

# Consciousness as the Subject and Object of Physics: Towards a New Paradigm for the Physical Sciences

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## Abstract

*This paper investigates the role of consciousness for the field of physics. We propose that physics needs to include a systematic account of consciousness if it aims to offer a complete account of the physical world. The discovery of quantum mechanics, and of completely unified quantum field theories such as superstring theory, has resulted in a profound transformation in the world view of physics. A view that makes it necessary to reassess the traditional perspective of physics which excludes subjective values. Our investigation is based on Maharishi Vedic Science, a science that provides a logically consistent, intellectually meaningful, and empirically validated framework for discussing the relationship between objective and subjective aspects of reality.*

*In Maharishi Vedic Science, consciousness is explained as a universal field of intelligence which gives rise to both individual intelligence and to all aspects of the physical world, an understanding compatible with the view of modern physics. Maharishi Vedic Science also provides a unifying basis for understanding the relationship between objective and subjective values in physics leading to a vision of the completion and fulfillment of physics through the full development of individual consciousness. According to Maharishi Vedic Science, such development will result in the ability to directly experience the Laws of Nature in one's own awareness and to apply the knowledge obtained spontaneously for the benefit of oneself, one's society, and all of mankind.*

*Thus, for the physicist, the direct subjective experience of the laws of nature and the intellectual mastery of the theories of modern physics will mutually promote and enrich each other. At the same time, the holistic expansion of awareness brought about by the technologies of Maharishi Vedic Science will eliminate the dangers of misuse of scientific knowledge. Empirical evidence from scientific research on the effects of the Maharishi Transcendental Meditation and TM-Sidhi programs, the inter-subjectively validated experiences of individuals trained in these programs, and comparisons between theoretical structures of Maharishi Vedic Science and of modern physics lend support to this vision.*

## Introduction

This paper proposes that consciousness plays a central role for the science of physics. In particular, we show that physics needs to include a systematic and scientific account of consciousness in order to achieve a complete understanding of the physical world and its own scientific approach. Our discussion of consciousness is based on the framework provided by Maharishi Vedic Science<sup>SM</sup> (Maharishi Mahesh Yogi, 1986, 1994). According to Maharishi Vedic Science, consciousness is not only individual awareness, it is an essential and universal field of intelligence. Through its self-interacting dynamics, this field gives rise to both individual intelligence and to all aspects of the physical world. This world view is shown to be compatible with the view implied by modern physics. Maharishi Vedic Science also provides a unifying basis for understanding the relationship between objective and subjective aspects of research in physics and for developing a corresponding new research paradigm. Implementation of this new research paradigm is based upon the full development of individual and collective consciousness through the technologies of Maharishi Vedic Science. This will allow the physicist to study the most basic Laws of Nature in his own consciousness, and will ensure that all results are being applied spontaneously in a life-supporting manner.

According to previous understanding, consciousness as a subjective phenomenon had no place in objective science. After all, is not the success of modern science due to its elimination of subjectivity and

its reliance on objective empirical verification? A closer look reveals two interesting aspects of this situation.

First, subjectivity has not been eliminated, and in fact cannot be eliminated, since scientific research is conducted by subjects using the subjective faculties of the human mind, such as reason and the ability to recognize order. Rather, the operation of these faculties has been restricted by the requirement of inter-subjective validation through empirical test and, at least in physics, by the requirement of theoretical description in mathematical language.

Second, empirical test and mathematical language by themselves are not sufficient to understand how physics works and succeeds. An essentially subjective element enters here, namely the intuitive vision of individual scientists. The history of scientific discoveries is full of examples of the important role of intuitive insight, sometimes providing the starting point for conceptual and mathematical work, sometimes occurring after a long period of apparently unsuccessful intellectual effort. For example, the important “principle of equivalence,” capturing the geometrical nature of the force of gravity, occurred to Albert Einstein effortlessly in what he called “the happiest thought of my life” (Pais, 1982, IV, 9). Examples for insight occurring after extended effort are the discovery of the ring structure of benzene in an intuitive vision by Friedrich Kekule (Asimov, 1965, p. 115), Einstein’s insight into the central role of time dilation for understanding the invariance of the speed of light (Pais, 1982, III.7.a), and his choice of differential geometry as a framework for the theory of gravity (Pais, 1982, IV.12.b). The latter example shows that intuition may involve the design of a theoretical framework for an entire area of research, within which experiments can be interpreted, and which gives physical content to mathematical structures.

It is true that these designs are always constrained and also inspired by empirical data, and by the internal logic of mathematics. However, they do have compelling, intuitive evidence of their own. Sometimes physicists upheld theories in the absence of supporting or even in the presence of contradicting mathematical or empirical evidence. For example, the discovery of the general theory of relativity by Einstein occurred over a period of 11 years, and it involved many steps of conceptual trial and error before the mathematical structure and physical concepts were finally understood and seen to match—an intricate interplay of mathematical analysis and physical intuition (Pais, 1982, IV). As a second example, the theoretical principle of energy conservation appeared to be violated in the radioactive decay of neutrons into protons and electrons. Upholding the theoretical principle against the apparent empirical evidence, Pauli in 1930 postulated the existence of a new massless particle which carried the missing energy, and which was supposed to interact only extremely weakly with other known particles, such as to escape detection. The new particle, termed neutrino, was discovered experimentally in 1956, 26 years after its conceptual discovery by Pauli (Ford, 1965, p. 128).

Having identified these necessarily subjective elements as the faculties of human intelligence and the creative role of human intuition, we now need to inquire whether the science of physics should or can investigate these values. After all, has not physics progressed very well even without systematic investigation of its subjective elements, and furthermore, have not attempts to systematically explore subjectivity met with very limited success, if any?

Regarding the success of merely objective research, if one excludes essential, subjective elements of one’s research paradigm from scientific investigation, one is unable to systematically explore and improve them, or even to understand those aspects of nature’s functioning which allow them to work. As we shall discuss in more detail in the section entitled Research in Consciousness below, some theories of modern physics have now reached a level of abstraction which makes intuitive guidance by classical concepts and quantitative test by experiments either unreliable or simply unavailable. The issue of how to conceive of valid theories then becomes a very relevant one. Furthermore, by restricting attention to the objective aspects of research activity only, the objective approach excludes all subjective dimensions from the emerging world view. In fact, it is commonly held by scientists that their scientific activities and results are neutral with respect to any ethical, social, or other “non-scientific” issues. This separation eventually deprives the individual of the opportunity for holistic growth, and leaves him open to the influence of irrational and destructive values. The dangers resulting from the misuse of scientific knowledge are a testimony to this deplorable state of affairs. Thus, both with respect to promoting the deepest possible understanding of the physical world, and with respect to a life-supporting application of scientific research, the systematic inclusion of subjective values into the science of physics appears to be necessary.

