

SUMMER - FALL  
1999

# Center Voice

The Newsletter of the Center for Sacred Sciences

## Special Focus:

## Science and Mysticism

### Contents:

Center News .....	2
Science and Mysticism in the Twentieth Century .....	4
by Joel	
The Illusion of Materialism .....	7
by Thomas J. McFarlane	
In Their Words .....	13
Library Corner .....	15

### In This Issue . . .

Science is a word that appears basic and simple, but carries many meanings and implications. Technically, science is the use of methods to test theories against observation and experience. In our culture, however, it is interpreted on a continuum from 'ultimate truth' to 'having no legitimate value', with 'practical' and 'narrow' somewhere between. This issue of Center Voice is dedicated to an exploration of the contemporary voices of science in relation to the mystical path and what they may mean for us.

Introducing and defining the parameters of this relationship in "**Science and Mysticism in the Twentieth Century**," Joel outlines the developments in both fields that lead to a potential dialogue and shows the parallels between them as well as a reminder of the eternal, essential difference.

Following with our spotlight article, "**The Illusion of Materialism: How Quantum Physics Contradicts the Belief in an Objective World Existing Independent of Observation**," Tom McFarlane takes up the discussion and

moves into a very specific demonstration of the scientific side of the equation. He shows how the materialist perspective still predominant in our society is literally debunked and how science is currently, although unintentionally, in some agreement with mysticism.

In a closing reminder of the foundation of these teachings, the scientists and mystics themselves clarify, "**In Their Words**," their own experience and conclusions. Here, they encourage, by example, to look beyond the limiting beliefs we may hold, further freeing us along the path.

"**Library Corner**" describes the present status, form and inhabitants of the library, a truly remarkable treasure house of resources on (but not limited to) science as well as mysticism. And rounding out this issue is "**Center News**," in which are described the latest meditation events and parties. As always, we hope you will find something herein to nourish and support you along the way.

*Thus it dawned upon me that fundamentally everything was subjective, everything without exception. That was a shock.*

— Max Born (physicist)

*Fundamentally, there is no reality in external objects.*

— Lankavatara Sutra (Buddhist)

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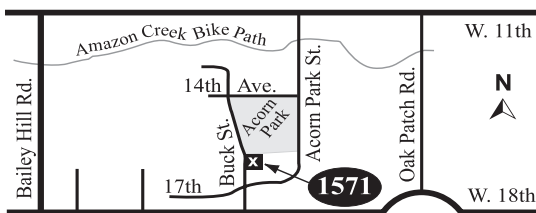
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The Center for Sacred Sciences is a non-profit, tax exempt church dedicated to the creation and dissemination of a new worldview based on the wisdom of humanity's great spiritual teachers, but presented in forms appropriate to our present scientific culture. Our programs draw on the teachings of the mystics of all traditions, informed by the Enlightenment or Gnosis of Joel, our Spiritual Director. Among the Center's current offerings are Sunday Programs with meditation and talks by Joel, once a month Sunday video presentations, twice yearly meditation retreats, and a weekly Practitioners Group for committed spiritual seekers. The Center also maintains an extensive lending library of books, tapes and periodicals covering a broad spectrum of spiritual, psychological, and scientific subjects. Joel's teachings are offered freely as a labor of love, and he receives no financial support from the Center. We rely chiefly on volunteer labor to conduct our programs, and on donations and membership dues to meet our operating expenses.



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## **CENTER NEWS:**

### ***Sacred Quilt Art Show***

On Saturday, December 5th, Center member Niraja Lorenz held a showing of her quilt art at the welcoming home of member Grace Mikesell. Niraja's quilts are inspired by the sacred, as the many members who gathered for this public exhibit can confirm. Filled with enthusiasm, this group festivity flowed into a sing-along accompanied by Gene Gibbs on guitar and reinforced by pizza. Those truly inspired continued the festive spirit into a night of dancing out on the town. Niraja, the sacred impulse revealed in your art truly knows no bounds!



### ***Quilt Show Sing-along***

### ***Winter Potluck Lightens the Night***

On Saturday night, January 16, Mike and Sheila Craven brought light into the dark of winter by hosting a Center winter potluck. Fueled by a tasty spread, this group sang and debated its way through the evening. Musicians were Steve Zorba Frankel, Tanja Petal and Wayne Leeds. Topics of debate? Way out there!

### ***Outgoing Contributing Editor***

A debt of gratitude is owed to Michael Taylor, who generously gave of his time and talent by contributing much of the editorial text of this newsletter over the last four years. Due to changes in other demands on Michael, as well as changes in newsletter staff, this responsibility will now be merged into the Editor job. Thank you, Michael, and we'll continue looking for your input in elsewhere.

### *Meditation Extraordinaire!*

The Center community was graced in early December when Andrea Pucci, our teacher in absentia, joined us for the weekend of December 4-6. On Friday night and Sunday afternoon, Andrea led us in her Tibetan Dzogchen space meditation interspersed with walking meditations. This form is becoming a favorite here and we offer our heartfelt gratitude to Andrea for her presence, humor and aliveness, and for this profound practice she brings to us.



*Andrea Pucci*

### *Santa Barbara Retreat on the Beach*

“Emptiness” was the topic of a retreat led by Joel in Santa Barbara, California, the weekend of April 9-11, 1999. Organized by Andrea Pucci, an intimate group averaging a dozen people filled the magical hobbit house-on-the-beach of Linda and Dan Smith, who generously provided food and a beautiful setting free to all comers. The group of mostly experienced Buddhist practitioners listened to talks on emptiness and how it relates to other mystical traditions in addition to Buddhism, and participated in practical exercises and meditations. A great big thank you from all to Linda, Dan, and Andrea for making this event possible.

### *Spring Retreat*

Twenty-four Center members gathered from April 23-28, 1999, at Cloud Mountain Retreat Center in Castle Rock, Washington, for our five-day Spring Retreat. Joel and Andrea co-led the retreat, which explored the theme of “The Wisdom of the Heart.” Participants had the opportunity to investigate the four levels of heart wisdom, starting with the physical heart and its responses, and proceeding on to the emotional heart, whose natural wisdom is so often distorted by the misunderstanding of the deluded mind. Next we probed the wisdom of the spiritual heart, which is the source of our inner spiritual guidance. Lastly we heard teachings regarding the radiant Heart, the Source of all being, and did practices to help us to discover this radiant Heart at the core of our own being. As always, there was a dynamic balance between the teachings of Joel and Andrea, supported by references to the mystical traditions and the practical application of meditative techniques so that participants could taste the truth of the teachings in their own experience.



*RETREATANTS: (Bottom row from left) Damien Pierce, Miriam Reinhart, Tom McFarlane, Karen Fierman, Shan Ambika, Rich Marlatt, Diana Taylor, Todd Corbett, (middle row) Michael Taylor, David Cunningham, Jennifer Knight, Joel, Andrea Pucci, Mike Craven, Sheila Craven, Fred Chambers, Merry Song, (top row) Tom Kurzka, Ani Tsering Chodron, Grace Mikesell, Jim Zajac, Ann Everitt, Gene Gibbs, Carla Wenzlaff, Clivonne Corbett, and Jim Patterson.*



# ***SCIENCE AND MYSTICISM IN THE TWENTIETH CENTURY***

by Joel

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Not without reason has the twentieth century been called *The Revolutionary Century*. Hardly any field of human endeavor has escaped some major upheaval. There have been political revolutions, economic revolutions, social revolutions, revolutions in technology, in transportation, in medicine, in communication—even in our everyday manners. For the spiritual seeker, however (and ultimately for humanity, itself), none of these can compare in importance to the twin revolutions which have occurred in the fields of science and religion. So, let us take a brief look at these two revolutions and how they affect us.

