot and get a sense of when we might expect the “Forth and Fifth Waves?” It seemed I could, but the intervals between projected Waves became shorter and shorter until I reached a 10th and even 100th Wave long before I got to anything like a “now.” I could not make much sense of this at the time, and so I set the idea aside.

About a year later, when David Chalmers suggested in a phone conversation that I submit a paper to the 2nd Tucson Conference on the Science of Consciousness to be held in the spring of 1996, I revisited my logarithmic time plot, and with some new insights (including a new appreciation for evolutionary timelines⁶⁴), submitted the original version of the STS under the title “The SummaTime Scale—a tool for “hard problem” research”.⁶⁵ Here I attempted to place *historical* events along a logarithmic timeline and speculated on how such a plot might be used to explore various alternative solutions to the “hard problem of consciousness”—a phrase that had entered wide circulation since Chalmers had coined it at the first Tucson conference two years earlier.

It was fully ten years later before I saw that the STS was much more appropriately understood as a *synchronic map* (as described above) and recognized simultaneously that as such it resonates strongly with a core element of the most *radical* forms of esoteric spirituality. A discussion of the specific histories, teachings, and practices of these “radical” schools is way beyond the scope of this brief paper.⁶⁶ However, the key feature that I suggest they all share is teaching regarding the “goal” of practice as being “always already,” “present in every instant of experiencing,” and an orientation to awakening that is sometimes characterized as “non-gradual” or “sudden.” The obvious implication of this descriptive language is that some most fundamental feature of our existence is “simultaneous” or, as I’m using the term here, “synchronic.”

In terms of our aim here to explore the possibility of a new approach toward a science of subtle energies, the most important “technical feature” of the STS concerns the third group listed above—the three domains of time and their associated meta-levels of complexity. The most striking Aha! Moment came in late 2006 when I saw that these three might align with the esotericist categories “gross, subtle, and causal.” In what follows I’ll discuss them one by one summarizing the considerations of this possibility that have developed since that Aha! I’ll then touch upon some potential further implications of the “forth,” “source,” “timeless,” or “plenal” domain.

Complex Gross⁶⁷ Realm

In the esoteric literature, “gross” refers to tangible, physical, palpable things we might reach out and touch. It does not have the *negative* connotations we sometimes associate with the word. As discussed above, a vast body of technical research has been devoted to “complex systems” over the past century. Self-organizing complex dissipative systems are now routinely studied in a wide range of academic settings. As just one example, astrophysicist Eric Chaisson

⁶⁴ including those drawn from a first exposure to Wilber’s then brand new AQAL framework in *Sex, Ecology, & Spirituality* (Shambhala, Berkeley, CA, 1995). I’d run across it on the new books shelf on 1/2/95, and had been slowly reading it over the course of the spring of that year.

⁶⁵ Posted on my website in Documents, Summa Project.

⁶⁶ I’m referring here to *specific* schools *within* the larger traditions of Jainism, Buddhism, Advaita, Taoism, Sufism, and contemporary “nondual” approaches including Adidam.

⁶⁷ In Buddhist literature, “coarse” is sometimes used in lieu of “gross.”

has analyzed the entire span of cosmic evolution using “dissipative systems.”⁶⁸ His work is being cited by the “Big History” movement in education that aims to connect human history with its larger cosmic context.⁶⁹ It is important to note, however, that when wikipedia reports that “Big History looks at the past on all time scales, from the Big Bang to modernity,” the phrase “on all time scales” means something quite other than the SummaTime Scale—for all practical purposes it means only BB-H—what I’m here calling “the Gross Realm.”

Chaisson’s in-depth work makes a strong scientific case that self-organizing material systems predominate in the “outer domain” of the STS. The dynamics of such systems are well-described using complex numbers (one part real and one imaginary). My outsider’s sense has been that most of the work being done by the now newly “respectable” complexity science is largely of this kind (i.e., related to the dynamics of the huge range of systems that can be described using complex math). Note: complex analysis can be applied to phenomena *across the entire STS*; however, my suggestion here is that complex systems *predominate* in this outer domain that I am aligning with the “gross realm” of classical esotericism.

Hyper-Complex Subtle Realm

In Yoga, the “subtle realm” is a term used to describe the experience of a variety of energies and phenomena. Subtle energies are felt *primarily* as interior to the body. However, in many cases subtle energy *perception* may extend to seeing or feeling energies in or around the bodies of others or elsewhere in the environment *external* to the body. This realm of experience is often subdivided and a large array of terms is found in esoteric literatures from around the world to describe these domains of experience such as etheric, astral, and mental. Dreams and various kinds of visionary experience are typically included as experiences of the subtle realm. It is thought that all of these kinds of experiences are mediated via a *subtle body* (or a number of subtle bodies) that permeates the physical body and yet is *ontologically* distinct from it.