With reference to the lack of success in exploring subjectivity, the failure of Western psychology to produce a theoretically consistent, experimentally verified and practically useful account of subjectivity does not preclude this possibility. In fact, such an account has been given in the Vedic tradition of

knowledge since times immemorial (Maharishi Mahesh Yogi, 1967, preface). In recent times, the knowledge of consciousness preserved in this tradition has been brought to light in its completeness and made accessible in the language of science by Maharishi Mahesh Yogi (Maharishi, 1994). A central point has been the rediscovery of simple, natural, and reliable techniques for the experience and development of consciousness, the Transcendental Meditation® technique and TM-Sidhi® programs (Maharishi, 1963, Part 1, Chap. 2; Maharishi, 1994, p. 260). Maharishi explains that these techniques are part of a complete science of consciousness he calls Vedic Science that is founded upon the Veda and the Vedic Literature (Maharishi, 1986, Inaugural Address).

In the context of Maharishi Vedic Science, consciousness is seen as a universal reality, a field of intelligence which gives rise both to the subjective aspects of individual human awareness and the objective aspects of the material world (Maharishi Mahesh Yogi, 1994, p. 53). This field of intelligence has a precise structure and dynamics, which can be directly experienced and logically explained, provided the required techniques of experience are available. The failure of western psychology to locate this field was simply due to the lack of such techniques, of proper research tools. We will give a brief account of Maharishi Vedic Science and its potential relevance for physics in the following section.

Maharishi Vedic Science understands both the objective material world and the subjective individual intelligence to have a common source in a universal field of intelligence. This paradigm is compatible with the world view presented by modern unified quantum field theories. In fact, Maharishi predicted the discovery of unified quantum field theories as early as 1966 (Maharishi Mahesh Yogi, 1966, p. 34). We present a brief historical review of the world views implied and promoted by physics in the second section. Furthermore, there exist several examples in which structures and functions of the field of consciousness as described in Maharishi Vedic Science are identical to corresponding structures and functions of unified quantum fields (Hagelin, 1989; Maharishi Mahesh Yogi, 1996, p. 99). These aspects are discussed in the section entitled Fundamental Structures of Natural Law in Maharishi Vedic Science and Modern Physics.

Maharishi Vedic Science thus provides a holistic view of subjectivity and objectivity, which integrates the deepest understanding of nature obtained through the objective approach with the knowledge of consciousness obtained through the subjective approach of the ancient Vedic tradition of knowledge. This makes it possible to include the systematic study of consciousness into the science of physics, thereby answering the need for such an inclusion, which we found above.

For example, the role and effectiveness of reason and intuition for objective science are now easily understood, since objectivity is nothing but an aspect of subjectivity, and Nature itself is an expression of intelligence—the same intelligence which every individual can fully explore in his own awareness through Maharishi’s technologies of consciousness. This offers an interesting perspective for the future development of physics, which goes far beyond the need to explain the subjective elements of research in physics. It presents the possibility for the human intellect to systematically gain direct and full access to the laws of physics, and in fact to any Law of Nature (Maharishi Mahesh Yogi, 1994, p. 20). Even more important, the knowledge of Laws of Nature obtained through the techniques of Maharishi Vedic Science is always life-supporting and leads in a positive direction. This is because the practice of Maharishi’s techniques of experience leads to an expansion of awareness and a reduction in stress and strain (Orme-Johnson, 1977; Chalmers, 1989), which allow the individual to spontaneously identify himself or herself with the evolutionary tendencies of Natural Law, and thereby to act spontaneously in a life-supporting way (Maharishi Mahesh Yogi, 1994, p. 108).

This presents the possibility for the fulfillment of physics through Maharishi Vedic Science, both in its quest for deep and reliable knowledge and its goal to help contribute to the welfare of mankind. We give a vision of this possibility in our final section.

### **Maharishi Vedic Science—a “New Science” of Consciousness**

Our discussion in the introduction led us to the conclusion that it is necessary to investigate more closely the subjective elements of physics. Such an investigation, to be more than mere speculation, requires a conceptual and empirical framework for the realm of subjectivity, within which these elements can be located and analyzed. A comprehensive, logically consistent, and empirically verified framework is provided by Maharishi Vedic Science (Maharishi, 1986, 1994). The following aspects of Maharishi Vedic Science are the most important for this framework.

First, it provides techniques of experience through which its basic concepts and statements about consciousness can be tested and validated by everyone—the Maharishi Transcendental Meditation<sup>SM</sup> and TM-Sidhi programs. These techniques provide subjective experiences of consciousness, the essential features of which are found to be shared by the experiences of all qualified practitioners, independent of culture, time, and location (Orme-Johnson, 1988). These inter-subjectively valid features provide an objective, empirical basis for the scientific discussion of consciousness.

Second, it provides access to and a rational interpretation of the testimony of other researchers in consciousness, the *rishis* of ancient India and the accomplished yogis of all times—the testimony, reports, and guidance of experienced researchers in any area are of greatest value to the novice. In our times, such results of research in consciousness have been made accessible in and through the teachings of Maharishi. Among his achievements are the development of the Transcendental Meditation and TM-Sidhi programs, the revival of numerous aspects of Vedic knowledge and their interpretation in terms of a complete science of consciousness which is compatible with the most advanced concepts and standards of modern science.

Third, the understanding presented by Maharishi Vedic Science is logical and rational, both in terms of its premises and their implications. Also, it is compatible with, and even sheds light on, the most advanced concepts of modern physics. We will develop this theme more fully in the section entitled The World View of Modern Physics below.

Fourth, the experiences of consciousness made available through Maharishi's techniques lead to measurable changes in the mind, body, and behavior of the individual and in society. These effects have been documented in over 500 studies, and are always found to be of a positive, life-supporting nature (Orme-Johnson, 1977; Chalmers, 1989). This fact is relevant to the validity of Maharishi Vedic Science, since its understanding of the relationship between individual consciousness and the human physiology imply that the techniques of Maharishi Vedic Science bring about a growth of the individual towards states of better health, expanded awareness, increased energy and intelligence, and, over all, more success and fulfillment in achieving one's goals.

We will now give a brief description of Maharishi Vedic Science in terms of the four points just mentioned.

