

The Breath of God: Identifying Spiritual Energy

Victor J. Stenger

Emeritus Professor of Physics and Astronomy, University of Hawaii

Visiting Fellow in Philosophy, University of Colorado

vstenger@mindspring.com

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Abstract

If other forms of energy exist beyond those recognized by physics, these should still be detectable in controlled experiments by the observation of apparent violation of energy conservation. This includes the psychic energy associated with paranormal phenomena, the vital energies supposedly manipulated in alternative medicine, and even supernatural or spiritual energy. So far all the data are consistent with conservation of the known forms of energy. Furthermore, observations indicate that the total energy of the universe is zero, and so no outside energy was necessary to bring it about.

Material Models

Soon after subscribing to *Skeptical Inquirer* in the early 1980s, I was surprised to discover that much of what appeared on its pages was related to my own work as a high-energy particle physicist and astrophysicist. At that time I was heavily involved in the collaborative efforts being carried out on a grand scale to explore the fundamental nature of matter and the physical universe. The data gathered at large particle accelerators had just been successfully interpreted in terms of a new synthesis called the *standard model*. In this model, which remains today fully consistent with all observations, matter is composed of *quarks* and *leptons* that interact locally with one another by the exchange of other particles called *gauge bosons*.

The atomic nucleus was found to consist of *up* and *down* quarks, the lightest of three generations of quark pairs. The electron that swirls about the nucleus proved to be the lightest of three electrically charged leptons. The photon, the particle of light, turned out to be just one of a set of twelve gauge bosons.¹

No one believes that this model will be the final one. For one, it does not include gravity, which remains well described by Einstein's 1916 theory of general relativity. Physicists still seek a fully unified picture in what they hope will be the final synthesis, the "theory of everything," although I am personally holding off my bets. The current most promising approach is *m-theory*, in which the fundamental objects are *m-dimensional m-branes*.² A particle is a 0-brane, a string a 1-brane, and so on. A politician is a p-brane. Whatever the dimensionality, the approach remains one in which localized, discrete bits of matter form the primary elements of nature.

Combining the results from nuclear and particle physics with a great variety of astronomical observations, cosmologists have begun to draw a comprehensive picture, at least in broad terms, of the evolution and structure of the universe. The big bang,

now well established by ever-improving agreement between theory and observation, has been enhanced by the *inflationary model* that offers plausible solutions for most of the remaining problems of the original theory.³ Inflation is also strongly supported by the data, but will be severely tested in the next year or two as accurate new measurements are made on the structure of the cosmic microwave background. Recent observations on distant supernovae indicate that the expansion of the universe is accelerating under the action of some yet-unidentified “dark energy,” that constitutes the bulk, over two-thirds, of the mass-energy of the universe.⁴

As a result of all this progress over the recent decades, we can now safely say that the wide range of observations of thousands of scientists worldwide, with the best instrumentation modern technology can provide, reveal a universe that contains matter and nothing more. No data or theories currently require the introduction of either supernatural forces or immaterial substances.

Something More?

Many supernatural and paranormal claims do not fit within this new synthesis of physics and cosmology. They assert something more, that the universe contains other ingredients beyond the known particles and forces in physics. By itself, of course, this does not imply a contradiction. Perhaps these nonnatural effects are so tiny as to be very difficult to detect. Or, perhaps the detectors of physics and astronomy are not suitable for these phenomena, just as a telescope cannot be used to see bacteria.

Indeed, the observations reported by parapsychologists are not made with high-tech instruments. Rather they are based on unusual human experiences, reported as anecdotes, or simple experiments that can be done on the dining table in your own home. Even the experiments conducted in the handful of university parapsychology laboratories are crude by the standards of the conventional science being done on the same campuses.

To be found so easily and cheaply, paranormal forces, if they exist, must exert powerful control over normal matter. If paranormal claims are valid, then the picture of the universe that is rapidly evolving in all the major physics laboratories and astronomical observatories around the world is wrong or at best grossly incomplete.

The common thread I see running through most of paranormal claims is the hypothesis that the universe contains a nonmaterial component that plays a significant role in the lives of humans--possibly providing the animating source for life and consciousness.⁵ This substance is often identified as some form of force or energy not presently registered in the scientific inventory.