When the twentieth century opened, science and religion were locked in a protracted war in which it seemed no compromise was possible. There were two primary reasons for this. The first was *epistemological*,<sup>1</sup> involving different notions about what constitutes truth and how it can be known. While science boasted that scientific truths could be tested and verified through empirical experiments, religion apparently demanded that spiritual truths be accepted on blind faith.

The second reason was *ontological*.<sup>2</sup> That is, science and religion were founded on diametrically opposed views concerning the fundamental nature of reality. Religious believers insisted that, ultimately, the nature of reality was spiritual, and that, apart from this All-Encompassing Spiritual Reality, nothing would or could exist. Advocates for science, on the other hand, adopted a strictly materialist position, arguing that everything could be reduced to, and explained by, the interactions of independently existing atoms and the physical forces which acted on them.

Faced with two such irreconcilable worldviews, it appeared that any thinking person would have to choose sides—and many did. But for those who admired science, yet also intuited there must be more to life than the “wiggling and jiggling of atoms,”<sup>3</sup> the apparent intractability of this historical conflict presented something of a personal dilemma. To pursue a spiritual path while simultaneously maintaining a scientific outlook required a kind of philosophical schizophrenia. How else could one pray for divine guidance by night and then take one’s automobile to a mechanic in the morning? The underlying paradigms upon which these two actions were based simply refused to mesh.

As this century draws to a close, however, the situation in both science and religion has changed dramatically—so much so, that we must now rethink the very terms in which the whole controversy between them has been cast.

First, in the field of religion, the last hundred years has seen a veritable explosion in our knowledge of humanity’s great religious traditions. A plethora of new translations of sacred texts from around the world is expanding and reshaping our basic understanding of what it can mean to be religious and to lead a spiritual life. In particular, we have discovered that, at the core of all the major religions, there exists a current of mystical teachings which, when compared to one another, exhibit a startling degree of cross-cultural agreement.

What’s especially interesting about these mystical teachings is their epistemology, which in many respects resembles that of science. For instance, while mystics recognize that faith is, indeed, a significant part of a spiritual path, they also maintain that faith alone is not enough. In fact, according to the mystics, if faith solidifies into dogmatic belief, it will actually become an obstacle to further progress. As Simone Weil wrote: “In what concerns divine things, belief is not fitting. Only certainty will do.”<sup>4</sup> It was out of this same concern that his disciples not rest on mere faith that the Buddha admonished them:

*As the wise test gold by burning, cutting and rubbing it (on a piece of touchstone), so are you to accept my words after examining them and not merely out of regard for me.*<sup>5</sup>

This is also why Sufis (the mystics of Islam) who have reached the end of their path are called *al-muhaqqiqun*, which means “verifiers.” They, too, have examined the teachings and verified their truth for themselves.

Moreover, just as science incorporates a well-defined methodology for testing its theories, so do mystical traditions. Thus, while scientific theories can be verified by observation made within the context of various kinds of physical experiments, mystical teachings can be verified by insights gained within the context of various kinds of spiritual practices. In fact, engaging in such practices is considered essential in mystical traditions, because, as the anonymous author of the

Christian *Cloud of Unknowing* warned: “you will not really understand all this until your own contemplative experience confirms it.”<sup>6</sup>

In Mysticism, then, we find a type of spirituality which has close epistemological parallels to science—a spirituality that begins with faith but ends in a certainty which each of us can and must discover in our own practice. Thus, for seekers who cannot accept religious doctrines on faith alone, the recovery and dissemination of these mystical teachings is good news, indeed.

In the field of science, the last hundred years has wrought a revolution that has been, quite literally, world-shattering. The revolution we are talking about is quantum physics, and the “world” it shattered was the materialist world which the older classical physics seemed to support. Here is how Werner Heisenberg, one of quantum physics’ founders, describes it: “Quantum theory has led the physicists far away from the simple materialistic views that prevailed in the natural science of the nineteenth century.”<sup>7</sup> In short, materialism is no longer a scientifically tenable paradigm.

This, too, is good news for modern spiritual seekers who cannot ignore the evidence of science. The fact that quantum physics has rendered the materialist paradigm scientifically untenable means that an otherwise insurmountable barrier to a rapprochement between science and religion (at least in its mystical aspect) has been removed. And while quantum physics does not “prove” mystical teachings (as some overly eager enthusiasts have claimed), the fundamental reality which it describes is not at all incompatible with the fundamental reality testified to by the mystics.

One example of this can be seen in the similarity between the modes of description which both scientists and mystics have been forced to adopt. In order to give a complete account of the properties of physical systems, quantum physicists have had to resort to a paradoxical form of expression called *complementarity*. For instance, sub-atomic phenomena can be thought of both as “waves” and as “particles.” As Heisenberg points out, however, these two concepts are:

*...mutually exclusive, because a certain thing cannot at the same time be a particle (i.e., a substance confined to a very small volume) and a wave (i.e., a field spread out over a large space), but the two [taken together] complement each other.*<sup>8</sup>

Likewise, attempts by mystics to communicate what their spiritual practices have disclosed always result in one of those paradoxical statements for which mystics have become so famous. To give but one example, listen to the way the great Sufi shaykh, Ibn ‘Arabi, characterizes what he calls the “Reality of realities”:

*If you say that this thing is the [temporal] Universe, you are right. If you say that it is God who is eternal, you are right.*

*If you say that it is neither the Universe nor God but is something conveying some additional meaning, you are right. All these views are correct, for it is the whole comprising the eternal and the temporal.*<sup>9</sup>

An even more striking example of how science’s and mysticism’s perceptions of reality intersect concerns the relationship between subject and object. For quantum physics, deciding where one begins and the other ends presents something of a quandary. Here is how physicist-mathematician, John S. Bell, sums up the problem:

*The subject-object distinction is indeed at the very root of the unease that many people feel in connection with quantum mechanics. Some such distinction is dictated by the postulates of the theory, but exactly where or when to make it is not prescribed.*<sup>10</sup>

For a mystic, however, the fact that quantum mechanics cannot tell us *where* or *when* to draw the line between subject and object comes as no surprise at all. This is because one of the most fundamental truths—attested to by mystics of all traditions—is that the distinction between subject and object is purely imaginary. It has no real existence to begin with! Thus, Ibn ‘Arabi writes, “know you are an imagination, as is all that you regard as other than yourself an imagination.”<sup>11</sup> So, too, the Hindu mystic, Anandamayi Ma, says, “Seer-seeing-seen—these three are...modifications created by the mind, superimposed on the one all-pervading Consciousness.”<sup>12</sup> Likewise, Tibetan Buddhist master, Longchen-pa, declares: “There is no duality of mind and its object, and the perceiver is void in essence.”<sup>13</sup>

The discovery of such ontological points of convergence between science and mysticism is intellectually very exciting. Not only does it abolish our philosophical schizophrenia, it also holds out the possibility of creating a sacred worldview in which both science and mysticism would be seen as distinct yet complementary ways of exploring the same underlying reality. The importance of this task for establishing a future global civilization on genuine spiritual and moral values cannot be over-estimated.