### **The Experiential Basis of Maharishi Vedic Science**

At the core of Maharishi Vedic Science is the experience of what Maharishi calls transcendental consciousness, and which is provided by the Maharishi Transcendental Meditation technique:

Maharishi's Transcendental Meditation technique is a simple, natural, effortless procedure practiced for 15 to 20 minutes in the morning and evening while sitting comfortably with the eyes closed. During this technique the individual's awareness settles down and experiences a unique state of restful alertness: as the body becomes deeply relaxed, the mind transcends all mental activity to experience the simplest form of human awareness—Transcendental Consciousness—where consciousness is open to itself. This is the self-referral state of consciousness. (Maharishi Mahesh Yogi, 1994, p. 260)

This transcendental consciousness is an experience of deep inner silence that can be called universal because it can be universally experienced. While this experience may be unfamiliar to most, glimpses of it have been reported in records from a wide range of time periods and cultures (see Grant & Jones in this issue). This self-referral nature of awareness is a well documented experience. Unlike the complex and varied contents of awareness presented by thoughts or feelings, the experience of pure consciousness is simple, and—through proper personal instruction in the context of the Maharishi Transcendental Meditation program—it is easily identified. Its simplicity and universality make it a suitable object and basis for the scientific investigation of consciousness. In this respect, the scientific study of consciousness may be compared to the study of atomic physics, which began its successful history by investigating the structure of the simplest atom—hydrogen—rather than the complex structure of such atoms as iron or uranium (Domash in Orme-Johnson, 1977).

As the experience of transcendental consciousness becomes more familiar over time, one discovers that its deep silence has in fact some liveliness within it (Maharishi Mahesh Yogi, 1982, p. 77). Maharishi explains that this liveliness is due to the discriminating quality of intelligence which distinguishes within the continuum of silence three values: the knower, the process of knowing, and the known:

In its “self-referral” state, or transcendental state, consciousness knows itself alone; as such, it is the knower of itself. Being the knower of itself, it also is the object of knowledge and the process of knowing. Thus, in its self-referral state, consciousness is the unified state of knower, knowing and known.

In the Vedic language this “three-in-one” structure of consciousness is called Samhita of Ṛishi, Devatā, Chhandas—Samhita (unity) of Ṛishi (knower), Devatā (dynamism of the process of knowing), and Chhandas (the known).

Consciousness is the unity or coexistence of two qualities of intelligence that are contradictory to each other:

- 1) Singularity of self-referral Samhita, and
- 2) Diversity of Ṛishi, Devatā and Chhandas.

It is interesting to note that the quality of alertness in the nature of consciousness is due to the coexistence of these two opposite values within its structure. Togetherness of these contradictory qualities within the structure of consciousness renders consciousness wakeful, alert, and lively. (Maharishi Mahesh Yogi, 1994, p. 59)

Thus, the simplest form of human awareness contains liveliness, activity. As we will see below, this self-referral activity is found to have profound implications.

### **Research in Consciousness and the Vedic Literature**

In historical times, the qualities and structures of pure consciousness which Maharishi describes here, were discovered by the seers or *rishis* of ancient India, individuals who were able to clearly experience them in their own awareness (Maharishi Mahesh Yogi, 1994, p. 224). Maharishi explains:

The sound of the eternal process of transformation of singularity into diversity is heard by the fully awake consciousness within its self-referral structure—the Samhita of Ṛishi, Devatā, Chhandas. This sound is called Shruti (that which is heard), the Vedic sound, the sound of self-reverberating consciousness, the sound of intelligence in motion, which structures knowledge within consciousness. (Maharishi Mahesh Yogi, 1994, p. 62)

Researching consciousness in this way, they made an important discovery. They found that as the discriminating value of the intellect continues to operate, more and more quantified and specific values and relationships arise. Maharishi describes this process in terms of the self-interacting dynamics of Ṛishi, Devatā, and Chhandas as follows:

Consciousness continues to generate qualities one after the other. Samhitā generates Ṛishi, Devatā, Chhandas, and all the permutations and combinations of the three in sequential progression of the process of evolution of pure intelligence giving rise to the five senses of perception, the five elements, and from these the whole manifest creation within the nature of self-referral consciousness, promoted and sustained by the self-referral dynamism of consciousness. (Maharishi Mahesh Yogi, 1994, p. 318)

Three points in Maharishi’s description are of importance for our discussion here. First, the material world—the whole manifest universe—has its basis in consciousness, arises from pure intelligence while remaining within the nature of self-referral consciousness. Thus, the apparent differences between the realms of objective outer world and subjective inner world must be differences in appearance only. Second, the laws governing the physical world must be essentially the laws governing the process of evolution of pure intelligence—the process promoting and sustaining the physical world is the self-referral dynamism of consciousness. Third, this dynamism of “intelligence in motion” is heard as sound by the fully awake consciousness. This means that consciousness knows all the Laws of Nature as being located within its own self-referral nature, and that this knowledge finds expression in individual awareness as Vedic sound, *Shruti*.

An authentic record of this self-interacting dynamics of consciousness is available in the Vedic Literature, beginning with Ṛk Veda, “the holistic expression of all the mechanics of transformation” (Maharishi Mahesh Yogi, 1994, p. 81). Maharishi explains:

Basically this mechanics of transformation of self-referral intelligence into the ever-expanding material universe is available to us in countable stages in the structure of Ṛk Veda.

All the material and non-material expressions of creation have specific frequencies (sounds). These fundamental frequencies, non-material values, are the sounds of the Vedic Literature: the intellect, the hum of

the intellect, and with the hum, the flow and stop of it in sequence. The expression of melody, forming the whole of Vedic Literature, gives us the entire process of the basic mechanics of transformation within the self-referral state of consciousness. (Maharishi Mahesh Yogi, 1994, p. 65)

It is one of Maharishi's unique achievements to have revived the Vedic Literature as the authentic record of complete knowledge, covering the entire field of subjectivity, objectivity, and the relationship between both. An essential point in this rediscovery of Vedic knowledge has been Maharishi's formulation and worldwide teaching of the Transcendental Meditation and TM-Sidhi programs. For a long time, these basic techniques for the experience of pure consciousness had been lost and were generally unavailable. Therefore, the descriptions contained in the Vedic Literature were often considered to be the results of poetical or mystical imagination. Without the experience of pure consciousness, the verses of the Vedic Literature cannot accomplish anything significant, even if their importance is understood intellectually (Maharishi Mahesh Yogi, 1994, p. 170).

Continuing the tradition of research in consciousness from ancient times, thousands of modern "Vedic Scientists" practicing Maharishi's techniques have in recent times rediscovered the self-referral activity of consciousness in their own awareness, validating their experience through the Vedic texts, and the Vedic texts through their experience (Maharishi Mahesh Yogi, 1982, p. 77; 1994, p. 262, footnote 2).

### **Compatibility of Maharishi Vedic Science and Modern Physics**

The experiences and insights presented through Maharishi Vedic Science are compatible with the view which modern quantum field theory presents about the origin of the material world. According to this view, particles at the level of atoms are really waves, described by the wave functions of quantum mechanics. At the sub-nuclear level, these waves are excitations of quantum fields. At even more fundamental levels, the various fields describing different types of particles and forces are seen as being progressively unified as components of what is eventually a single unified field. In the context of modern "theories of everything," such as superstring theories (Davies, 1988), this includes not only the sub-nuclear particles and forces, but also space-time itself (whose structure is, according to Einstein's general relativity, determined by the gravitational field). Quantum fields are abstract conceptual entities, which cannot be reduced to a material basis, but rather provide the basis for an explanation of the apparent properties of material particles at the classical level. Adopting some of the language of modern physics, Maharishi has termed consciousness, in its role as the basis of creation, the Unified Field of Natural Law.