Although infrequently described so explicitly, mind-over-matter and mind-to-mind communication can be thought of as resulting from the flow of “psychic energy.” Perhaps the stars control our lives by means of the transmission of “cosmic energy.” Acupuncture, therapeutic touch, and other complementary healing techniques work by bringing the body’s “vital energy” into better balance.⁶ Similarly, trivial electromagnetic phenomena, such as infrared “auras” and Kirlian photography⁷ are

promoted as evidence for a human “energy field.” Energy seems to be a unifying concept among many paranormal claims.

Energy and Spirit

The English word *energy* comes from the Greek *energeia* for activity. Webster gives 1599 as the earliest date for its use, but energy did not play an identifiable role in physics until 1847. At that time, Helmholtz introduced the law of *conservation of energy*, also known as the *first law of thermodynamics*, which has proven to be one of the most powerful principles of physics.

Most people presume that life and consciousness require some activating agent beyond cold, impersonal matter. I suppose it would be consistent with the root of the term to call this a kind of energy. However, what is being proposed by paranormalists appears to be little different from the traditional notions of “spirit or “soul.” This strikes me as yet another example of an old idea being given a new, scientific-sounding name to make it sound like something new and give it modern authority.

The term “spirit” also has a classical root, deriving from the Latin *spiritus* for breath. Breath was associated with “soul,” the source of life, in many ancient cultures, including the Hebrew. In Genesis, God breathes life into Adam. Modern supernaturalists seem to be saying that they can feel the “breath of God” upon their cheeks.

Although many skeptics prefer not to bring religion into the discussions of paranormal claims, a connection between religion and the paranormal is impossible to avoid because of the connection with the supernatural, either direct or implied. No matter how much the editors of skeptical publications may wish to avoid offending potential subscribers, science and religion are two “magesteria” that cannot help but overlap when discussing paranormal claims.

The paranormal concepts of psychic, cosmic, and vital energies arise out of traditional religious beliefs, usually referred to as “deeply held.” To challenge paranormal claims is to challenge religious beliefs, perhaps the very existence of soul.⁸

Indeed, many of the original paranormal researchers, such as Oliver Lodge, William Crookes, and Joseph Banks Rhine, seem to have had strong religious motivations for their efforts to demonstrate the reality of psychic phenomena.⁹ I suspect many of the current investigators have similar motivations and that much of their mostly private funding is donated in the hope of “proving” religious beliefs. The religious overtones of astrology, UFOlogy, alien abductions, and much of alternative medicine are also evident.

If the existence of ESP could be shown, then this would be interpreted by many as evidence for the long-sought spiritual element to the universe. Although natural explanations would still have to be ruled out, these are not very likely to be found based on what we already know about the physical universe. Psychic energy is not part

of the current standard model and no conceivable extension makes any room for it. And, as I have written about extensively, quantum mechanics also offers no refuge for mystical beliefs.¹⁰ But, none of this means we might not find psychic energy if we look in the right place.

Before we start a search, we need to identify some of the properties of the object we are seeking. If what we are looking for is a form of energy, then it should have the properties of energy. So, what are the characteristics of other forms of energy that have been identified in physics?

Until the end of the eighteenth century, heat was regarded as physical substance, *caloric*, that flowed in and out of bodies. However, this substance was not, to my knowledge, ever directly equated with energy. The connection between heat and energy came about when Thompson and Joule refuted the caloric model by showing that heat was associated with *kinetic energy*, that is, motional energy.

Another generic form of energy is *potential energy*. This is the energy a body may have stored that can be later converted into other forms. Thus the gravitational potential energy of a falling body is converted to kinetic as the falls closer to earth. Electrical potential energy is converted to light and sound in a lightning discharge, each of the latter being forms of kinetic energy.

These examples illustrate an important point. Classical physics never regarded energy as a substance of some kind, but rather as a measure of motion or capacity for motion; this is consistent with its root meaning of “activity.” Even when Einstein showed that energy and mass were related by $E = mc^2$, this did not mean that energy was now to be regarded as a material substance. Rather, matter was understood as containing within its *rest mass* m a certain stored capacity mc^2 for inducing motion. For example, in chemical and nuclear explosions, rest energy is converted to kinetic energy.