Meanwhile, Science tells us that the electromagnetic spectrum predominates in this middle section of the STS. Not surprisingly, therefore, there has been debate for well over a century: are “subtle energies” *equivalent* somehow to “electromagnetic energies?” Members of ISSSEEM are much more aware than most of the nuances of this debate and the fact that the current *official* answer is, “maybe, but most probably not.” Hence the two categories created by the NIH: “veritable” and “putative” mentioned in the opening paragraph. What I’m proposing here is that *both* of the NIH categories of energy are *associated with* electromagnetism but that a) such energies always *also* exist both *within a larger context* and *embracing yet deeper levels* and, b) electromagnetism itself may still have further secrets to divulge.

Regarding the first point, at least in the specific case of *bioenergies*—as described for example by Beverly Rubik with the term “biofield”⁷⁰—we must keep in mind that such energies are *always associated* with specific “gross” bodies, as well as most often with minds, intentions, information, and/or sentience of some sort. In other words, bioenergy itself has an “inside”—or “interior.” As we’ve seen, there is yet the *third* vast domain of time—the region of the STS on the deeper *inside* of electromagnetism where there appear to lie even more complex and even more subtle phenomena.⁷¹

⁶⁸ See especially his *Cosmic Evolution* (Harvard University Press, Cambridge, MA, 2001).

⁶⁹ http://en.wikipedia.org/wiki/Big_History—I like to think of the STS itself as “Bigger History,” and when set in the Timeless Context, “Biggest History.”

⁷⁰ Beverly Rubik, PhD, *The Biofield Hypothesis: Its Biophysical Basis and Role in Medicine*, *The Journal of Alternative and Complementary Medicine*, 8, 6 (2002), pp703-717.

⁷¹ The term “very subtle” is often used in the Buddhist literature.

Regarding the second point, I propose that we may yet discover features of electromagnetism that have not been fully accounted for to date. There seem to be a number of details regarding the history of the development of Maxwell's equations that remain unsettled. Here I'll focus on just one key point: that Maxwell made use of (and may have preferred) the quaternion notation, that others found the notation cumbersome, and so the vector notation was settled upon *after* his untimely death.⁷²

As suggested here, however, electromagnetism will likely be *most* deeply understood only *in the context of* the full set of complex algebras. If, as suggested above, *all three types of complex systems exist simultaneously in all phenomena of nature*, then we are, in effect, proposing a sort of "SummaContext." When we try to isolate out the complex part, or the hyper-complex part, we will necessarily be *leaving out* the other domains. In many cases such simplification will be perfectly adequate for practical purposes—consider how far physics got *without* the use of *any* of the complex algebras. However, if we are to develop a fuller scientific account of nature, I propose that we cannot ignore these "subtleties." On the other hand, taking a more practical view, even though complex systems are now getting serious attention in academe as discussed above, the quaternion has long been side-lined in electromagnetism precisely because it is not easy to work with, and the octonion remains even more challenging.⁷³

In this connection, it may be instructive to pay close attention once again to Maxwell's actual writings. One thing that stands out, looking through his Treatise, is the *enormity* of the mass of detailed *observations* that had *been made previously by others*—including Ampere, Faraday, Coulomb and a host of scientists over the course of the preceding centuries—all of which observations Maxwell managed to summarize in his "Beautiful Equations." It is all too easy for us to forget what an accomplishment this really was and how much work went into laying a foundation for Maxwell. There may be a great deal more basic work ahead before any "Beautiful Equations" may be possible using the octonion. We can only speculate that given the inconceivably vast range of cycle times encompassed by the SummaTime Scale and the primitive state of our "subjective sciences" at this juncture, it may be quite some time before the situation will be ripe for the next Maxwell to show us how "it all fits together."

It also bears pointing out that in recent centuries mathematics has itself become a *vast* structure of inter-related tools. The complex numbers are just one very modest-sized and perhaps even peripheral element within a vast network of "mathematical structures."⁷⁴ Thus it seems likely that the potential depicted here for this one part of contemporary mathematics to play a role in a possible science of subtle energies will almost certainly have to be augmented in years to come with a much more complete set of mathematical tools in a *developed* science of subtle energies. Furthermore, some of the current debates in mathematical physics suggest to me that it may even require the integration of all of existing mathematics before such a science will be fully-developed. In what follows, therefore, we will surely be "looking through a glass darkly" as I offer some amateur speculations on a possible role for the octonion.

