Qi = mc^2?

Victor J. Stenger

For "Reality Check" in *Skeptical Briefs*, June 2005.

My contribution to this column seven years ago this month was called "The Energy Fields of Life."[1] I described how the ancient belief in a unique life force remains widespread today, despite the fact that science has found no indication of a special ingredient in nature that distinguishes the living from nonliving.

In Western religions, the life force is widely associated with the soul, which is now generally taken to be a substance separate from matter—although this was not always the case. The life force invoked in alternative medicine is more akin to that found in Eastern traditions, what the Chinese call *qi,* or *ch'i*. Practitioners claim that they are dealing with a natural phenomenon, although they view it as holistic and not reducible to purely material particles. In classical Chinese literature, qi is described as the cosmic creative energy and primordial force of the universe. Nothing supernatural is required. If a qi-master exhibits what appears to be superhuman strength, it is not because he is a miracle worker but because he is able to focus qi-energy on the task being performed.

A similarity can be seen between the ideas of qi and psi, the "psychic energy" sought in Western parapsychology. In the 1930s, Einstein said he had an open mind about the results on ESP being reported by J.B. Rhine at Duke University, but would not believe it until he saw a fall off with distance. If psychic energy was truly energy, then it should spread out as it radiates, lowering in intensity as you get farther from the source. This is a

consequence of energy conservation. For example, if the radiation is uniform in some solid angle, then the intensity should fall off as the square of the distance to the source.

Rhine proceeded to conduct a series of experiments in which he attempted to measure ESP at various distances. While he reported positive effects, the hoped-for distance effect was not observed.[2] Presumably Einstein remained unconvinced.

I remembered this when I was sent a recent paper claiming physical manifestations of qi, measured in a supposedly controlled scientific experiment using modern radiation detectors and other devices.[3] The reported experiments were performed during several public healing "lectures" by qi-master and healer Dr. Xin Yan in Beijing in 1987. Positive signals above background levels were reported in radiation dosimeters, as well as changes in Raman spectrum in aqueous solutions and alterations in the half-life of ^{241}Am. Both the background levels and signals were quite high.

The paper was not published until 2002 and makes no mention made of any successful (or unsuccessful) attempts at replication during the intervening years. The results are difficult to evaluate from the data presented. Furthermore, no error estimates are given, which would be sufficient cause to deny publication in any reputable physics journal.

Nevertheless, the data presented are sufficient in the case of one experiment to draw some conclusions. In this experiment, Dr. Xin Yan "emitted qi" during an 11-hour (!) lecture. Thermoluminescence dosimeters (TLDs) of the type commonly used in nuclear laboratories to measure radiation exposure were placed throughout the auditorium. Doses significantly above background were reported from different directions, indicating that the supposed qi-rays were unfocussed. Although some of the other experiments contained

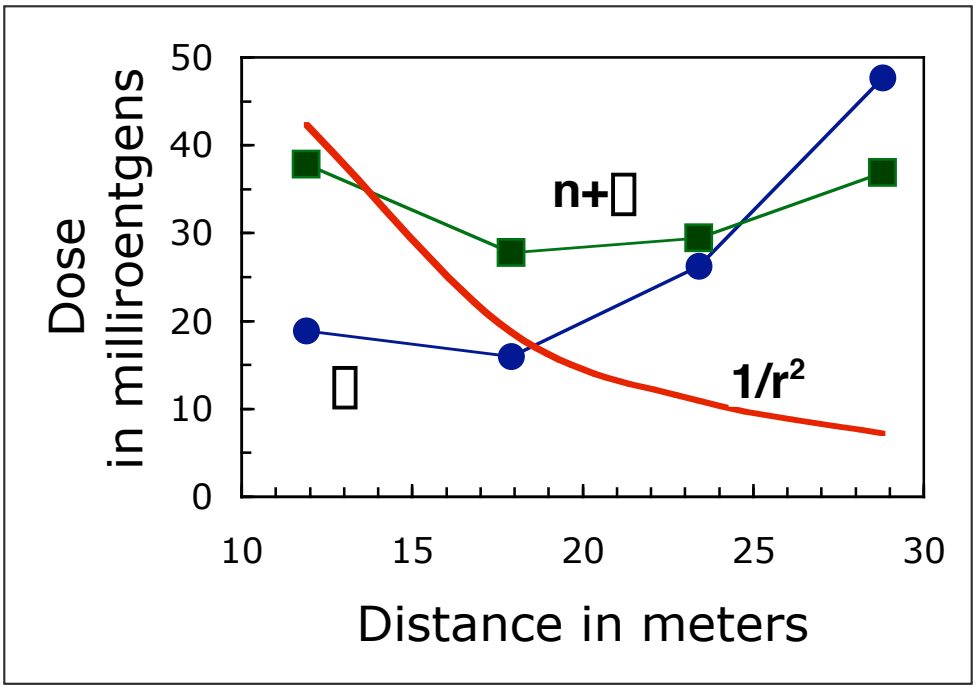
controls, no measurements taken under identical conditions with the qi-master absent are reported for the distance study.