Physicists often use words loosely; their equations and symbols encompass the facts anyway, so they see no need to act like philosophers about the precise meanings of words. This, unfortunately, is a major source of the serious lay misinterpretations of physics that are exploited by merchants of paranormal wares.

In the case of energy, physicists tend to talk as if were some kind of physical essence that, for example, is radiated away from a heated body or a light source. Actually, in this case material particles are radiated: photons that carry in their kinetic energy a capacity for inducing motion in other material bodies. For example, light falling on a roof will increase the molecular motion in the house, warming it up. Energy is conserved as it moves from photon kinetic energy to molecular kinetic energy.

If you wonder whether light should properly be termed “matter,” note that it has the identifying properties of matter: inertia and gravitation.

Parenthetically, modern relativistic physics can be formulated without ever introducing the term “energy.” All the properties of energy can be incorporated in

inertial mass, as defined by Newton's laws of motion. Kinetic energy is equivalent to the difference between inertial and rest mass. That is, it can be viewed as the additional mass a body has when it is moving. However, physicists have chosen to break with Newton's original inertial definition and reserve the term mass for rest mass, the mass measured when a body is at rest. This is arbitrary and has unfortunately resulted in the common confusion that energy is a property that is somehow independent of matter.

The Signature of Energy

The crucial significance of the concept of energy in physics rests on the fact that it is conserved. Until Helmholtz discovered the principle of conservation of energy, physics had no use for the term. The concept of energy is intimately bound to the concept of energy conservation. If forms of energy beyond those already familiar to physics exist, these must be added to the energy conservation equation. If they are not part of the equation, then perhaps they should be called something other than "energy" so as not to confuse them with energy as used in physics. (I doubt we can talk physicists into dropping the use of the term, unnecessary though it may be to their theories).

Radiated energy will spread out over an ever-increasing area as it moves away from its source. If the source sends its energy uniformly in all directions, the energy intensity (energy per unit area) will fall off as the square of the distance from the source. Beaming can also occur, where the fall off with distance is much slower. However such a beam then has to be carefully aimed to hit its target and even then some spreading occurs that eventually reduces the intensity at some distance.

When Einstein was told about Rhine's work on ESP at Duke, the famous physicist said he would not believe it until the effect was shown to fall off with distance. This prompted Rhine to carry out a series of ESP experiments in the 1930s in which the distance between sender and percipient was varied. The anticipated "distance effect" was not seen; in fact, no convincing effect was seen at any distance.¹¹ Rhine concluded that psychic phenomena were not bound by energy conservation. Perhaps ESP was supernatural. The more economical explanation that the phenomenon did not exist apparently never occurred to him.

Actually, contemporary parapsychologists have come up with a less mystical rationalization for the missing distance effect in ESP: information that is encoded in radio signals does not decrease as you get farther from the source. They suggest that the ESP signal should analogously show no distance effect.

The analogy is strained. The energy intensity of radio propagation still decreases with distance, and the signal goes away at some point when it becomes indistinguishable from background noise. In any case, I think Einstein's point was that *had* a distance effect been seen, that would have been pretty good evidence for the reality of psychic energy. And, it still would be, because this is a signature property of energy.

Energy conservation, or a distance effect, is also not found in astrology. There what matters are the alignments of heavenly bodies irrespective of distance. Even if

astrology's "cosmic energy" is not associated with gravity, and so not dependent on the mass of the body, we should expect a reciprocal square dependence in the ratio of the effects of two planets or stars. For example, Mars would have over six hundred times the effect of Saturn and billions of times the effect of any star.

Again, the point that I am trying to make here is not that the absence of a distance effect disproves the existence of paranormal phenomena. Rather, the observation of a distance effect would provide an indication of the presence of some form of energy that would be strong evidence *for* the paranormal. This essay is meant to be positive; I am looking for a way to discover psychic or spiritual energy that would be convincing to a skeptical physicist. Solid, scientific evidence for the apparent violation of energy conservation would be a sign of some previously unknown form of energy, within our universe or without.

For example, consider a body at rest and completely isolated from all known sources of energy. Suddenly it is observed to start moving. Such an observation would indicate an apparent violation of energy conservation. A moving body has kinetic energy, but the original energy was zero. If this happens when someone casts his thoughts in the direction of the body, and conventional explanations (like trickery) can be ruled out, then this would be evidence for psychic energy converting into kinetic energy.