Ultra-Hyper-Complex Causal Realm

The word "causal," as used in esotericist literature, refers to a realm of experience deeper or more subtle than the subtle. In the Tibetan schools it is often referred to simply as the "very

⁷² For details, see "Debates in Physics" posted on the author's website.

⁷³ Note, however, that Amazon.com lists *hundreds* of books on the quaternion and Google returns over 500,000 hits.

⁷⁴ See for a discussion of this point, M. Tegmark, Is 'the theory of everything' merely the ultimate ensemble theory? *Annals of Physics*, v270 (1998), pps1-51.

subtle.” The word *causal* is confusing for its connotations in both science and common usage because *in the esoteric context* it is often *without* the connotation associated with *causation* or causative relation.⁷⁵ When used in this “noncausal” sense, the term refers to a kind of *structural seniority* that should *not* be thought of as necessarily implying any *ordinary* cause and effect relationship.

In addition to *this* caveat, there is a substantial esotericist literature regarding this deep realm of experience that yet further muddies the semantic waters. Much of the older material—such as the classic compilation of late 19th and early 20th Century Theosophical writings on the subject by Arthur E. Powell⁷⁶—is cast entirely in terms of “revealed secret wisdom teachings” *without any practical Yoga whatsoever* whereby one might actually confirm the descriptions in one’s own experience. This kind of information is thus arcane, obscure, and quite possibly mistaken or at least confused, however interesting it may seem at times. Only over the course of the 20th Century, with the arrival of Yoga in the West, has it become possible for individuals in our society in some numbers to actually enter this realm within the context of systematic *practice* and thus at least begin to *find out for themselves* what “the causal” is all about through systematic contemplative exploration.

The causal realm has long been associated with deep sleep and Patanjali describes deep sleep as “a thought-form of nothingness” (I. 10.). The causal realm can thus be understood as a *common* domain of experience. However, most of us only “experience” deep sleep while *unconscious*. We may have some sense of “having slept well,” but few of us can describe with any richness “the experience of deep sleep” itself. However, while “lucid dreaming” is not an uncommon phenomenon, lucidity *in deep sleep*—becoming fully aware of the fact that one is *in* the deep sleep state while yet remaining in deep sleep—although comparatively rare—has been reported and is often cited as a key example of this realm of experience.

The main source of description of this realm comes from experienced meditators. Here is one example:

The empty space of the mind of which one is aware, once the mind has been settled in its natural state, is called the *substrate* (*ālaya*). Due to the relatively nonconceptual nature of this state of consciousness, there is no distinct experience of a division between subject and object, self and other. Relatively speaking, the subjective substrate consciousness is nondually aware of the objective substrate, an experiential vacuum into which all mental contents have temporarily subsided. The mind may now be likened to a luminously transparent snow globe in which all the normally agitated particles of mental activities have come to rest.⁷⁷

Perhaps the most important source of description, however, comes from those for whom the term *fully realized Yogi* might be applied. Here is a recent description given by Adi Da:⁷⁸

Attention itself... need not move or take an active or thing-like form to be in the causal position relative to subtle and gross appearances... All the making operations are in the subtle and gross aspects of the being... So, in this sense,

⁷⁵ Adi Da put it this way, “Something can be said to be cause by merely being there... The causal body can be said to be “cause” because it is the egoic root.” *The Causal Position*, (Track 1, Disc 1, v2, talk given 8/11/95), *The Structure of Existence* (audio CD series) (Dawn Horse Press, Middletown, CA, 2007).

⁷⁶ Arthur E. Powell, *Causal Body and the Ego* (The Theosophical Publishing House, Los Angeles, CA, 1928).

⁷⁷ B. Alan Wallace, *Hidden Dimensions: The Unification of Physics and Consciousness* (Columbia University Press, New York, NY, 2007), p 46.

⁷⁸ Adi Da, “The Causal Position.” See fn 72 above.

attention is causal, it's in the first position, and by merely being there it causes motion in the subtle and gross dimension of the personality.