At their most fundamental level, the unified quantum theories of modern physics present a single self-interacting field, whose components are unified through the concept of local symmetry. Local symmetry is upheld by the field itself, which contains the generators of all corresponding transformations. This compares to the singularity of consciousness in its self-referral state—*Samhitā*. Differences in physical properties, such as mass and effective coupling constants, are generated through the process of spontaneous dynamical symmetry breaking, a result of the self-interaction of the unified field. This leads to a sequence of effective low-energy theories with progressively less symmetry, and eventually to the known set of four fundamental forces and corresponding particles, from which the entire material world is structured. The phenomenon of symmetry breaking compares (Maharishi Mahesh Yogi, 1994, p. 174) to the diversifying quality of intelligence, giving rise to the whole manifest creation. The five fundamental spin-types of quantum field theory—basic categories of quantum fields—have been shown to compare closely to the five *tanmatras* or "subtle elements" (Hagelin, 1989), qualities of consciousness which structure the material world. This theme of detailed structural correspondences between the unified quantum field of physics and consciousness in Maharishi Vedic Science is taken up in detail in the section entitled *Fundamental Structures of Natural Law in Maharishi Vedic Science and Modern Physics*.

These correspondences may actually indicate more than an analogy. The unified quantum field may be nothing but a glimpse, from the objective view point of modern physics, of the field of consciousness (Maharishi Mahesh Yogi, 1986, p. 27). We will discuss the implications of this hypothesis in the sections on the *World View of Modern Physics* and the *Fundamental Structures of Natural Law in Maharishi Vedic Science and Modern Physics*.

### **Practical Benefits of Maharishi Vedic Science**

In addition to being compatible with modern physics, the experience and resulting concept of consciousness as the basis of all aspects of life also has important empirical and practical implications. This experience includes and goes beyond—in a reproducible and systematic way—the common experience of consciousness as dominated by thought, emotions, etc. It can therefore be said to be more accurate, and such more accurate experience should be the result of a better functioning physiology, just as improved vision is the result of better functioning eyes. This expectation has been confirmed throughout the world by the experiences of individuals who practice the Transcendental Meditation technique, and has been validated scientifically by over 500 research studies (Orme-Johnson 1977; Chalmers 1989, Maharishi, 1994, p. 263). These studies document a wide range of benefits to the individual and society from the practice of the Transcendental Meditation technique, including benefits for the development of the mind, improved health, better social relations, and the reduction of crime and other negative tendencies in society (see Alexander et al. in this issue).

There is another implication, which leads to even farther reaching practical consequences. The human nervous system which is able to experience the Unified Field of Natural Law is also able to think and act from that level (Maharishi Mahesh Yogi, 1994, p. 261). This relationship is well known in physics. For example, the same laws of interaction which allow an antenna to receive radio signals also allow that very same antenna to emit radiation. Both modes of interaction, reception and transmission, experience and activity, result from the same basic law of interaction. Maharishi Vedic Science goes beyond this common understanding of reciprocity in interactions by realizing that the human physiology not only interacts with but is in fact an expression of the field of consciousness (Nader, 1995) (see also the section entitled *Research in Consciousness: Towards a New Paradigm for Physics*). The results of such action at what is assumed to be the most basic and powerful level of Natural Law can be expected to be far reaching, just as technologies based on the nuclear level of matter are more powerful than those using atomic or the macroscopic, classical levels. Instructions for creating such profound effects have indeed been recorded in Patanjali's Yoga sutras. Successful performance of these techniques involves the ability to systematically experience pure consciousness—a lost art for many centuries. Maharishi rediscovered this forgotten technology of consciousness, and has made it generally available in his TM-Sidhi program (Maharishi Mahesh Yogi, 1994, p. 260, p. 283). A central part of this program is Yogic Flying (Maharishi Mahesh Yogi, 1994, p. 283), which is practiced, as are the other aspects of the TM-Sidhi program, for its purifying and life-supporting effect on the individual practicing it and on the environment. The full value of this technique is the ability to move through the air at will. At present, the first stage of Yogic flying (which involves short hops during which the body briefly lifts off the ground) is experienced by practitioners.

Maharishi Vedic Science predicts that the group practice of the TM-Sidhi program creates coherence in the individual and in the environment. This is because in the TM-Sidhi program, the individual acts from the level of transcendental consciousness, a level at which all aspects of Natural Law at every point in the universe are correlated with each other. Therefore, action at this level can have a profound effect that can spread everywhere in the universe (Maharishi Mahesh Yogi, 1995, p. 514). This leads to an improvement in the quality of life, as measured by sociological and economic indicators such as crime and accident rates, unemployment figures, number of patent applications, stock market indicators, etc. This improvement of trends in society—known as the Maharishi Effect—is expected to occur when the number of participants in the group program exceeds certain thresholds. These predictions have been investigated and verified in over 40 scientific studies, providing empirical support for the understanding of consciousness as the Unified Field of Natural Law and for the fact that man is able to operate from this level (Maharishi Mahesh Yogi, 1994, p. 277).

This concludes a brief introduction to Maharishi Vedic Science, in which this science is shown to offer a sound basis for the investigation of the role of consciousness in physics. The next section will review some aspects of the historical development of the scientific approach and world view of physics—in particular, to what degree and in what sense these can be properly characterized by the word “objective.”

### **The World View of Modern Physics**

This section will review some of the historical developments and most recent theories of physics to understand what view of the world modern physics suggests. Many physicists and probably most non-physicists regard this science as a strictly objective one. Among other things, this is understood to imply

that the physical world has an objective existence, which is independent of any subject observing it or having knowledge about it. In fact, this is very much the world view which our ordinary sensory experience implies, and of course it is very useful and almost irrefutable in the context of that kind of experience.

Nevertheless, the world view of physics, or rather, implied by physics, has undergone a dramatic transformation within the last century or so, starting with the discovery of quantum mechanics around 1920, and continuing with the discovery of completely unified quantum field theories in the 1970s. The material world of diverse particles and fields is now understood to emerge from a single self-interacting, unified quantum field—a non-material, abstract entity, whose qualities and dynamics have much in common with the Vedic description of consciousness, as brought to light by Maharishi (see previous section). Furthermore, quantum theory shows that the emerging classical properties of a quantum system depend in an essential manner upon the process of observation. This shows that the separation of reality into an independent outside world and an observing subject is impossible at the quantum level, and an approximation of limited validity at the classical level. These transformations in understanding have, however, gone largely unnoticed in the public, and even among scientists. It will be useful, therefore, to give a brief historical review. Mason (1953) provides a good general reference for the historical facts up to the discovery of quantum mechanics.