In the graph below, I have plotted the reported dosages measured by two types of TLDs as a function of distance from the podium. One type [^{7}LiF(Mg,Ti)] is sensitive to gamma rays while the other type [^{6}LiF(Mg, Ti)] is sensitive to thermal neutrons as well as gamma rays. I averaged over the two sides of the auditorium. The squares and circles show the measured data in milliroentgens (mR) accumulated over the 11-hour experiment. For gamma rays, one milliroentgens is approximately equivalent to one millirem (mrem), the unit used to measure biologically significant exposure. If the numbers are accurate, they represent an intensity that would exceed the generally considered safe dosage if experienced steadily for a year, 5000 mrem. That is, the recorded radiation intensity was appreciable. At the same time, the dosimeters used are designed for measuring long-term accumulated exposure with about a 10 mR detection limit. They were not particularly suitable for the short-term exposures used here and more precise instruments for measuring radiation intensities are available. If we put 10 mR error bars on the data points, we would see they are insignificant.

The authors claim numerous reports of beneficial health effects from the audience, although they present no data on this. Since gamma rays and neutrons are not noted for their positive health consequences unless directed at tumors, the authors conclude, "It is highly unlikely that the qi field generated by Dr. Yan contains actual gamma rays and neutrons. Rather the TLD readings seem to be a phenomenological description of the interactions between a TLD detector and Dr. Yan's qi field." They offer no theoretical model for the phenomenon.

Independent of the significance of the dosage level, we see that the "gamma-ray" data actually increase with distance, while the "neutron-plus-gamma" data show no significant distance effect. (Perhaps there was a gamma ray source in the back of the auditorium.) The smooth curve shows the fall-off with the square of distance that would be expected from energy conservation (arbitrary scale).

If you were to ask me, "What is the defining property of energy?" I would answer the fact that it is conserved. If energy were not conserved, the quantity would be of little use in physics. When one measures a quantity that is not conserved under conditions when it should be, then that can be taken as good evidence that what is being observed is not some form of energy. This is the same conclusion that was drawn from the Rhine ESP distance series of experiments. Neither qi nor psi looks like energy. Indeed, they look nonexistent.



Vic Stenger's next book, *Where Do The Laws Of Physics Come From?* is with the publisher. His website is http://www.colorado.edu/philosophy/vstenger/.

References

[1] Stenger, Victor J., "The Energy Fields of Life," *Skeptical Briefs* Vol, 8, No. 2 (June 1998), online at http://www.csicop.org/sb/9806/reality-check.html (accessed March 22, 2005).

[2] Stenger, Victor J., *Physics and Psychics: The Search for a World Beyond the Senses* (Amherst, NY: Prometheus Books, 1990), pp. 168-69.

[3] Xin Yan et al., "Certain Physical Manifestation and Effects of External Qi of Yan Xin Life Science Technology," *Journal of Scientific Exploration* 16, No. 3 (2002): 381-411.