Here, however, a word of caution is in order. For even if the rapprochement between science and mysticism does, indeed, lead to a new worldview, there still is, and always will be, one big, *big* difference between them.

The truths which science yields are conceptual truths, arrived at through a combination of thinking and experiencing. As such, they are also and inevitably relative truths, subject to revision and change as our thoughts and experiences change.

But the Truth to which mystics bear witness is an Absolute Truth—one which, as the Hindu sage, Shankara, says, “is beyond the grasp of the senses,”<sup>14</sup> and which, Ibn ‘Arabi writes, “cannot be arrived at by the intellect by means of any rational thought process.”<sup>15</sup> This Absolute Truth can

only be known through a *third* mode of cognition—called variously *Enlightenment*, *Realization*, or *Gnosis*—which transcends both thinking and experiencing. In fact, it is precisely our ordinary ways of thinking and experiencing that veil this Truth from us, for as Buddhist master, Huang Po, writes:

*Blinded by their own sight, hearing, feeling and knowing, they do not perceive the spiritual brilliance of the source substance. If they would only eliminate all conceptual thought in a flash, that source-substance would manifest itself like the sun ascending through the void and illuminating the whole universe without hindrance or bounds.*<sup>16</sup>

And, at the opposite end of the spiritual spectrum, here's what Dionysius the Areopagite says of the Christian mystic's Enlightenment:

*Renouncing all that the mind may conceive, wrapped entirely in the intangible and the invisible, he belongs completely to him who is beyond everything. Here, being neither oneself nor someone else, one is supremely united by a completely unknowing inactivity of all knowledge, and knows beyond the mind by knowing nothing.*<sup>17</sup>

In other words, the Truth to which all Mystics testify is of an entirely different order than the truths formulated by science. When Jesus said, "Know the Truth and it shall make you free,"<sup>18</sup> he wasn't talking about the theory of relativity. And when the Buddha said, "The gift of truth is the highest gift,"<sup>19</sup> he wasn't referring to quantum physics.

I stress this because there are quite a few seekers out there today who think that discovering mystical Truth is simply a matter of "shifting your paradigm," or learning a "new worldview." And while it is certainly valuable to examine your worldview and to investigate new paradigms, it is also crucial to remember that, no matter how revolutionary a worldview may seem, or how compatible with mysticism a paradigm may be, worldviews and paradigms always remain conceptual constructs. But the Absolute Truth revealed by Gnosis lies beyond *all* concepts, *all* paradigms, and *all* worldviews, whatsoever!

So, if you want to know this Truth, you must finally let go of all your thoughts and all your experiences. You must allow yourself to sink beneath this whole transitory stream of mental and sensory phenomena into that Ocean of Silence at the Heart of the World. For it is only when you are completely lost and dissolved in the shoreless depths of this Ocean that Gnosis can burst forth like a bolt of lightning, "which lights up the sky from one end to the other,"<sup>20</sup> and makes the Truth as plain to you "as an amalka fruit held in the palm of your hand."<sup>21</sup>

May all of you Realize this Fruit for yourselves!

❖ Joel, Spring 1999

1. From Greek: *episteme* = "knowledge"; *logos* = "study of"
2. From Greek: *onta* = "ultimate reality"; *logos* = "study of"
3. As physicist Richard P. Feynman once put it.
4. Simone Weil, *Waiting For God*, trans. Emma Craufurd (1951; reprint, New York: Harper & Row, Publishers, 1973), 209.
5. Mahathera Narada, *The Buddha and His Teachings*, 2nd rev. ed. (Kandy, Sri Lanka: Buddhist Publication Society, 1988), 157.
6. Anonymous, *The Cloud of Unknowing And The Book of Privy Counseling*, ed. William Johnston (Garden City, N.Y: Doubleday & Company, Inc., an Image Book, 1973), 171.
7. Werner Heisenberg, *Physics and Philosophy*, (New York: Harper & Row Publishers, 1962), 128.
8. *Ibid.*, 149.
9. S.A.Q. Husaini, *The Pantheistic Monism of Ibn Al-'Arabi*, 2nd ed. (Lahore: Sh. Muhammad Ashraf, 1979), 53-54.
10. John S. Bell, "Subject and Object," in *The Physicist's Conception of Nature*. ed. Jagdish Mehra (Boston: D. Reidel Publishing Company, 1973), 687.
11. Ibn Al'Arabi, *The Bezels of Wisdom*, trans. R.W.J. Austin (New York: Paulist Press, 1980), 125.
12. Sri Anandamayi Ma, *Matri Vani: Vol 2*, 2nd ed., trans Atmananda (Calcutta: Shree Shree Anandamayee Charitable Society, 1982), 138.
13. Longchen Rabjam, *The Practice of Dzogchen*, 2nd ed., trans. Tulku Thondup, ed. Harold Talbott (Ithaca, NY: Snow Lion Publications, 1996), 338.
14. *Shankara's Crest-Jewel of Discrimination*, trans. Swami Prabhavananda and Christopher Isherwood, 3rd ed. (Hollywood, Calif.: Vedanta Press, 1978), 75.
15. Ibn Al'Arabi, *The Bezels of Wisdom*, trans. R.W.J. Austin (New York: Paulist Press, 1980), 51.
16. *The Zen Teachings of Huang Po*, trans. John Blofeld (New York: Grove Press, Inc., 1959), 36.
17. *Pseudo-Dionysius: The Complete Works*, trans. Colm Luibheid (New York: Paulist Press, 1987), 137.
18. John 8:32
19. *The Dhammapada: The Path of Truth*, trans. The Venerable Balangoda Ananda Maitreya, revs. Rose Kramer (Novato, Calif.: Lotsawa, 1988), 95.
20. Luke 17:24
21. A traditional analogy in both Hinduism and Buddhism.



# The Illusion of Materialism: How quantum physics contradicts the belief in an objective world existing independent of observation

by Thomas J. McFarlane

*Tom McFarlane has a B. S. in physics from Stanford University, an M. S. in mathematics from the University of Washington, and is now in the graduate program in philosophy and religion at the California Institute for Integral Studies in San Francisco. One of Joel's first students when the Center was founded in 1987, Tom attended for several years thereafter. Although he has since moved away from Oregon, he continues to attend Center retreats at Cloud Mountain and is one of the sponsors of Joel's annual seminars in the Bay Area. Tom also maintains the Center's web site.*

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The Center for Sacred Sciences was founded on the belief that the testimony of the mystics of all religions is compatible with the evidence of modern science. This compatibility, however, is often far from obvious, largely because the modern scientific tradition has attached itself to a materialistic cosmology which is inherently antagonistic to spiritual insight. This cosmology, also known as materialism, asserts that matter has independent objective existence, and that all phenomena, including those of the mind and consciousness, are ultimately reducible to the motions of matter. The development of quantum mechanics, however, has shown that materialism is actually incompatible with modern science.