Prior to the discovery of quantum mechanics, physics was mainly shaped by two successful theories: classical mechanics and electromagnetic theory. Historically, classical mechanics has its basis in astronomical observation, experiment, mathematical analysis, and conceptual design. Using the careful observations of planetary positions by astronomer Tycho Brahe (Mason, p. 105), Johannes Kepler found mathematical laws governing the motion of planets around the sun. Through systematic experiments, Galileo Galilei discovered the laws governing the motion of uniformly accelerated bodies on earth (Mason, p. 116). The conceptual foundation for the emerging scientific approach was provided by the French philosopher-scientist Rene Descartes (Mason, p. 135). Descartes established the scientific method based on experimental and mathematical validation of rational hypotheses about the external world. This world he saw as being composed of matter, moving under the influence of forces according to precise laws, and thereby giving rise to all objects, inanimate and animate, comprising the entire observable universe (Mason, p. 135). This external, material world he saw as distinctly and essentially different from the internal world of the mind. While Descartes' specific physical theories were soon found to be incorrect, the scientific method and the dualism between matter and mind which he established have continued to shape the world view of science up to this time.

Classical mechanics, as we know it today, began with Isaac Newton's formulation of his famous laws of motion in 1687 (Mason, p. 157). According to Newton, space and time are absolute realities, within which point particles move under the influence of mutual forces, in particular the force of gravity. Newton also developed the mathematical tool of differential calculus with which to describe this motion quantitatively, and the resulting theory was successful in predicting and explaining the motion of both celestial and terrestrial bodies. Extended objects, which cannot be successfully modeled as being point-like, were described by continuous distributions of mass, governed by equations of motion which were the appropriate generalizations of Newton's equations.

The corresponding world view saw the physical world as being composed of matter, moving under the influence of forces according to precise mathematical laws. The origin and structure of matter was not explained or even discussed; these issues appeared to have no bearing on the laws governing the motion of matter, and were, therefore, even considered to be outside the realm of physics. The outer world of matter, and the inner world of thought and feeling then appeared to have nothing in common—the success of the science of mechanics seemed to justify the Cartesian dualism of matter and mind.

A first challenge to this materialistic world view came from the theory which dealt with electricity and magnetism. The laws governing electrical and magnetic phenomena were given their first complete mathematical expression by James C. Maxwell in 1873 (Mason, p. 390). According to Maxwell's equations, these phenomena are attributed to electric and magnetic fields, interacting with each other and with charges and currents carried by matter (a field is a physical quantity, which assumes values at any point in space). The wave phenomena predicted by Maxwell's equations provided a successful explanation for the phenomenon of light. In fact, wave motion was nothing foreign to the discipline of mechanics, and its laws had successfully described sound waves in air and waves of vibration of elastic bodies. These waves were all the result of the motion of a material medium, be it air or something as inert as a steel plate. Thus it was initially thought that electromagnetic waves were likewise the waves of motion of a hypothetical material substrate, called ether (Mason, pp. 391, 440). Attempts to detect this substrate, or

effects of motion relative to it, failed, however, and in fact the mathematical structure of Maxwell's equations was seen to be inconsistent with the notion of a material substrate.

The puzzle was resolved by Albert Einstein with the discovery of the special theory of relativity in 1905 (Pais, 1982). In the special theory of relativity, it is recognized that the universal validity of Maxwell's equations for observers in relative motion to each other implies that space and time are not separate and absolute concepts. Such important notions as the distance between two points in space, the amount of time elapsed and the simultaneity of events all depend upon the state of motion of the observer, requiring the introduction of four-dimensional space-time for the description of physical events. Furthermore, the electric and magnetic fields of Maxwell's theory were found to be components of a single electromagnetic field, which was now recognized as a physical entity in its own right, independent of any material substrate, and providing a unified description of electric and magnetic phenomena.

In Einstein's general theory of relativity, completed in 1916, space-time finally lost its role as a fixed background for the motion of particles and the propagation of fields, and acquired itself the role of a physical field. The force associated with this field is nothing other than the force of gravity (Pais, 1982).

The classical world view now had been broadened, to embrace non-material physical fields in addition to matter, the former typically being responsible for the forces acting on material particles. However, this was not the end of the story, and the theory of electromagnetism had in fact already presented another, even more profound challenge for the materialistic world view. At the end of the 19th century, attempts were made to calculate the amount of energy radiated by a hot object at a given temperature. It was found that an infinite amount should be radiated, since even in a finite volume, the electromagnetic field contains infinitely many modes of radiation at higher and higher frequencies. To remedy the situation, Max Planck in 1900 had to postulate that the electromagnetic field carries energy only in discrete packets or quanta, later called photons by Einstein, and that the energy in each photon is proportional to its frequency (Gamow, 1966, p. 6; Jammer, 1976, p. 28). This gave a particle-like structure to the electromagnetic field, which had no basis in the classical field equations known at that time.

The notion of energy quanta was soon to be applied to the structure of atoms, the smallest units of ordinary matter. In 1911, Ernest Rutherford found that these atoms were composed of a small, positively charged nucleus, surrounded by comparatively light particles of negative charge, electrons (Gamow, 1966, p. 29). The electric force of attraction between nucleus and electrons would bind the latter to the former, causing them to orbit the nucleus much like the planets orbit the sun under the influence of the force of gravity. The problem with this model is that, according to electromagnetic theory, the orbiting negative charge of an electron will emit radiation, thereby losing energy, and spiraling into the nucleus within a very short period of time.

The solution to this dilemma was radical. In Erwin Schrodinger's wave mechanics, proposed in 1926 (Gamow, 1966, p. 80; Jammer, 1976, p. 236), the notion of a massive particle moving on a precise orbit in space was abandoned as a model for the electron and replaced by the notion of a standing wave centered on the nucleus. Standing waves can exist only in certain discrete forms with well defined energies, and electrons can spontaneously change to a wave form of lower energy, emitting the energy difference as a photon. In particular, there is a unique wave form of least energy, and an electron found in this ground state cannot radiate energy, simply because there is no wave form of lower energy to which it can change. At about the same time, Werner Heisenberg proposed a more abstract approach, in which electronic orbits are replaced by arrays of transition amplitudes, giving rise to matrix mechanics (Gamow, 1966, p. 196). Both approaches were later shown to be equivalent formulations of the same theory (Jammer, 1976, p. 293). This new theory—quantum mechanics—has been extremely successful in describing the atomic level of matter, and forms the theoretical basis for many advanced modern technologies.

As was the case with the electromagnetic and gravitational fields, the waves of quantum mechanics cannot be described in terms of a material substrate. Rather, quantum mechanics explains all observed properties of material bodies in terms of the properties of the electron waves surrounding the nuclei of their atoms. The discrete, particle-like structure of matter now appears to be an approximation only, essentially an illusion, created by the inability of our senses to resolve the extended wave structure of electrons. For the electromagnetic field, what had appeared to be a classical field with a continuum of possible energies for each mode, now turned out to be very much like a theory of particles, photons.