Jumping back now to the next division algebra, it uses octonion numbers composed of one real part and seven imaginary parts. Of the limited amount of work done with octonions, as mentioned above, most is in mathematical physics and way over my head. However, it has been suggested that “reflexivity” is inherent in octonionic structures. What might this mean? This idea emerged during an extensive email discussion Kent Palmer took part in with mathematicians Ben Goertzel, Onar Aam, and Toby Smith in the mid to late ‘90s.⁷⁹ Most of their discussion is well beyond me, but a few of the ideas that emerged are suggestive. One such notion is that the complex algebras can be thought of as describing structures of mirrors and with the octonion, *four* mirrors configured as an internally-reflecting tetrahedron. Inside such a structure, “everywhere you look you are only seeing yourself” as in a hall of mirrors but in all directions at once, a bit like being inside a crystal lattice, or perhaps within “Indra’s Net”—an infinite network of mirrored gems each of which reflects all the others.

Garvin McCurdy has recently suggested⁸⁰ that the model being developed by William Tiller refers primarily to this domain—the causal realm. Prominent in Tiller’s model is the concept of “a mirror realm” with properties that are the inverse of those in the ordinary “D Space” of our everyday experience. This “R Space” has many unique features that I will not go into here except to say that it may best be thought of as relating to this innermost realm, involving the inside, as it were, of even the smallest sub-atomic particles. Finally, in the context of this consideration of the octonion, it may be significant that Tiller’s mirror realm thus yields an *eight dimensional* model—four dimensions for R Space and four more for D Space.

Meanwhile, in a recent article by physicist Mark Comings—“The Quantum Plenum: the Hidden Key to Life, Energetics, and Sentience”—Mark proposes that an “the inner light” beyond the reach of our present understanding of electromagnetism and suggests that it “is actually higher dimensional light and has a physics to it which can be elucidated mathematically.”⁸¹ One approach may lie in the shift from the quaternionic dynamics of electromagnetism to an octonionic dynamics—a step that indeed adds “new degrees of freedom to our equations.”

This way of thinking may perhaps yield insights into thinking itself. What is a thought? Is it just “a complex pattern of electrical impulses in the brain,” or does it have or involve *deeper* perhaps octonionic *structures*? Such questions loom on the scientific horizon and one aim here is to nudge our collective scientific agenda in a new direction—one less confined to the exclusively *objectivist* approaches so pervasive in our mainstream sciences.

The two giant steps taken thus far along the STS suggest that the innermost domain of time is where we will find objective correlates of the causal realm “at the root of thought.” This is *not* to imply that I think we will find here “the neural correlate of consciousness” as it is often referred to in the cognitive neuroscience literature. This important issue will bear extensive discussion at a later date. The key thing to point out here is that Yoga Science suggests that “consciousness itself” is not “in time” at all, but rather a timeless SummaContext of time itself. I’ll elaborate a bit more on this in the next section.

An open question here is whether we can make meaningful interpretations of the Q-P region in light of the fact that we are bodily and biologically such low temperature/low energy

⁷⁹ Palmer, personal communication. Note: Kent has a complete record of this extensive email discussion that might be available from him upon request.

⁸⁰ Personal communication.

⁸¹ Bridges (ISSSEEM’s magazine) 17, 1, (Spring 2006), pps 4-13, & 20.

phenomena.⁸² Physicists generally consider this domain only in connection with extremely *high energy* phenomena such as the earliest epochs after the Big Bang, regions near black holes, and particle accelerator experiments. It may turn out that phenomena in this region are more about “possibilities” than “actualities.” Thus, if and when we develop a deeper understanding of octonionic thought and informational structures, we may discover a sufficient *temperature independence* in this domain that we will be able to confirm that we do in fact *inhabit* this Q-P region of the STS every bit as much as the other two. On the other hand, it could also turn out that the STS *within biological processes* is in fact many orders of magnitude *shorter* on the Planckian end.

It could be that the highly abstract kind of thought involved in mathematical physics may itself be our best evidence of a capacity for our minds to enter directly into the Q-P domain. Could this perhaps account for the astonishing precision with which the equations derived by physicists working in this domain have been able to predict experimental results? Here is an opinion on this from mathematician and spiritual practitioner Thomas McFarlane:⁸³

As for these energy-time scales being directly accessible via inner penetration, it may be that what is being accessed by the yogic mind is actually the causal ontological level of reality, and the colliders are seeing a projection of that in the physical plane of manifestation. So, the two are not exactly the same, but related by a projection. Mathematics is a projection into the level of conceptual understanding. Even that is not a direct contact with the causal level, but a projection of it into the conceptual plane.