The purpose of this article is to explain in detail exactly how quantum physics contradicts the materialistic account of the universe. As we will see, quantum mechanics demonstrates that the world as we commonly experience it does not, in fact, have an objective existence independent of its observation. In the words of Niels Bohr, the pioneer of 20th-century quantum physics,

*An independent reality, in the ordinary physical sense, can neither be ascribed to the phenomena nor to the agencies of observation.<sup>1</sup>*

This remarkable claim is entirely compatible with the claims of the mystics. For example, consider the following fundamental teaching of the Center for Sacred Sciences:

*The appearance of an objective world distinguishable from a subjective self is but the imaginary form in which Consciousness Perfectly Realizes Itself.<sup>2</sup>*

In the same spirit, the third Chinese Zen patriarch, Sengtsan, teaches us:

*Things are objects because of the subject [mind]; the mind [subject] is such because of things [object]. Understand the relativity of these two and the basic reality: the unity of emptiness. In this Emptiness the two are indistinguishable and each contains in itself the whole world.<sup>3</sup>*

The mystics and physicists, therefore, both make the outrageous claim that the materialistic belief in an objective world independent of observation is a delusion. Or, in Buddhist terms, all objects are empty of any inherent existence. Since this claim is in blatant contradiction with both our ordinary experience and conventional worldly wisdom, our natural response is to dismiss it as ludicrous. We might say to ourselves, "Those mystics are obviously the deluded ones who have lost touch with reality, not me and everyone else."

Although it might be easy for a modern Westerner, raised in a materialistic culture, to dismiss the radical claims of the mystics, it is not so easy to dismiss the most eminent of our physicists, who make claims remarkably similar to those of the mystics. Consider, for example, the words of Werner Heisenberg, the inventor of quantum mechanics:

*The ontology of materialism rested upon the illusion that the kind of existence, the direct "actuality" of the world around us, can be extrapolated into the atomic range. This extrapolation is impossible, however.<sup>4</sup>*

The Buddha, speaking about the true nature of reality, makes the following very similar claim:

*There is that which does not belong to materialism and which is not reached by the knowledge of philosophers who...fail to see that, fundamentally, there is no reality in external objects.<sup>5</sup>*

If we dismiss the Buddha and other mystics, shall we also dismiss Heisenberg and Bohr? These eminent physicists won Nobel prizes for their fundamental contributions to quantum theory. Perhaps no other physicists have thought more deeply about the nature of quantum physics than Heisenberg and Bohr. And they are talking about quantum mechanics, the most precise and far-reaching physical theory ever devised. It explains how the sun shines, how molecules bond together, how iron is magnetized, and why various materials are solid, liquid, or gas. It is quantum mechanics that gives us computer chips, lasers, and atomic energy. So if we dismiss quantum mechanics, we throw out the cornerstone of modern physics and the theory that provides the essential foundation for all these scientific marvels. It seems that we had better think twice before dismissing what Bohr and Heisenberg have to say about the nature of the physical world.

Put simply, they say that the objective world is an illusion. The biggest problem with this claim is that our experience, for the most part, is quite compatible with the idea that there really is an independently existing objective world. There seems to be no contradiction at all between our normal day-to-day experience and our assumption that the objects we encounter during the day are objectively real. So the problem is, if this idea of an objective world is wrong, then why does it seem so right? To shed some light on this problem and its solution, let me digress for a moment with the following thought experiment.

Imagine going back in a time machine 3000 years and encountering some people who are convinced that the world is flat. Wishing to correct their misconception, you politely inform them that they are mistaken. In fact, you tell them, the world is not flat but round. They ask you why you believe such a crazy idea, and you become quite embarrassed when you find that you cannot show them the least bit of evidence to back it up. They, on the other hand, explain to you that it is perfectly obvious from all their experience that the earth is flat. After all, they use concepts of plane geometry to measure out land and make road maps and they never find any contradiction at all with their day-to-day experience. Nor do they see any curvature at all when they look across wide open spaces of land or sea. So your claim that the earth is round is obviously a delusion and they dismiss you as a crazy mystic (especially after you tell them about people from your time who ascend into the heavens in a blaze of fire where they can look down upon the whole created world and see that it is round). Frustrated and disappointed, you board your time machine and head back home to the present.

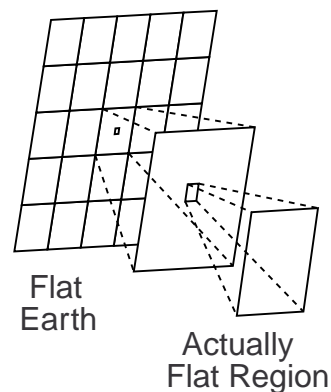


Figure 1: A flat earth appears flat on a small scale.

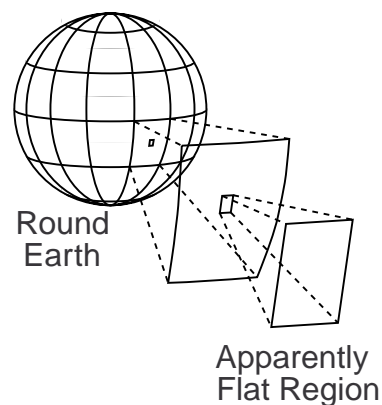


Figure 2: A round earth also appears flat on a small scale.

The reason you could not convince your friends in the past that the world is round, of course, is because you are so small in comparison to the earth. Since your experience is normally limited to a small geographical region, the earth appears flat even though it really is not. In other words, the apparent flatness of the earth is not a real flatness due to an earth that is actually flat (Fig. 1), but rather is an illusory flatness due to the large size of the earth (Fig. 2). To prove that the earth is round, you would need to go beyond your ordinary experience. For example, you could fly around the globe in an airplane, or catch a ride on the next space shuttle flight. But as long as you are confined to your ordinary experience, there is no proof that the flatness is an illusion, and no reason why you should not believe that the earth is flat.

If people have been so deluded about reality in the past, how can we be so sure that we are not deluded now? As we have seen, just because our present notions of reality are consistent with our ordinary experience, does not make them true. Since our experience certainly has its limits,



perhaps our idea of the objective world really is an illusion, just as much an illusion as the idea of a flat earth. What wonders might lie beyond the limits of our present experience? What truth might lie hidden beneath our present illusions?

We can now reconcile the shocking claims of Heisenberg and Bohr with our normal experience of an objective world, and understand how the world might not have an independent objective existence, even though it appears to have one. The solution is to recognize that our experience is ordinarily limited. Because we ignore certain aspects of our experience, we typically mistake what appears to be true in this limited experience for what is actually true in all experience. Just as the belief that the world is flat is at best a useful fiction, and not at all real, the belief that the world exists objectively is also just an illusion. Of course, this fiction, like the fiction of a flat earth, is a useful one that fits much of our ordinary experience. But the moment we take it to be universally true, we slip into delusion. To break the spell of delusion, we need to depart from the limitations of the ordinary and expand our experience to include more subtle observations. Then we find that these fictions quickly unravel to reveal a very different reality.

To quote Heisenberg once more,

*The existing scientific concepts cover always only a very limited part of reality, and the other part that has not yet been understood is infinite. Whenever we proceed from the known into the unknown we may hope to understand, but we may have to learn at the same time a new meaning of the word 'understanding'.<sup>6</sup>*

And Bohr expresses the same idea as follows:

*As our knowledge becomes wider, we must always be prepared...to expect alterations in the point of view best suited for the ordering of our experience.<sup>7</sup>*

Now that we have a framework for understanding how, in spite of our experience to the contrary, the objective existence of the world could be an illusion, let us now consider the quantum mechanical evidence that unravels the fiction of materialism. Keep in mind, however, that this evidence will necessarily draw from phenomena that lie outside the usual limits of our experience.