A unifying framework for the quantum theory of particles and fields was developed soon after the discovery of quantum mechanics, and has the name of quantum field theory. (Davies, 1979, p. 114; Dodd, 1984, Ch. 4). According to quantum field theory, the waves of quantum mechanics and quanta of all force fields are nothing but excitations of quantum fields. The difference between particle or Fermi fields, such

as the electron field, and force or Bose fields, such as the electromagnetic field, is just that; in the former case, at most one quantum of energy is allowed for each wave, while in the latter case, arbitrarily many quanta are allowed.

By the early 1960s, four fundamental forces and several types of particles believed to be fundamental were known, each requiring a separate quantum field for its description (Dodd, 1984, Ch. 5). Progress towards a more unified description was made with the discovery of hidden or broken symmetries (Dodd 1984, Part 5). Several quantum fields may be considered to be components of a single quantum field, if the field equations describing their propagation and interactions do not change their form under an arbitrary interchange of the individual fields. A precise mathematical theory of such symmetry transformations has been developed, and it was found, that the fundamental field equations may well exhibit symmetry, even if the quanta of the component fields show different physical properties. An example for such broken symmetry is the electro-weak symmetry (Dodd 1984, Part 5), linking the massive, charged electron and the massless, neutral neutrino. Through the application of this concept of broken symmetry, completely unified theories have been constructed, which attempt to provide a unified description of all known particles and forces (Dodd, 1984, Ch. 39; Peat, 1988, Ch. 4). Super symmetric theories, such as superstring theories, allow for the unification of Fermi and Bose fields, and also appear to be promising candidates for a consistent, unified quantum theory of gravity, i.e., of space-time (Peat, 1988, Ch. 5, 6; Davies, 1988, Ch. 1.11–1.13).

This research program of unified quantum theories, while not completed at present, has provided successful explanations of physical phenomena, integrating results from areas as diverse as particle physics and cosmology (Zee, 1982, Vol. II). In this para-digm, modern physics has moved away from the old, materialistic world view as much as one can possibly imagine. Inert, localized matter is now seen as the mere appearance of complicated states of excitation of a single unified field, which is itself unbounded, self-interacting, and completely symmetric, despite the apparent lack of symmetry in its physical particle states, caused by symmetry breaking. Comparing this modern scientific description of quantum fields to the ancient Vedic description of consciousness, one cannot help but suspect that modern physics may have obtained a glimpse of the field of consciousness (Maharishi Mahesh Yogi, 1963, p. 34; 1986, p. 29).

If the unified quantum field theories of modern physics do indeed describe aspects of the field of consciousness, as it is known to Maharishi Vedic Science, one should be able to locate identical structures and functions in both descriptions. A discussion of several such correspondences is given in the following section.

### **Fundamental Structures of Natural Law in Maharishi Vedic Science and Modern Physics**

This section presents two examples for the description of fundamental structures of Natural Law in Maharishi Vedic Science and in modern physics, which are found to be in close correspondence. This provides additional evidence for the hypothesis that the most advanced quantum theories of modern physics are descriptions of the field of consciousness.

The first example concerns the fundamental structure of consciousness as expressed in the first *Sukta* of Ṛk Veda, and the structure of superstring theory as expressed in the string Lagrangian. As we discussed in the section on Maharishi Vedic Science, Maharishi locates the self-interacting dynamics of consciousness in Ṛk Veda and in the Vedic Literature (Maharishi Mahesh Yogi, 1994, p. 72). The laws governing this self-interacting dynamics form the basis for all other Laws of Nature, and Maharishi therefore has termed them the Constitution of the Universe. According to his *Apaurusheya Bāshya*—which literally means: “uncreated commentary”—of the Veda, this structure is presented in a sequence of successively more detailed elaborations, by the first syllable, the first phrase (*Pāda*), the first stanza (*Ṛicha*) and the first hymn (*Sukta*) of Ṛk Veda. Further stages of elaboration or commentary are presented in the following mandalas of Ṛk Veda., in Sama, Yajur, and Atharva Veda, and in the entire Vedic Literature (Maharishi Mahesh Yogi, 1994, p. 80).

In terms of superstring theory, the fundamental structure of Natural Law, the Constitution of the Universe, is contained in the Lagrangian of the superstring, a compact mathematical expression, from which the field equations of the theory can be derived. Both formulations show close structural similarities. Note the following description of the structuring dynamics of consciousness from Maharishi’s Absolute Theory of Government:

According to my *Apaurusheya Bâshya* of the Veda, AK [the first syllable of Rk Veda.] describes the collapse of fullness of consciousness—A collapses within itself to its own point value, K. This collapse, which represents the eternal dynamics of consciousness knowing itself, occurs in eight successive stages.

In the next stage of unfoldment of the Veda, these eight stages are separately elaborated in the eight syllables of the first *Pâda*, which emerge from and provide a further commentary on the first syllable of Rk Veda. AK. These eight syllables correspond to the eight “Prak@iti” or eight fundamental qualities of intelligence, which constitute the divided nature of pure consciousness.

The first line or *Âicha* of the first *Sukta*, comprising twenty-four syllables, provides a further commentary on the first *Pâda*, (phrase of eight syllables)—the eight-syllable structure of the first *Pâda*, now appears three times: the first *Pada* expresses the eight Prak@iti (fundamental qualities of intelligence) with respect to the knower, or “Rishi” quality of pure consciousness; the second *Pada* expresses the eight Prak@iti with respect to the process of knowing, or “Devatâ” (dynamism) quality of pure consciousness; the third *Pâda*, expresses the eight Prak@iti with respect to the known, or “Chhandas” quality of pure consciousness. Together these three *Pâda*, comprise the first *Âicha* (verse) of the Veda, which represents another complete stage in the sequential unfoldment of knowledge.

The subsequent eight *Âicha* (eight verses) complete the remainder of the first *Sukta*—the next stage in the sequential unfoldment of knowledge in the Veda. These eight *Âicha* consist of twenty-four *Pâda*, (each *Âicha* (verse) having three *Pâda*, (phrases) of eight syllables), comprising  $8 \times 24 = 192$  syllables. (Maharishi Mahesh Yogi, 1995, p. 403–405)

A corresponding structure was located by John Hagelin (1992) in the Lagrangian description of the ten-dimensional heterotic superstring (Maharishi Mahesh Yogi, 1995, p. 94, footnote). The corresponding ten-dimensional Lagrangian contains eight fun-damental fermionic modes intrinsic to the string itself. A threefold interpretation of these fields can be given with respect to their Hilbert space, operator, and state vector aspects. This gives  $3 \times 8 = 24$  fundamental values, corresponding to the 24 syllables of the first *Âicha* of Rk Veda.