As we have seen, the term energy is frequently used in paranormal theories as equivalent to the ancient notion of soul or spirit as the motivating element of life. The notion of conservation of energy can still be maintained in these theological terms. The breath of God, which we suppose carries the motivating energy, simply comes from outside the universe. This is no more difficult to conceive than a child propelling a boat in the bathtub by blowing on its sail. God's breath could have provided the energy for the parting of the Red Sea for Moses.

Unfortunately, we have only anecdotal evidence for these kinds of observations. None are scientifically documented. Indeed, paranormal phenomena seem to become neutralized in the presence of knowledgeable and especially skeptical observers. If such events could be captured on sophisticated instruments in properly controlled experiments, then we would have to take them seriously.

Let me give another example. Suppose the Virgin Mary were to appear for a minute in an open field in the presence of nonbeliever scientists. Magicians James Randi and Joe Nickell are also present to detect any trickery. Instruments record the event so it cannot be attributed to a collective hallucination.

The lady steps on a scale and is found to weigh 50 kilograms. This corresponds to a rest energy of 4.4×10^{18} Joules. The scientists and magicians can find no source of energy anywhere near this amount. The Heisenberg uncertainty principle allows a certain quantum fluctuation of energy over a one minute period, but this is only 5.5×10^{-36} Joules. So this can't account for the energy observed. Most of those present would likely conclude that they witnessed a miracle.

While this example would make many of us believers, the simple observation of the violation of energy conservation in, say, a particle physics experiment, would not lead us to immediate conversion. Perhaps the energy came from another universe, or another dimension, a possibility that has been recently proposed. Or, we may just be missing something purely material. For example, when nuclear beta-decay was first observed in the early twentieth century, energy did not seem to be conserved. It was later discovered that a previously unknown particle, the neutrino, was carrying away the missing energy. Such natural explanations would still have to be ruled out. I did not say that detecting spiritual energy would be easy!

Criteria

From my reading of the literature of parapsychology, I conclude that psychic energy has not yet been conclusively detected in any experiments or observations. In the history of paranormal studies, going back over a century now, one can find at any given time one or two experiments that proponents claim are solid evidence for psi. Typically these fade away and are replaced by new claims. Today, remote viewing and random-number generator experiments are fashionable. While proponents insist the evidence is strong, it does not convince most scientists. Here again is where particle physics comes in to account for my personal skepticism.

For forty years I was involved in a field where extraordinary new discoveries were being made regularly, often several a year. I personally played a small role in some of these, including most recently the evidence for neutrino mass found in Japan in 1998. Colleagues of mine were involved in the first observation of the top quark a few years earlier. In these cases and many others, the physics journals did not permit publication until a certain threshold of statistical significance was passed, along with other stringent criteria.

The statistical criterion for publication of a new phenomenon in physics demands that if you were to repeat the experiment ten thousand times, the observed effect, or something greater, would not occur more than once on average as a random artifact. This must be demonstrated quantitatively, which today requires extensive calibrations of the detectors and elaborate computer programs that simulate all conceivable backgrounds.

Some psi proponents have argued that the criteria that should be applied in parapsychology are those of psychology or medicine, not physics. In these fields, the statistical threshold has been traditionally $1/20$ rather than $1/10000$. This low standard is justified in two ways: First, $1/10000$ is impossible to achieve in most cases; second, the primary goal of psychology and medicine is to help people. Making extraordinary new discoveries is a secondary goal.

While these justifications have merit, the fact remains that $1/20$ is a rather loose criterion, far too loose even for the purposes stated. The implication is that up to one in twenty results published in medical and psychological journals could be a statistical artifact. In fact, given the propensity of investigators to not publish negative results, the

number could be even greater. No wonder the public is often confused by news reports of studies that say one thing, only to be contradicted by studies that say the opposite. Many of the studies should not have been published in the first place.

In any event, authors cannot reasonably claim that they have demonstrated the existence of psychic, vital, or spiritual energy when the statistical significance is at the ridiculously low 1/20 level. The demonstration of any extraordinary phenomenon demands extraordinary criteria. I can guarantee that psi will not be accepted into the consensus of science until it is demonstrated with much greater significance and independently replicated, in quantitative detail, to at least the same level of significance.