Before the 20th century, our scientific worldview was based on the laws of classical physics, which included Newton's laws of motion and Maxwell's equations. While Newton's mechanical laws governed the behavior of material particles, Maxwell's wave equations described the behavior of light. In the classical world, therefore, there were two very different types of phenomena: matter which behaved like discrete particles localized in space, and light which behaved like continuous waves spread out in space. Around the turn of the century, however, new scientific observations at the microscopic scale revealed that light sometimes behaves like particles, and matter sometimes behaves like waves!

To understand this strange paradox, let us first perform a couple of thought experiments, one to illustrate the classical behavior of particles, and another to illustrate the classical behavior of waves. Then we will compare these two thought experiments with a quantum thought experiment. So, first, let us consider classical particles. Imagine that we place a source of large particles (a sand blower, for example) behind a wall that has two slits in it (Fig. 3). On the other side of the wall is a screen which can detect the particles that have passed through the two slits. Since particles are by definition localized in space, each one is emitted from the source, travels through one slit or the other, and hits the screen. After allowing many particles to pass through the two slits and hit the screen, we observe two clusters of points on the screen:

*In classical physics science started from the belief—or should one say from the illusion—that we could describe the world or at least parts of the world without any reference to ourselves.*

— Werner Heisenberg (physicist)

*[Quantum physics requires] the necessity of a final renunciation of the classical ideal of causality and a radical revision of our attitude toward the problem of physical reality.*

— Neils Bohr (physicist)

*Quantum theory does not allow a completely objective description of nature.*

— Werner Heisenberg (physicist)

one cluster corresponding to particles that went through one of the slits, another cluster corresponding to particles that went through the other slit. A graph of the particle intensity versus position on the screen thus has the shape of two separate peaks, as shown in the figure. Note that these observations are consistent with the assumption that each particle follows a definite path through one slit or the other slit, and objectively exists as it follows one or the other of these paths. Note also that if we plug up one slit, the corresponding peak disappears. The other peak, however, remains unaffected. The particles, therefore, follow independent paths through one slit or the other.

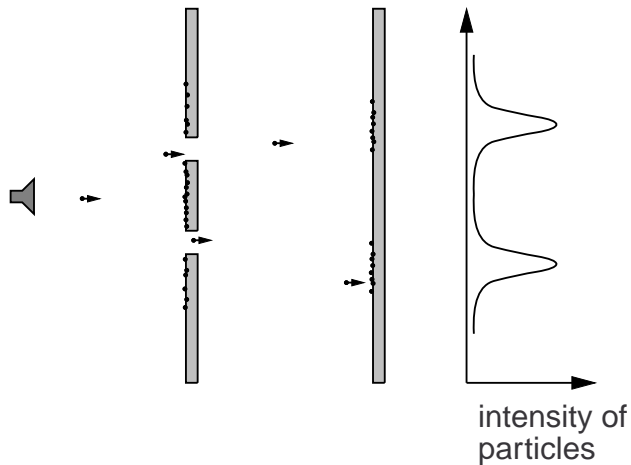


Figure 3: The double-slit experiment with classical particles results in a two-peak pattern.

Next, imagine we perform a similar experiment (Fig. 4), only instead of sending particles of sand through empty space from the source to the screen, we fill the whole space with some medium, such as water. Instead of a source of sand particles, we use a vibrating object (such as a water bug jumping up and down) that disturbs this medium, continuously generating waves that spread out in all directions.

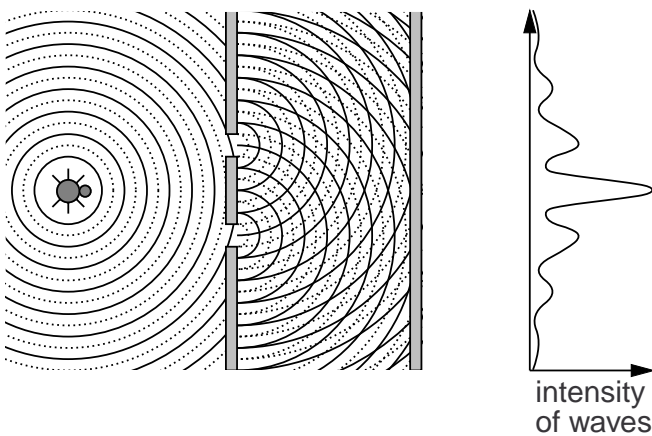


Figure 4: The double-slit experiment with classical waves results in an interference pattern.

The crests of the waves are shown in the figure as circles with solid lines, while the troughs of the waves are shown as circles with dotted lines. For the screen we can use a long line of small wave detectors (such as floating corks that move up and down when a wave hits them). Note that the waves are not localized in space like particles, but are spread throughout the whole medium. As a result, a wave does not go through just one slit or the other, like a particle, but goes through both slits simultaneously, resulting in an interference pattern. When the crest of one wave combines with the trough of another wave, they cancel each other out, leaving nothing (Fig. 5). This interference phenomenon is an essential feature of waves.

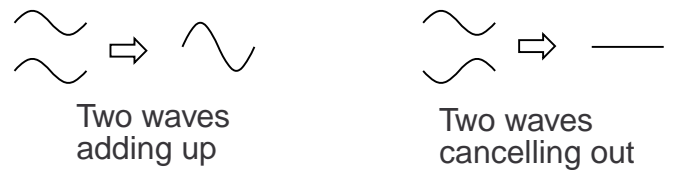


Figure 5: Unlike two particles, two interfering waves can either add up or cancel out.

This interference behavior is very different from the behavior of two particles. And the results of this experiment reflect this difference: the screen (Fig. 4) shows a wave interference pattern, with large wave intensities where the waves from the two slits add up (two intersecting lines of the same type) and small wave intensity where the waves from the two slits cancel out (a solid line intersecting with a dotted line). Note that this complex interference pattern is quite different from the simple pattern we saw with the particles (Fig. 3). With particles, the peaks were clearly independent: one peak from one slit, the other peak from the other slit. With waves, however, the entire interference pattern reflects a coherent effect of both slits, and if one slit is plugged, the whole pattern disappears.

The two experiments above contrast the classical behavior of particles with the classical behavior of waves. When this double-slit experiment is performed on a microscopic scale with small particles, however, we begin to observe a very strange mixture of waves and particles. So, let us conduct another thought experiment with these small particles, or quanta (Fig. 6). Like the first experiment, we have a source of particles traveling through empty space. Only this time, we use electrons as the particles, and make the slits so small and so close together that you need a microscope to see them. We then observe that the source emits the electron particles in chunks, and that the screen detects the electrons in chunks, just as before. The pattern we see on the screen, however, is not the two-cluster pattern we saw for classical particles. Instead, we see the interference pattern for waves!