The next level is the free-fermionic formulation of the string in four dimensions, with its corresponding four-dimensional Lagrangian. In this formulation, all bosonic degrees of freedom associated with the original space-time are replaced by fermi fields, except for four coordinates needed to account for the four-dimensional structure of classical space-time. This gives 64 intrinsic fermionic degrees of freedom. The threefold interpretation of these 64 string fields with respect to Hilbert space, operators, and states gives  $3 \times 64 = 192$  fundamental values, corresponding to the 192 syllables of the first *Sukta* of Rk Veda.

A second example is provided by the five spin-types of quantum field theory, fundamental categories of quantum fields with distinctly different structure and function. According to N=1 supersymmetry, these are paired into three super fields. These fields and pairings and their functions in physics bear a striking similarity to the five subtle elements or *tanmatras* of Maharishi Vedic Science and their three pairings (Hagelin 1989). In the context of the human physiology, Maharishi Vedic Science associates these three pairings with subtle metabolic principles, called *dosha* (Sharma 1993, p. 273). A table summarizing this comparison is given below, with the conventional translations for the tanmatras given in brackets.

Spin	Field	Super field	Tanmatra	Dosha
2	Graviton		Akasha (space)	
3/2	Gravitino	Gravity	Vayu (air)	Vata
1	Gauge		Agni (fire)	
1/2	Gaugino	Gauge	Jala (water)	Pitta
1/2	Leptons, Quarks		Jala	
1/2	Higgsino		Jala	
0	Sleptons, Squarks		Pṛithvi (earth)	
0	Higg's	Matter	Pṛithvi	Kapha

The graviton is responsible for space-time curvature—the force of gravity. It compares to the *Akasha* or “space” *tanmatra*. The gravitino is the gauge field upholding local supersymmetry; it corresponds to the *Vayu* or “air” *tanmatra*. Both fields are paired in the gravity super field. This compares to Vata *dosha*, which governs motion. The spin-1 gauge fields are responsible for all fundamental forces. They compare to the *Agni* or “fire” *tanmatra*, associated with the sense of sight. Together with their spin-1/2 partners they form the gauge super field. *Agni* and *Jala tanmatra* combine to form Pitta *dosha*, which governs heat, metabolism, energy production, and other chemical reactions. All matter fields have spin 1/2. They

compare to *Jala* or “water” *tanmatra*. The spin 0 Higg’s field is responsible for symmetry breaking, and generation of mass. It corresponds to *P@ithvi* or “earth.” They are paired to form the matter super field. Correspondingly, *Jala* and *P@ithvi* are paired to form *Kapha dosha*, which governs physical substance and stability.

In view of the similarities in the description of physical reality, as presented in the section on the World View of Modern Physics, and of the structural and functional similarities described above, it appears to be a promising hypothesis that the quantum field theories of modern physics describe aspects of the field of consciousness, as described in Maharishi Vedic Science. This hypothesis is much more than an interesting curiosity, but has important implications for research methods and for the application of research results. These implications will be discussed in the following section.

### **Research In Consciousness: Towards a New Paradigm for Physics**

Physics has reached a point in its development, where it becomes feasible to assess and re-evaluate its historical self-understanding as a purely objective science. Let us recall, that this understanding has always been incomplete, and has been unable to explain or systematically improve upon the functioning of the indispensable subjective elements: intuition and reason. Furthermore, the materialistic and mechanistic concepts of classical physics have been shown to apply only to the realm of macroscopic objects. The microscopic realm is described by the wave and field concepts of quantum mechanics and quantum field theory, which show striking similarity to the description of consciousness in Maharishi Vedic Science.

The hypothesis that the physical world is structured from a universal field of consciousness according to precise laws, and that these laws can be directly experienced and applied through Maharishi’s technologies of consciousness, has important implications for the process of research itself and for the application of its results.

Research in theoretical physics has so far been guided by intuition, mathematical structure, and experimental facts. Modern physics, in its unified field theories and “theories of everything” is probing time and distance scales, which are no longer accessible to direct experimental test—although implications of processes postulated to occur at these scales may still be seen in events occurring in a laboratory. Intuitive insight, on the other hand, has close ties to the realm of sensory experience, and to the space-time concepts which correspond to this realm. A theory which aims at explaining space-time from a deeper level may therefore find it difficult to locate appropriate concepts.

This situation is exemplified in the approach of “quantization” in which a quantum theory is constructed by applying certain rules of “quantization” to a corresponding classical theory. This approach has been successful in quantum electrodynamics and other quantum field theories (Dodd 1984, Ch. 4). It has also been applied to superstring theories, in which unified quantum theories are constructed from classical theories describing one-dimensional objects—strings—rather than points (Davies 1988, Ch. 1.13; Peat 1988, Ch. 5). Researchers in this area report the conceptual and mathematical problems to be very challenging (Davies 1988), and this situation may be related to an inherent inadequacy of intuition based on classical space-time concepts.

In Maharishi Vedic Science, the material world, the Laws of Nature which structure it, and the faculties of human intuition and intelligence are just different levels of expression of the same basic reality—consciousness, the Unified Field of Natural Law. This explains, why the subjective faculties of the human mind and intuition are successful in capturing laws which govern the physical world. The individual scientist locates within his own awareness the same structures of intelligence, which—at more complex levels of expression—present themselves as the outside world of space-time, fields, and material objects.

The phenomena observed in the physical world are essentially the same structures of consciousness as the laws of physics which govern them, and these very same structures are available to everybody in their own transcendental consciousness. Intuition and sensory perception, subjective and objective experience, relate to different levels of the same basic reality of consciousness. Research in physics therefore, in the deepest sense, is research in consciousness.

This understanding naturally leads to the vision of a fully adequate research strategy for physics. Maharishi Vedic Science demonstrates that the human mind is capable of gaining access to the full range of consciousness, from its most silent level in transcendental consciousness through all levels of complexity to the apparently objective and material structures of the physical world. For most individuals, however, this natural ability is obstructed by stresses and strains located in the physical nervous system (Orme-Johnson

1988, p. 131). In this situation, the direct subjective experience of laws of physics—intuition—occurs only occasionally and incompletely.

Systematic access to transcendental consciousness is available through the Maharishi Transcendental Meditation<sup>SM</sup> program, which could therefore become the basis of all research procedures in physics. Furthermore, through the regular practice of the Transcendental Meditation and TM-Sidhi programs, stresses and strains in the physiology are released, and the nervous system gains its normal ability to operate within and experience the full range of consciousness. This ability is gained in a systematic sequence of steps, known as higher states of consciousness (Maharishi Mahesh Yogi, 1994, p. 187. Alexander (1987) presents a review of empirical research in this area).

By practicing research in consciousness through the techniques of Maharishi Vedic Science, the physicist will thus be developing higher states of consciousness, and thereby gain the ability to directly experience any Law of Nature in his or her awareness. Mathematical formulation, theoretical analysis, and experimental verification will then be used to validate the experience and to enjoy the richer fabric of detail which emerges. Intuition then rises to its full value of clear and direct inner experience of the Laws of Nature, and is no longer obstructed by the constraints of a less than fully developed nervous system. This new research paradigm will be important for research not only at the most fundamental level, but in all areas of physics, theoretical, experimental, and applied.

