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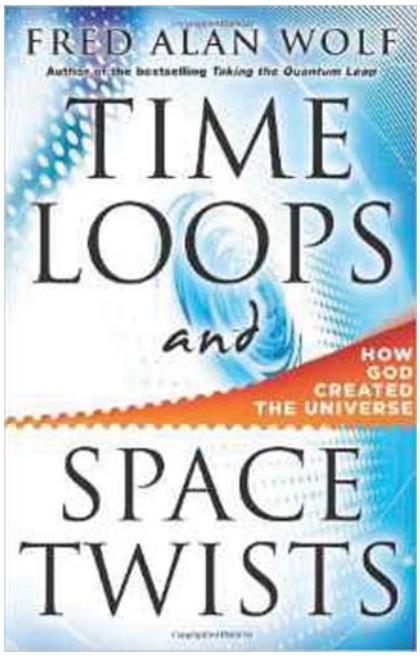
BOOK REVIEW

Time Loops and Space Twists: How God Created the Universe by Fred Alan Wolf. Hierophant Publishing, 2013 (hardcover 2010), xii + 286 pp. $18.95. ISBN 978-1938289002.

Reading this book, I could not help comparing it with another covering some of the same ground, which I had read recently, namely, *A Universe from Nothing: Why There Is Something Rather than Nothing* by Lawrence M. Krauss (2012). Each author has an agenda. Krauss wishes to persuade us that the universe will arise from nothing quite naturally, without any need for a Divine Creator, while Wolf wishes to persuade us that consciousness determines reality and that the very same phenomena that led Krauss to atheism actually provide evidence for the existence of a Divine mind at the heart of everything. Each author attempts the difficult task of explaining quantum-field theory in non-technical terms in order to bolster his case, but they draw diametrically opposed conclusions from the physical data. In my opinion, Krauss' argument fails because it is circular, but his book is not under review here and I shall not go into details. Wolf is more subtle and low-key in his presentation. Despite the subtitle, and apart from some tantalizing references to the Vedic scriptures and a few scattered mentions in the body of the book, God does not make an appearance until the last chapter. There, Wolf presents us with his own personal interpretations, but he makes no claim to have provided a scientific proof of the existence of God and freely acknowledges that many of his colleagues will disagree with him.

Wolf takes us on a journey through special relativity and quantum field theory, promising to use no more mathematics than readers will have learned in high school. He keeps the promise, although I am not sure how successfully he gets his message across. Mathematical symbolism, after all, is only a kind of shorthand, although a long and rigorous training is required to understand it. In my student days I was familiar with partial differential equations and even enjoyed working with them, but any abilities to do so that I may have had have atrophied from lack of use—they have not been required in the areas of science in which I have worked. So I am not much better off than Wolf's intended readers when I try to understand quantum field theory, although I do have some appreciation of the difficulties of the task he has set himself.



The shorthand of mathematics is succinct, and many words are needed to explain equations that look simple. Wolf's literary style, on the other hand, tends to the repetitious and he supplements it with many diagrams—so many, in fact, that one is often reading the text on one page that explains a diagram on another, which does not make for easy comprehension. Although the diagrams themselves are often helpful and sometimes amusing, the general impression is analogous to that created by a PowerPoint presentation in which the lecturer has too many slides. The early diagrams are concerned with explaining special relativity and are very similar to ones that I find simpler and easier to follow presented by Eddington (1928) in his book *The Nature of the Physical World*. I also have reservations about the use of the terms "space-vibes" and "time-vibes." The latter term is simply a synonym for frequency and is proportional to energy; the former is related to wave-number and proportional to momentum. The concepts of energy and momentum are common enough, even if many readers will not fully understand the precise sense in which those terms are used in physics, and I do not see what is gained by introducing trendy phrases in their place.

From special relativity, Wolf proceeds to the behavior of the fundamental particles that clearly are his main interest. He introduces us to *tachyons*, particles moving faster than light, which is the same as moving backward in time. A positively charged particle moving forward in time with positive energy is the same as a negatively charged particle moving backward in time with negative energy. It is important to remember here that Wolf is talking about *kinetic energy* although he does not always make this clear. In our everyday macroscopic world, kinetic energy can only be positive, since it is proportional to the square of a body's velocity. *Potential energy* or *gravitational energy*, on the other hand, is conventionally considered to be negative. Non-specialist readers who venture to read both Wolf's book and Krauss' may be confused here, since Krauss makes much of the fact that the

total gravitational energy in the universe exactly balances its kinetic energy. After his long treatment of tachyons, Wolf mentions that some physicists, including Richard Feynman, prefer to speak of *virtual particles*, but that he prefers to think in terms of tachyons. Krauss uses the virtual-particle formalism and I find his discussion the easier to follow at this point.

The above critical remarks are, however, of only minor significance. The last chapter of the book is probably the most important one. Wolf emphasizes the role of mind or consciousness in quantum physics, which is surely familiar to most readers of this *Journal*. The traditional objectivity of science which separates the observer and the observed does not apply at the level of sub-atomic particles where the act of observation appears to affect what is being measured. This has been brought out, for example, by Paul Davies (2008) in *The Goldilocks Enigma* where he discusses the famous two-slit experiment. It is possible to modify that experiment to determine whether a given photon has behaved as a wave or a particle. A slightly different setup is needed for each of those possibilities and the experimenter can delay the choice of setup until after the photon has passed through the slits. Yet, whichever setup is chosen, the photon will obligingly display the appropriate behavior. Consciousness plays a role in determining reality! Wolf goes on to suggest that mind does not reside in the brain but that there is, rather, a "mind-field" permeating the physical universe. Tentatively, he identifies this field with the Higgs field (he was writing before the claimed discovery of the Higgs boson) which, he further suggests, could be identified with the mind of God. That would certainly guarantee God's omnipresence and possibly explain both His omniscience and omnipotence!

Although Wolf is clearly conversant with the Hebrew Bible in its original language and also quotes the *Qabala* (his preferred spelling), his conception of God appears to be different from that found in the Abrahamic religions. Indeed, as I have already hinted, he is also clearly influenced by some aspects of Hinduism. It is at this point that Wolf stresses that he is offering a personal opinion and does not try to tell us that we must inevitably come to his point of view—and his honesty on this account is much to be applauded. He admits that many of his colleagues will disagree with him, and he must know that some of them will dismiss his ideas as "mysticism" in the pejorative and incorrect sense in which that word is often used. Indeed, Wolf's ideas have much in common with the correct sense of the word "mysticism."

I like Wolf's suggestion because it gives the lie to those who try to persuade us that quantum theory inevitably leads us to a godless universe, but I have some hesitations about embracing it fully. Newton wrote of space as the "sensorium of God" and was criticized for it in his own lifetime.

Nowadays, probably only a few historians of science remember the remark. More importantly, I recall a sentence from the penultimate paragraph of Eddington's book (1928) cited earlier:

> The religious reader may well be content that I have not offered him a God revealed by the quantum theory, and therefore liable to be swept away in the next scientific revolution.

Quantum theory, of course, has developed far beyond the stage known to Eddington, but he saw a danger that is still present. Cosmologists and theoretical physicists alike (they are often the same people) seem confident that they have approached a final understanding of the natural world; that a "theory of everything" will soon be discovered. I believe this confidence to be misplaced. Both scientific cosmology and quantum theory are approximately a century old and that seems hardly enough time to unravel mysteries that have been with us since the first human beings began to think. To tie our notions of God even to the Higgs field may be too limiting and is, perhaps, a form of that idolatry against which the Hebrew prophets railed so stridently.

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