Because the electron produces the interference pattern that is the signature of waves, it cannot be a particle. But the electron cannot be a wave either, since it arrives at the screen in discrete chunks, which is the mark of a localized particle. Our observations thus suggest that the electrons are localized particles when they leave the source and when they arrive at the screen, but that the electrons are waves everywhere in between. This is very odd, indeed, for it seems to imply that the localized particle at the source dissolves, in some sense, into a non-localized wave that propagates through space from the source to the screen, where it transforms back into a localized particle again!

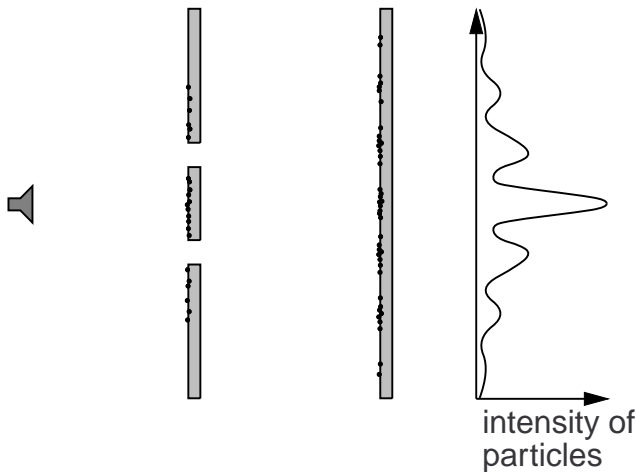


Figure 6: The double-slit experiment with very small particles results in a wave-like interference pattern.

This experimental evidence flies in the face of materialism. According to materialism, any particle always has an objective existence at a specific location in space. In particular, according to materialism, the electron must follow a single path through one slit or the other, and cannot travel through both slits like a non-localized wave. That, however, is exactly what the electron evidently does.

Let's test this hypothesis that the electron propagates as a non-local wave by performing another thought experiment. Suppose that we look closely at each of the slits (with two narrow laser beams, for example) while the electrons are supposed to be passing through (Fig. 6). Will we see a localized particle passing through one of the slits, or will we see some kind of wave passing through both slits at the same time? Surprisingly, when we actually perform this experiment, we do see a localized particle go through just one of the slits, just as a materialist would expect. In addition, however, we no longer see the interference pattern of waves on the screen. Instead, we now see the regular two-peak pattern for particles, like the pattern shown in figure 3. Thus, our observation somehow changes the behavior of the electrons

from waves to particles. Indeed, as soon as we turn off our laser beams, the interference pattern immediately reappears on the screen. So the only way to see the wave pattern is to refrain from observing which slit the electron goes through; and when we observe its path through one slit or the other, we do not see the wave pattern anymore. Therefore, when we do not look at it, the electron is a non-local wave, without any definite localized position. Only when we observe the electron does it have a definite position.

It is important to emphasize the difference between saying that the electron does not have a definite position unless we observe it, and saying that the electron has a definite position but we just do not know what it is. If the electron really had a definite position all the time, then the electron would have to go through one slit or the other, and could never produce an interference pattern. But the electron does produce an interference pattern, so the electron must, in some sense, go through both slits, like a non-local wave. It cannot, therefore, have a definite position all the time. As the Zen master Sengtsan might say, the electron is empty of any independently existing position. Its position exists only in dependence upon its observation. While the electron is unobserved, therefore, its existence is not like that of an ordinary object which we think of as having a definite and objective position in space. Rather, it exists as a non-local wave, with no definite or objective position in the ordinary sense.

Moreover, this non-local wave is not actually a physical wave, like a wave in a physical medium such as water. Rather, the electron's wave is a wave of probability. Where the probability wave has a large intensity, the electron has a high probability of being observed; where the wave has a small intensity, the electron has a low probability of being observed. When it is not observed, therefore, the electron exists as a wave of probability that represents a potential position, not an actual position. In addition, this probability wave does not exist in the ordinary three-dimensional space of our physical world. Rather, it exists in an abstract infinite-dimensional space described by complex numbers (i.e., numbers that involve the quantity  $i$ , which has the unusual property that  $i^2 = -1$ ). Whatever we might try to say about the nature of an unobserved electron, one thing is for certain: it cannot be understood as having any conventional kind of existence that can be described with simple physical or mathematical concepts. As Heisenberg explains,

*If one wants to give an accurate description of the elementary particle—and here the emphasis is on the word “accurate”—the only thing which can be written down as a description is a probability function. But then one sees that not even the quality of being...belongs to what is described.<sup>8</sup>*

These remarkable conclusions about the nature of elementary particles generalize to all forms of matter and

energy. We can perform all the above experiments with any subatomic particle. The results will be the same. Moreover, the position of a particle is not its only attribute that is empty of inherent existence. The particle's velocity, for example, is also empty of objective existence independent of observation. Only in relation to an observation does a subatomic particle have a definite attribute of position or velocity. The same conclusions apply to collections of subatomic particles, such as atoms and small molecules. Indeed, because quantum mechanics describes all matter and energy, we can generalize these conclusions to the entire physical world of objects. When millions and millions of atoms are clumped together into a speck of sand or some larger object, however, the strange interference effects are not usually noticeable. This does not mean, however, that the weird quantum reality is not there anymore. It just means that it is not noticeable anymore. The situation is analogous to the fact that the curvature of the earth is not noticeable in a small area of land. That we cannot observe the curvature in such a small area, however, does not mean that the earth has actually lost its roundness. As Heisenberg said,

*The statistical features of natural laws are ubiquitous and a matter of principle. It's just that these quantum-mechanical features are far more obvious in atomic structures than in the objects of daily experience.<sup>9</sup>*

So all matter is really this way. Even large objects of our ordinary experience do not have objectively existing properties unless and until they are observed. This is very startling. Or it *should* be very startling! As Niels Bohr once said,

*Those who are not shocked when they first come across quantum theory cannot possibly have understood it.<sup>10</sup>*

The physical reason the quantum nature of most objects is not noticeable is because of a phenomenon called decoherence. When one wave passes through two slits, the resulting two waves are coherently related to each other, resulting in the interference pattern. When millions and millions of particles are gathered together, though, there are so many of these waves interfering in so many ways that they appear on the macroscopic scale to average out, or decohere. This is analogous to how the curvature of the earth appears to disappear in a small area of land. The decoherence effect is the reason we can normally neglect the quantum nature of macroscopic objects, and treat them as if they had objective existence. Similarly, we can normally neglect the curvature of the earth, and treat it as if it were really flat.

It is important to remember that this decoherence effect does not change the underlying quantum reality. The quantum coherence is really still there—it is just hidden in the microscopic details and not noticeable on the macroscopic scale. Thus, because of this decoherence effect, the macroscopic world usually appears in a manner that is consistent with the materialistic idea of objectively existing matter.

Despite appearances, however, objects never depart from their true quantum nature, they never actually become the objectively existing objects that they appear to be, any more than the earth actually becomes flat even though it might appear that way. The apparent observation of an electron's actual position, in other words, results from our ignorance of its quantum coherence. When the quantum coherence is ignored, the electron appears as if it had an actual position. In reality, however, the electron does not have any actual position, just as the earth does not have any actual flatness when we ignore its curvature. We can only imagine that the position actually exists by ignoring the quantum coherence.