Another area of physics that most likely relates to our innermost subjectivity is the phenomenon of entanglement. Now well-established experimentally in physics—although debate rages on how the findings should be interpreted—a wide range of possible implications has already been explored in the groundbreaking work of a number of ISSSEEM presenters including Larry Dossey, Dean Radin, Amit Goswami, William Tiller, Claude Swanson and others. It seems likely that phenomena become increasingly “non-local” and “entangled” as we move deeper toward the Planckian limit where entanglement becomes universal. As a result of this entanglement, we must think of our own structure as opening to the cosmos in this innermost domain. Thus the *subjective cosmology* being suggested here, is *open at top and bottom*, if you will.

The “Plenum” as Sedenionic Timeless Domain?

Here I’ll suggest that the discussion thus far leads us to take one final step: that the well-established notion in contemporary physics sometimes referred to as the “Plenum”⁸⁴ might *correspond* to an experiential state—known in the esoteric traditions by many names since pre-history—of an *ultimate* domain *beyond even the causal*. Often couched in the language of religion, myth, or poetry and perhaps most often with strongly worded caveats regarding its *ineffability*, a common characteristic of such descriptions is reference to a *timeless* (or eternal) state or nature—and one *within which* all the rest of Nature is arising. The proposal here, using the STS scheme and terminology developed thus far, is simply that there exists a timeless *context*

⁸² And the exact opposite objection has been raised to the “Objective Reduction” model of Penrose & Hameroff—that our brains are *too hot* for quantum states to cohere across the entire brain (<http://en.wikipedia.org/wiki/Orch-OR>).

⁸³ Personal communication via email 6/12/08. Tom’s website is <http://integralscience.org/tom/>.

⁸⁴ A word that well-describes how free space—a perfect vacuum totally devoid of matter—is still literally “full” of “virtual particles” comprising a “non-zero vacuum energy.”

within which the entire span of time depicted by the STS arises.⁸⁵ It may be useful to consider the sedenion and associated “zero-divisor” structures as somehow “depicting” the *ineffable* “design” of this *forth* meta-level of complexity—one that quite literally “cannot be grasped by the mind.” There is a loose body of current of research in theoretical physics that resonates with this kind of interpretation.⁸⁶

Of particular relevance to us here, however, is a sophisticated and articulate exploration of these ideas published in 2007 by Columbia University Press. Hidden Dimensions: The Unification of Physics and Consciousness by B. Alan Wallace marks a significant departure from the rest of the of the many books with such titles published in the three decades since Fritjof Capra’s pioneering exploration The Tao of Physics. What distinguishes Wallace’s contribution is that he combines two unique talents that are rarely found in a single person:

- He speaks from personal experience as a Yogi who is trained to the unusual degree that he can routinely enter with full awareness into contemplation of the causal domain. And on the basis of this training, he has entered into practice of the radical tradition of Dzogchen—considered by many within Tibetan Buddhism to be the pinnacle of esoteric spiritual practice.
- He has a good command of key issues in contemporary physics and philosophy of science based on an undergraduate degree in physics, ongoing mentoring from physicist educator Arthur Zajonc, contacts with a number of leading physicists, and years of service as translator for His Holiness the Dalai Lama over nearly three decades of dialog with leading scientists.

With these “Yogi Scientist” qualifications, Wallace proposes, in effect, that a scientific revolution is “waiting to happen”—an authentic “science of mind.” Readers are strongly encouraged to study Wallace’s contribution which makes a sophisticated case for “Contemplative Science” (compare to “Yoga Science”) as the way forward toward “a first scientific revolution in the mind sciences.”⁸⁷

Here I’ll take a final brief detour into some experiential reflections: even a moment’s consideration may convince you, “if in every instant I and everything I experience can only exist in a radically present “now,” then is anything *actually* arising ‘in time’?” Can I see then, in any moment, as Adi Da was quoted above as having said, “that it is not true that anything has already arisen?” As I’ve contemplated these ideas and the SummaTime Scale, often in a relaxed and meditative setting, I’ve been drawn repeatedly into moments of a deeply felt sense of how every sensation and every thought are but luminous reflections of awareness itself. These moments often have a very distinct sense of “timelessness” about them—somehow, whatever movement they display—visually, acoustically, mentally—all are caught up in a special sort of unbroken stillness or continuity.

IV. Towards a Scientific Definition of Subtle Energies

The STS suggests a new kind of scientific cosmology—a *phenomenological* or *subjective cosmology*—one literally “centered” in the experiencing subject and paradoxically de-centered at the same time since it is *open at top and bottom*. Taking an esotericist view, my conscious

⁸⁵ Reminiscent of Ken Wilber’s suggestion that the nondual can be thought of as “the paper on which the AQAL diagram is pictured.” *Ref needed*

⁸⁶ See “Debates in Physics” on the author’s website.