Throughout the Cosmos

Given the great difficulty of designing foolproof, and cheatproof, experiments involving people, I have grave doubts that this level of significance will ever be achieved by this approach. But why should we rely on human experiments? If humanity never evolved, or if the earth were destroyed tomorrow by a cosmic cataclysm, neutrinos and quarks would still exist. Similarly, if spiritual energy exists, it should not matter whether or not humanity does. The breath of God should be detectable throughout the cosmos, not just on earth.

As I have already remarked, those instruments that explore the cosmos have not yet revealed any mysterious sources of energy that might even remotely be considered supernatural. Although the nature of the dark energy is still uncertain, such a component to the universe is allowed by existing theories and remains in the physical realm. The processes observed at the greatest distances from earth, and deep into the past, still exhibit energy conservation.

This undisputed fact has led many theists to look to the origin of the universe as evidence for an external source of energy that could be associated with a creator God. Surely, the argument goes, energy had to be pumped into the universe at the beginning. Else, where did all the current matter and energy come from?

Well, it turns out that as best as we can tell from observations, the total energy of the universe is zero, within allowed quantum fluctuations. The positive kinetic and rest energy of all the matter in the universe seems to be exactly balanced by the negative gravitational potential energy of that matter.

This observation is equivalent to the one you will read in articles about cosmology that the universe on the average is *flat*. That is, although an arbitrary curvature of spacetime is allowed by Einstein's equations of general relativity, the overall curvature that seems to exist in fact is zero. The energy of a flat, empty spacetime is zero, give or take the tiny zero point energy expected by quantum mechanics.

A flat universe is predicted, indeed required, by the inflationary big bang cosmological model. In this model, the universe underwent a rapid exponential expansion during its first moments that stretched out its original curvature, whatever it

was, to zero. The observation of a nonflat average geometry to the universe would doom inflation, and perhaps also open up room for a creator.

Recently, a brief interim occurred in which inflation seemed to be in deep trouble. Observations indicated that the matter of the universe, including the yet-unidentified *dark matter*, could provide no more than about 30 percent of the mass needed to give a flat universe. But then, in two independent investigations on supernova in distant galaxies, the remarkable, unanticipated discovery was made that expansion of the universe is accelerating.¹² Some additional component to the universe, which I have previously mentioned--the dark energy (or "quintessence"), is producing a negative pressure that is pushing the galaxies apart. Furthermore, the amount of this dark energy seems to be just what is needed to give a flat universe. Thus, the energy conservation equation is once again in balance, with only a slight quantum fluctuation away from zero energy, allowed by natural processes, needed to produce the universe as we know it.

Conclusions

The great majority of humanity believes in the existence of forms of energy beyond those currently recognized by physics. In this essay I have tried to indicate how these might be detected to the satisfaction of the scientific community. Energy conservation is one of the great principles of physics. The observation of an apparent violation of energy conservation in a carefully controlled experiment would imply the existence of another form of energy. The source of this energy could be within our universe, in the form of "psychic" or "vital" energy, or some source of energy from outside the universe.

I do not hold out much hope for these energies to be found in experiments involving humans with the significance required for such an extraordinary discovery. Such experiments are too hard to control, too easily contaminated by psychological factors or trickery. However, if the phenomena exist, they should be evident elsewhere, on earth and in the cosmos.

The observation of an apparent violation of energy conservation at a particle accelerator or astronomical telescope would not constitute immediate evidence for the supernatural. Obviously, natural explanations would have to be sought and ruled out. In any case, the discovery would be remarkable.

One obvious place to look for a violation of energy conservation is in the energy balance of the universe as a whole. For many years it seemed that the universe contained too little matter for negative gravitational potential energy to cancel the positive kinetic energy in the motions of galaxies. The universe seemed to have positive energy that would have had to be inserted from the outside at sometime in its history. However, increasingly precise observations have indicated that invisible components of matter exist, dark matter and dark energy, that provide an exact balance between positive kinetic and negative potential energy. Thus the total energy of the universe appears to be zero and no input of energy from outside, either natural or supernatural, seems to have been needed to bring the universe into being.

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