The textbooks for research in consciousness are the texts of the Vedic Literature. Maharishi has brought to light (see section on Maharishi Vedic Science) that the Vedic texts not only describe and comment on the self-interacting dynamics of consciousness, but their sound value actually *is* that dynamics. For this reason, reading of the Vedic Literature in Sanskrit is itself a technique for the full development of consciousness:

Every aspect of the Vedic Literature expresses a specific quality of consciousness. Reading every aspect of the Vedic Literature as it flows and progresses in perfect sequential order has the effect of regulating and balancing the functioning of the brain physiology and training consciousness, the mind, always to flow in perfect accordance with the evolutionary direction of Natural Law. (Maharishi Mahesh Yogi, 1994, p.144)

Recent research by Dr. Tony Nader (1995) presents additional evidence for the status of the Vedic Literature as representing definite aspects of the self-interacting dynamics of consciousness. Under the guidance of Maharishi, Dr. Nader has discovered precise correspondences in structure and function between the texts of the Vedic Literature and aspects of the human physiology. For example, the 192 Suktas of Rk Veda are seen to correspond to structures in the nervous system, including layer one of the cortex, the excitatory and inhibitory stimuli of corpus callosum, corona radiata, cranial nerves and spinal nerves, and the filium terminale. This discovery of Veda in the human physiology provides not only empirical evidence for the status of the Vedic Literature, but also promises to be of great practical value for understanding and culturing the proper functioning of the human physiology.

Going beyond the ability to know anything, Maharishi Vedic Science also promises to the individual the ability to command Natural Law to achieve anything. As we discussed above, the ability to know, to experience the self-interacting dynamics of consciousness on its most fundamental level, implies the ability to act on the same level. Since this is the level of Natural Law, where all phenomena occurring in the physical world are being structured, by learning to act from this level, the individual gains the ability to accomplish anything.

This ability is developed in the Maharishi TM-Sidhi<sup>SM</sup> program, which constitutes a rediscovery of the techniques described in Patanjali's Yoga sutras. Sidhi means perfection, the ability to act in a perfected way, such as to achieve results usually considered to be unavailable to humans. For example, Yogic Flying involves the ability to move through the air at will (Maharishi Mahesh Yogi, 1995, p. 33, p. 308, p. 380).

The classical theory of space-time—general relativity—provides no explanation for such a phenomenon. However, general relativity is only a classical approximation to a quantum theory of gravity, and Yogic Flying therefore implies the ability to act at the level of quantum gravity. John Hagelin (1987) proposes that the yogic flying sidhi involves control over the local curvature of space-time. In a quantum theory of gravity, the classical gravitational field is the average of an infinite number of possible geometries, with the gravitational force pointing in any direction. Hagelin envisions that, through a suitable coherent influence at the level of quantum gravity, the result of the quantum mechanical averaging process can be modified, to result in a net gravitational field pointing in any desired direction.

Quantum theoretical modifications of classical fields are well-known in quantum field theory. For example, the electric field produced by an electron is modified by the fields produced by virtual electron-

positron pairs, in such a way that the observed net field is not the classical field corresponding to the bare charge of the electron, but rather that corresponding to a modified effective or renormalized charge (Dodd 1984, Ch. 4.8). Extending Hagelin's argument along this line of thought, it is conceivable that a coherent influence on the level of quantum gravity could substantially reduce the effective coupling between the sidha's body and the gravitational field, thereby reducing the body's weight.

A more detailed analysis of these and other aspects of the Maharishi TM-Sidhi program in the context of superstring theory is at present beyond the computational abilities of modern physics. The principle involved here—that processes on the quantum level can give rise to observable effects which are incompatible with classical theory—is, however, demonstrated by several examples. These include the generation of intense coherent light in a laser and the occurrence of superconductivity and superfluidity (complete absence of electrical resistance and mechanical friction) at low temperatures. In all of these cases, the quantum mechanical principle of stimulated emission results in a macroscopic number of quanta (units of energy) to be found in a single quantum state. This is in contradiction to the classical statistical expectation of seeing energy distributed over a continuum of possible values, and allows non-classical, quantum mechanical coherence phenomena to appear at a classical level.

These discussions and examples lend support to the vision, in Maharishi Vedic Science, of fully developed individuals being able to command Natural Law at its most fundamental level to accomplish anything. Fortunately, the full development of individual consciousness required to gain this ability brings with it what Maharishi calls spontaneous right action. Life-damaging behavior results from restricted awareness, and this from stresses and strains in the physiology. As these stresses and strains are eliminated and higher states of consciousness develop through the practice of Maharishi's technologies of consciousness, the individual identifies himself or herself spontaneously with the evolutionary, life-supporting tendencies of Natural Law, and acts spontaneously in a life-supporting way (Maharishi, 1994).

### **Conclusion**

The science of physics began as an attempt to understand an outside world of material objects. We have seen, through a review of historical examples and analysis of the process of research, that physics necessarily involves subjective elements: intuition and reason. Since its proposed field of inquiry does not include its own research method, the science of physics is necessarily incomplete. A complete science and technology of consciousness is now available in Maharishi Vedic Science. In this science, consciousness is a universal field of intelligence, giving rise to all aspects of individual awareness and of the physical world. A review of the historical development of physics shows that this description is consistent with the most advanced theories of modern physics. Close correspondences between fundamental structures of Natural Law in Maharishi Vedic Science and modern physics confirm this point.

Maharishi Vedic Science finds that human awareness can experience the entire range of consciousness, from its transcendental, self-referral state to the complex structures appearing as the physical world. This opens the possibility to establish a new paradigm for research in physics as research in consciousness. Such research, through Maharishi's technologies of consciousness, has been shown to release stress and strain from the physiology, and thereby develops the full potential of individual consciousness. Maharishi explains that this will result not just in the knowledge of isolated facts or Laws of Nature, but direct experience of and mastery over the holistic value of Natural Law. This gives the ability to know anything and to accomplish anything, without mistakes and without harmful side effects.

Proper education in physics must then include proper development of consciousness, the development of higher states of consciousness through Maharishi Vedic Science. In the process of this development, the individual increasingly acts in accord with the Laws of Nature, and eventually identifies himself spontaneously with the evolutionary tendencies of Natural Law. This eliminates the dangers of misuse of technical knowledge, which has been so acutely relevant in physics and many other sciences. Through the technologies of Maharishi Vedic Science, each physicist will not only enjoy full knowledge of Natural Law, but also apply this knowledge spontaneously for the benefit of himself, of society and all of mankind. We invite all physicists to carefully evaluate the merit of this vision, and join in its realization.

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