⁸⁷ B. Alan Wallace, *Hidden Dimensions*, p 15 (see fn 77)

experience in every “now” is of events and phenomena that have themselves taken place at some point in the past. Those events and phenomena *include* all those *external* to my body that have been and remain the primary objects of scientific investigation. However, those events and phenomena *also include* all those *internal* to my body about which our biology and psychology have revealed quite a bit, but for the most part thus far only as “objective” phenomena. The STS is, in contrast, a map of our *subjective universe*, the universe *as we experience it*.

The STS points to the always instantaneous nature of that subjective universe. However deeply enmeshed I may be in thoughts, reveries, dreams, memories, speech, or written words, each of these can only be *experienced* in some specific now moment of experience as I think a thought, have a day or night dream, remember something, hear, speak, or read.

We might think of this as the flip side of what I proposed earlier as the Principle of Cosmic Synchrony—“any and every phenomenon exists across *all* time scales at once.” Here we have a Principle of Phenomenological Synchrony—that all experience consists of events and phenomena that are *synchronically* “past present.”

Principle of Phenomenological Synchrony—all experience consists of events and phenomena that are *synchronically* “past present.”

Taken together with the above discussion, these two principles suggest that what we *experience* as “subtle energies” have, all at once, the following properties:

- They consist exclusively of phenomena taking place in our “past present” as *we are currently embodied* (the “gross” aspect).
- They display autopoietic and hyper-complex dynamics of living energy (the “subtle” aspect).
- They are also necessarily *associated* with informational, mental, and intentional forms (the “causal” aspect).
- Finally, the experiencing “subject” is discovered ultimately to be a timeless Condition nondual with any and all phenomena arising in the present.

The first three of these properties are consistent with those proposed by Rubik for the “Biofield:” complex *material* dynamics, self-regulating characteristics of *life*, and informational components implying mind. However, as she also suggests, “a full scientific model of the human being may indeed require elements that go beyond space-time, matter-energy, and require multidimensional geometry or other novel concepts,” as I’ve also suggested here. Thus, “subtle energies” are necessarily “holistic,” cannot be separated out from the entire field of phenomenal synchrony, and form an integral part of a phenomenal field that spans the entire spectrum of the STS.

There are no *isolated* or *pure* gross, subtle, or causal phenomena, however one or the other *aspect* may predominate in any given process and its characteristic time. By this I mean that for any given phenomenon, although its most prominent features may lie in one or the other of the three domains, *all three domains are always present in phenomenology*. The PCS implies that we cannot truly isolate phenomena into slices of the time-ago spectrum, while the PPS implies that the entire flow of experience consists precisely and only of whole-of-time moments.

Based on the discussion in this paper, and given the “wholistic” caveats just stated, we can propose a definition of subtle energies as the sum across the STS of the hypercomplex energy *aspect* of any phenomenon.

Definition: subtle energies are the sum across the STS of the hypercomplex (energy) *aspect* of any phenomenon.

The analysis offered here suggests that *many mechanisms* will be found *within* this definition and that *no single mechanism* nor any specific “spectral band,” however broad, will be found to be characteristic of what has been known through the millennia as “subtle energies.”

Further Implications, Connections, and Discussion

Here I’ll briefly discuss three broad areas of potential further implications of the subjective cosmology outlined here that may deserve extensive consideration in the future:

The *subjective cosmology* turns conventional cosmology “inside out” and links it to a vast inner depth. The entire span of the STS is rarely considered as a whole anywhere in physics and viewing cosmology in this way could lead to any number of new and potentially fundamental scientific insights. Setting all *in-time* processes within a *timeless context* may yield insights that contribute to the “first scientific revolution in the mind sciences” to which B. Alan Wallace has referred. Many additional technical features will likely be found at each meta-level of complexity. These may include:

- *topologies* including spherical, knotted, fractal, and vortex structures.
- *geometries* that will include complex, non-commutative, and non-associative degrees of “strangeness.”
- *harmonic resonances* defining alternating bands of more or less structure as we move along the STS.