Thus, according to quantum physics, the attributes of physical objects are only imagined by us to have definite or actual existence. Or, as Sengtsan might say, they are empty of such existence. Just as the earth always is round, but appears with greater or lesser degrees of curvature, these objects always exist in a state of quantum coherence, appearing with greater or lesser degrees of decoherence. The electron in our double-slit experiment, for example, is very coherent when it remains unobserved. Thus, it does not have a definite position at one slit or the other. But when the electron's position is measured at one of the slits, its coherence becomes so difficult to detect that we can imagine the electron to have a definite position. Thus, in one sense, it appears as though we can precisely measure a position of the electron. Yet, in another sense, such a position never really can be shown to have definite existence.

This testimony of modern physics has striking resemblance to the testimony of the mystics. Consider, for example, the words of the Buddha:

*I teach the non-existence of things because they carry no signs of inherent self-nature. It is true that in one sense they are seen and discriminated by the senses as individualized objects; but in another sense, because of the absence of any characteristic marks of self-nature, they are not seen but are only imagined. In one sense they are graspable, but in another sense, they are not graspable.<sup>11</sup>*

Remarkably, both physics and mysticism teach us that the appearance of an objectively existing world independent of observation is an illusion. Moreover, they both say that even the observed world does not exist objectively with anything like the definiteness that we imagine. And this illusion of definite objective existence, they tell us, arises from our ignorance of the true nature of phenomena. Far from being incompatible with the testimony of the mystics, therefore, modern science seems to make many of the same claims as the great mystical traditions about the nature of phenomena.

Although modern physics is quite compatible with mysticism, this does not imply that the evidence of physics proves or validates the claims of mystics. While their claims

converge, the type of experience used by physicists and mystics to validate claims are significantly different. Whereas physics is fundamentally extrospective, mysticism is radically introspective—to the point of transcending the subject-object distinction altogether. The mystic’s non-dualistic Knowledge or Gnosis far transcends any knowledge derived from physics. Gnosis does not, and cannot, be demonstrated or proved using physics. Nevertheless, an understanding of the compatibility between modern physics and mysticism can provide the valuable service of helping to dispel the illusion of materialism, and reveal the Gnosis that is already our true nature. For, just as we falsely imagine the electron to have an actual position by ignoring its true nature, so we falsely imagine that we have actual ignorance by ignoring our true nature. So, by recognizing that our own ignorance is itself falsely imagined to be real, our true nature is clearly revealed.

❖ Tom, Spring 1999

1. Niels Bohr, *The Philosophical Writings of Niels Bohr*, Vol. I, (Woodbridge, Connecticut: Ox Bow, 1987), p.54.
2. *Challenge and Response*, (Eugene, Oregon: The Center for Sacred Sciences, 1992), p. 10.
3. Sengtsan, *hsin shin ming: verses on the faith-mind*, tr. Richard B. Clarke (Buffalo, New York: White Pine Press, 1984).
4. Werner Heisenberg, *Physics and Philosophy*, (New York: Harper and Row, 1962), p.145.
5. Dwight Goddard, ed. *A Buddhist Bible*, (Boston: Beacon Press, 1970), p. 313.
6. Heisenberg, p. 201.
7. Bohr, p. 1.
8. Heisenberg, p.70.
9. Werner Heisenberg, *Physics and Beyond*, (New York: Harper and Row, 1971), p.95.
10. Niels Bohr, as quoted in Heisenberg, *Physics and Beyond*, p. 206.
11. Goddard, p. 297.

## ***In Their Own Words***

*If we ask, for instance, whether the position of the electron remains the same, we must say 'no'; if we ask whether the position of the electron changes with time, we must say 'no'; if we ask whether the electron is at rest, we must say 'no'; if we ask whether it is in motion, we must say 'no.'*

— Robert Oppenheimer (physicist)

*I teach that the multitudinousness of objects have no reality in themselves but are only seen of the mind....In one sense they are graspable, but in another sense they are not graspable.*

— Lankavatara Sutra (Buddhist)

*And if we will see things truly, they are strangers to goodness, truth and everything that tolerates any distinction. They are intimates of the One that is bare of any kind of multiplicity and distinction.*

— Meister Eckhart (Christian)

*Another way to look at the context dependence of the attributes of quantum systems is to think of such systems as seamless wholes. In order to measure such a system, one is obliged to break that wholeness, to cut open the apple of knowledge, as it were. How we make the necessary cut determines, in part, how that system will appear to our eyes. But unobserved, the system has no cuts at all, and is, in a sense, indescribable by conventional means.*

— Nick Herbert (physicist)

*Brahman is without parts or attributes. It is subtle, absolute, taintless, one without a second. In Brahman there is no diversity whatsoever.*

— Shankara (Hindu)

*Only when it is cut are there names.*

— Lao Tzu (Taoist)

*These names [of opposites like higher and lower] do not proceed out of the nature of things but from the point of view of one who observes them part by part.*

— John Scotus Eriugena (Christian)

*Classes are created by imaginary boundaries drawn by definition around an ensemble of things which exhibit certain common properties. Under analysis, however, all 'things' turn out themselves to be classes (ensembles) of smaller things, ad infinitum. Therefore, things being themselves classes are also imaginary....The world is composed of classes which are imaginary or mere "ideas."*

— Carl Frederick von Weizsacker (physicist)

*The Cosmos is but a fantasy without any real existence, which is another meaning of the Imagination. That is to say, you imagine that it is something separate and self-sufficient, while in truth it is not so.*

— Ibn 'Arabi (Sufi)

*(continued on page 14)*

***In Their Own Words*** (continued from page 13)

*Man contains all worlds within him, as the holy Zohar and various Midrashim have taught.*

— Menahem Nahum (Hasidic master)

*The Way has never known boundaries; speech has no constancy. But because of [the recognition of a] “this,” there came to be boundaries.*

— Chung Tzu (Taoist)

*It was not possible to formulate the laws of quantum mechanics in a fully consistent way without reference to consciousness.*

— Eugene P. Wigner (physicist)

*All this sensible world is fashioned in man. No part of it is found, either corporeal or incorporeal, which does not subsist created in man, which does not perceive through him, which does not live through him, which is not incorporated in him.*

— John Scotus Eriugena (Christian)

*There is no contradiction....in assuming that all events 'have the essential nature of events in mind'....In this case a mental event or an 'I' would be no more an absolute than a material event or a thing.*

— Carl Frederich von Weizsacker (physicist)

*Separated from the mind there are not objects of senses, all conceptions of them arise in the mind and are developed and manifested by the false activities of the mind. Not one of them has any self substance of its own.*

— Awakening of Faith Sutra (Buddhist)

*In fact, what is called the world is only a thought.*

— Ramana Maharshi (Hindu)

*These mountains, these rivers, the whole world itself, together with sun, moon, and stars—not one of them exists outside your minds!*

— Huang Po (Zen Buddhist)

*For describing our mental activity, we require, on the one hand, an objectively given content to be placed in opposition to a perceiving subject, while, on the other hand, as is already implied in such an assertion, no sharp separation between object and subject can be maintained, since the perceiving subject also belongs to our mental content.*

— Neils Bohr

*What we have to learn is that the experiences we have through our imagination and those we have through our senses are actually the same! Both exist only for the particular mind experiencing them; they have no ultimate reality from their own side.*

— Lama Yeshe (Tibetan Buddhist)

*For the one who has distinctly seen [the difference between the ego-self and the True Self], questions about who one [really] is, cease.*