It may turn out that there is a range of possible additional meanings to the term “simultaneous” depending on whether, or not, or to what degree we permit *transluminality*—speeds faster than light.⁸⁸ Furthermore, as Primack & Abrams point out,⁸⁹ the expansion of the universe since the BigBang means that “it” is *actually, right now*, more like *46 billion* light years away, rather than where it was roughly 13 billion years ago when the cosmic background radiation began its trip towards us. (Note, however, that in terms of the STS, this would only move the BB point less than one order of magnitude (one of the small cross hatchings lower to just *below* the E symbol)—a change of only ~1% in the overall length of the STS.) A forum for discussion of these and associated scientific implications is being created under the auspices of ISSSEEM as the Theoretical Frameworks Independent Exploration Group. Interested readers should contact the author or visit his website for details.

The subjective cosmology outlined here suggests a new approach toward a formal definition of “esoteric.” It suggests a new way of thinking about our “inner world” as constitutive of our human condition. Thus equipped with a whole new way of viewing the depth of our humanity, we may be able to discover correlations across *all* the esotericist cosmologies and methodologies found in the long history and prehistory of esoteric practice and thought.

⁸⁸ For an authoritative discussion, see Tim Maudlin, *Quantum Non-Localilty and Relativity*, 2nd ed. (Blackwell Publishing, Malden, MA, 2002). The bottom line: violation of Bell’s inequality (now well-established experimentally) requires supraluminal causal connections and supraluminal information transmission.

⁸⁹ “The View from the Center of the Universe,” DVD of a talk given by Primack & Abrams at NASA Ames Research Center 10/25/06. I don’t believe they make this point in their book by the same name.

With such a revised historical “prologue” we may be better able to sort out, as we go forward, the vast array of esoteric phenomena which this analysis suggests will be a key focus of the “science of mind” that lies in humanity’s future.

Further analysis may reveal that the STS represents the basis for an *integral meta-meta-theory*.⁹⁰ Meta-theories coordinate many existing theories—Ken Wilber’s *AQAL map* is one such meta-theory that has proven itself in recent years as a powerful aid to our thinking. The analysis here suggests two additional meta-theories: one that aligns findings of the objective sciences and another that aligns findings of the esoteric traditions, *both along the STS*. Thus, although the AQAL map is itself developmental, evolutionary, and therefore *diachronic*, it could be seen as having a *synchronic core* such that every moment of experience displays the four distinct aspects of the quadrants of AQAL “tetra-arising.” The AQAL framework may thus provide useful *guidance* in *expanding* the rather skeletal *synchronic* analysis offered here out to the much fuller array of diachronic phenomena arrayed on the AQAL map.

In other words, if the STS depicts reality as a *synchronic* and “static” PlanckPrint, how are we to understand the notion of “dynamics” given that the term implies change over time? It may well turn out, as it seems some suspect, in both mainstream scientific and esotericist circles, that reality is *geometric* more fundamentally than temporal. Thus, it may turn out to be more useful, at least in some contexts, to think of these degrees of complexity in terms of *structure* rather than in terms of “system dynamics” as I have here.⁹¹ It seems evident, however, that as far as we humans are concerned, given the dozens of orders of magnitude that separate experience from the Planckian, dynamics will remain an essential feature of our human world even if that world turns out to be composed of a vast ensemble of *geometric* configurations. As mentioned above, Wilber’s AQAL framework may assist in making this translation between synchronic instantaneous and diachronic developmental and evolutionary perspectives.

In Conclusion: Pros and Cons of Maps

With the generally high degree of specialization in science, most practicing scientists are focused in the study of specific *processes or mechanisms* taking place within comparatively narrow regions of the STS. All the fields of science that make exclusive use of the visible light spectrum, for example, are working within just one of the over *sixty* orders of magnitude spanned by the STS.⁹²

When scientists aim to take “a really broad view,” they’ll still typically only focus on *one* of the three regions. For example, cosmologists typically look at BB-H as if that covers “the whole of existence.” Here I’m thinking especially of such popularizers as Carl Sagan, educational TV science programs, and the science centers I mention in the next paragraph (the work of Glashow and Primack & Abrams discussed above is an important exception). Students learning about electromagnetism will sometimes be shown charts of the EM Spectrum that span only the H-Q region. Mathematical physics is focused on the Q-P domain (although I gather rarely presented along a timeline per se). Thus, perhaps the principal *advantage* of a map such

⁹⁰ For in-depth discussion of integral meta-theory, see two recent articles by Mark Edwards, Where is the Method to Our Integral Madness, *Journal of Integral Theory and Practice*, 3,1 (2008), pp 165-194, and Evaluating Integral Metatheory, *JITP*, 3,4 (2008), pp61-83.

⁹¹ It is worth noting that there is within mathematics a field known as “non-commutative geometry” that I suspect is related to the quaternion. Likewise, “non-associative geometry” may be related to the octonion.

⁹² The fact that this one key band of the STS is located at almost its exact mid point, is likely of considerable significance. For an illustration and a brief discussion of this, see page 10 of

<http://yogascienceproject.org/wp-content/uploads/2007/05/Non-technical%20STS%20Intro2.pdf>

as the STS is that it presents not just a “big picture,” but rather a *bigger* picture, and even aims toward a *biggest possible* picture.

Forward-looking time scales (whether logarithmic or linear) are the type most typically drawn. They most often portray time as *beginning* with the Big Bang. Such scales tend to *reduce* “all of human history” to just “the last blink of time.” This *kind* of time scale is commonly used in popular science programs: Carl Sagan used it in his famous “Cosmos” program; it is used at the Rose Center for Earth and Space at the American Museum of Natural History in Manhattan from where the astronomer Neal deGrasse Tyson presides over Sagan’s “popsci” legacy; Chaisson uses it at his Wright Center for Science Education at Tufts University. It has, in my view, the most unfortunate effect of reinforcing a notion of ourselves as *incredibly small and insignificant*. I feel this is a type of dehumanization we’ve come to expect from science—perhaps as “what the market will bear”—the price we are willing to pay for all the “goodies” that science and technology provide us.

Thus, one of the most important things the SummaTime Scale does, in my view, is turn this around, quite literally: by expressing time in terms of “time before present,” and running that deep into the so-called “now” with the simple tool of logarithms, we get a scale that makes “inner time” (as well as “innermost time”) *much* more prominent and much more in keeping with actual experience—and especially in keeping with the important if *uncommon* experience of esoteric spiritual practice. It serves to restore, therefore, what I think is the proper and most important place of our inner depth as well as demonstrating graphically just how deep that depth actually is. It creates *a new kind* of scientific map that tends to *re-humanize* rather than de-humanize.

On the other hand, although a map can tell you *where* something might be found, it cannot tell you what it will look like or how it behaves once you find it.⁹³ The STS thus represents only a small possible step toward a genuine “science of subtle energies”—it may give us a new way to begin to think about where we might look for some of the more subtle features of subjective experience that have been known throughout human history but which have been curiously missing from existing scientific maps.

The future of such a science could be a long one. The STS says nothing about the specific new *mechanisms* and *structures* that it seems may have to be discovered as we proceed deeper into the exploration of the subjective cosmos. Not only will a whole new kind of “Yoga Science” be required for this exploration, it may take generations of concerted effort just to painstakingly accumulate the observations and piece-meal bits of lawful relation between them that may someday be ready to be “put together” by another Newton, or Maxwell, or Einstein as the “first scientific revolution in the mind sciences.”

We’ve got our work cut out for us. What I’ve proposed above is that the “job opportunity” here is to reframe, or reinterpret, *all* of our “in time” science in terms of a greater timeless context. This means, perhaps most importantly, that our very notion of cause and effect—where we always presumed that the *effect follows the cause in time*, will need to be likewise reframed and reinterpreted in terms of a greater *a-causal* framework. This, I suspect, will all be a big “job,” and one that will likely occupy generations of scientists to come.

On top of that, we humans need urgently to find better ways to grow out of our aeonic addictions with all their murderous suffering—and fast. To this end, I hope the correlations presented here may suggest fruitful avenues for further scientific and technical characterization

⁹³ Although given the rapid and ongoing development of tools such as Google Maps and related GIS systems, who knows what the future may hold for “maps.”

of subtle energies. The key, I've proposed, will be to appreciate that subtle energies *cannot* be separated from their setting in body, their deeper time-nature in mind, *and* their timeless "nature of mind."⁹⁴ By situating them in the mid-range of the STS between gross and causal energies, we may get a clearer picture of both the outer context and "inner context" of subtle energies.

In closing, I'll echo the sentiments of Mark Comings's recent article cited above: "I hope that we can start to put the power of science in the service of the spiritual and emotional awakening and liberation of our species." My prayer is that we esotericists begin what will likely be slow hard work of building consensus and reaching out in a spirit of collaboration to our fellow traditional religionists and mainstream scientists. To quote Obama's inaugural, "we will extend a hand if you are willing to unclench your fist." Navigating the troubled waters that lie ahead will almost certainly take the individual and collective best efforts of us all.

(Endnotes will go here)

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⁹⁴ A term widely used in Tibetan Buddhism that I take as largely equivalent to "timeless Source."