— Patanjalis (Hindu)

*All the Buddhas and all sentient beings are nothing but the One Mind, besides which nothing exists. This Mind, which is without beginning, is unborn and indestructible...It does not belong to the categories of things which exist or do not exist, nor can it be thought of in terms of new or old. It is neither long nor short, big or small, for it transcends all limits, measures, names, traces and comparisons.*

— Huang Po (Zen Buddhist)

*The illumined seers know Him as the uttermost reality, infinite, absolute, without parts—pure consciousness. In Him they find that knower, knowledge and known have become one.*

— Shankara (Hindu)

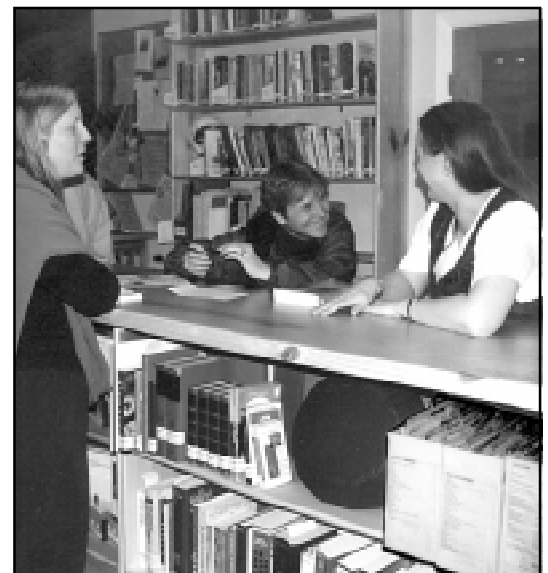
## Visit Our Web Site!

<http://www.integralscience.org/css>

The Center's web site includes:

- General information about the purpose, activities, and philosophy of the Center.
- Details about Joel's books and other Center publications.
- Some of the previous newsletters.

*Members enjoying the new library shelves.*





### CSS Library Hours:

**Tuesday evenings  
5:30 - 8:30 p.m.**

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Center members and librarian, Jennifer Knight, are enjoying our new digs. After a year of being literally pushed around, the library, remodeled and refurnished, has settled down again. That is, unless the members are present because, during library hours, we tend to keep things stirred up!

Jennifer explains that her vision in designing this new space had the following objectives: to hold the maximum number of books, to preserve the visual wholeness of the room, to disperse traffic patterns (which can get a little claustrophobic) and to achieve a social space. We'd say it works! Interviewed in March, Jennifer said that although the work area and storage spaces were not fully complete yet, it is a good space in which to work.

During the history of the library, the following people have made the physical space what it is and deserve our continuing appreciation: Brian Shephard, original book-cases; Gene Gibbs, original desktop; a t-section of shelves, David Capps; Michael Taylor, modification of shelves at the last house to enlarge the capacity. The most recent additions this winter are shelf structures (seen in the

photo), plexiglas covers for bottom shelves (to stop unmentionable interference by the cats) and drawer units to store the videos, all created by Scott Craig. Thank you all!

Finally, there are some new materials being stored in our library! First, CD's are now available. After much debate, assessment and planning, CD's have been added to the book, audio and video tape collections. Donations are enthusiastically encouraged. Next, Jennifer is maintaining a photo album of center people and events (including Joel's talks/events in other towns). She encourages contributions of photos from anyone who would like to share in the fun. Finally, a folder of short reviews of books is available in the library and has a dual purpose: a little clarification for people uncertain about which book to check out next, as well as a source of book reviews for possible future Library Corner publication. Another folder is being started specifically for the newsletter: articles, stories, memoirs, poetry, and jokes for possible inclusion in a future Center Voice. Publication is not guaranteed, but submissions to both folders are welcomed and appreciated. Check with Dawn about submitting items for either folder.

**In lieu of book reviews in this issue, we offer this brief list of relevant science books recommended by Joel and listed in order of accessibility.**

Gribbin, John. *In Search of Schrodinger's Cat: Quantum Physics and Reality*. Toronto and New York: Bantam Books, 1984. This is a general introduction to quantum physics.

Zukov, Gary. *The Dancing Wu Li Masters: an Overview of the New Physics*. Toronto and New York: Bantam Books, 1979. This is a general introduction to quantum physics.

Herbert, Nick. *Elemental Mind, Human Consciousness and the New Physics*. New York: Penguin Books, 1993. This is a survey of interpretations of quantum mechanics.

Wilbur, Ken. *Quantum Questions*. Boulder: Shambala, 1984. This is an accessible anthology of the

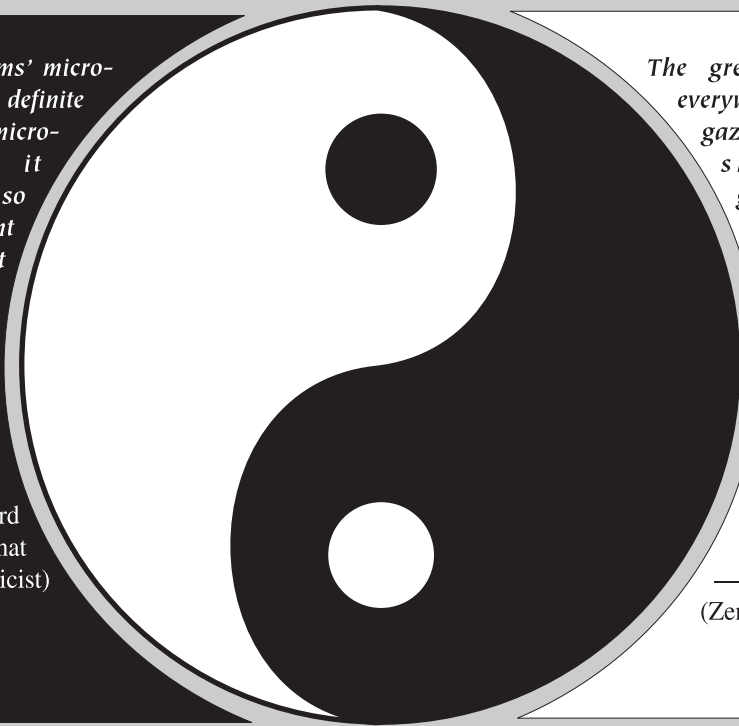
philosophical thoughts of the founders of quantum mechanics.

Heisenberg, Werner. *Physics and Philosophy*. New York: Harper and Row, 1958. The co-founder of quantum mechanics discusses how it has changed our view of reality.

D'Espagnat, Bernard. *Reality and the Physicist: Knowledge, Duration and the Quantum World*. Translated by J. C. Whitehouse. Cambridge and New York: Cambridge University Press, 1989. English. This physicist and philosopher gives a detailed exposition of quantum mechanics and analyzes problems it raises about the nature of reality. This book is one of the most challenging in our quantum section.

*If we call 'atoms' micro-objects, having definite properties, or micro-events, then it is we who, so to speak, paint the distinct atoms on the canvas of non-separable reality.*

— Bernard  
d'Espagnat  
(physicist)



*The green hills which everywhere meet your gaze and that void sky you see glistening above the earth —not a hairs-breadth of any of them exists outside the concepts you have formed for yourself!*

— Huang Po  
(Zen Buddhist)

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Sacred Sciences

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