

## BOOK REVIEWS

**How the Hippies Saved Physics: Science, Counterculture, and the Quantum Revival** by David Kaiser. W. W. Norton, 2011. 372 pp. \$26.95. ISBN 9780393076363.

Kaiser's thesis is that quantum information science, which is beginning to have application to subjects such as cryptography, came into existence only as a result of the activities of a counterculture movement, or "hippies." The curiously ambiguous nature of the connection between the mathematics of quantum theory, and reality as observed, had led the founders of the theory to an interest in deeper issues, but the budget cuts of the Cold War period led to a more exclusive focus on practical aspects, as epitomized in the instruction "shut up and calculate!" Dissatisfied with this restriction in what one was supposed to spend one's time thinking about, a group of people centered on the Berkeley campus of the University of California got together to form the "Fundamental Fysics Group."

Much of the attention of this group focused on the non-locality demonstrated by the work of J. S. Bell, work that appeared to demonstrate that any picture of what is going on cannot be a local one, that is to say that connections at a distance must be involved. Might these connections produce observable effects: could they explain paranormal phenomena? It was far from clear that this would be so; indeed quantum mechanics appeared to show that such influences as there might be would not act as a signal. Freedom to speculate was supported financially by organizations such as the CIA, no doubt interested in intelligence applications, and the "New Age" Esalen Institute.

The group never clearly showed links between physics and paranormal phenomena, but its work did lead to experiments to test for non-locality. These experiments, rather disappointingly, confirmed the existence of non-locality, while also confirming the predictions of quantum mechanics and thereby the impossibility of using that non-locality to transmit information at a distance.

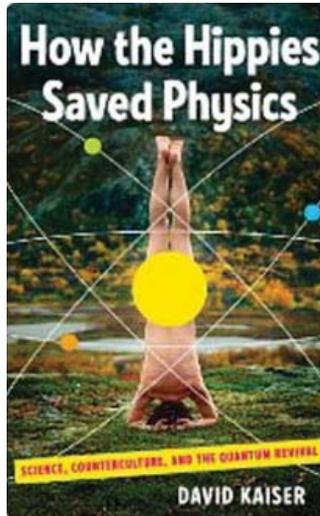
The group was able to get publicity for its ideas in various ways, despite the fact that *Physical Review* had responded to the submission of such views by banning papers on the interpretation of quantum mechanics. These connections included books such as Fritjof Capra's *The Tao of Physics*.

There was also interest in some quarters in paranormal phenomena and their possible applications.

While paranormal issues were not taken up by mainstream science, the fact that experiment confirmed non-locality in *some* senses of the word opened up scientists' minds to the value of looking for other counterintuitive anomalies, leading ultimately to developments such as quantum encryption.

Kaiser argues that the “hippies saved physics” in three ways: making speculation and philosophizing once again more acceptable; putting a focus on the question of non-locality; and discovering the “no-cloning theorem” on which quantum encryption is based. Did they really “save physics,” though? Tremendous prejudices remain, as exemplified by the way an invitation to a physics conference I had been planning to attend was withdrawn on account of my interest in the paranormal, as if I might contaminate the conference even if I did not lecture on the subject. Because of the taboo nature of the subject, the large number of scientists who surveys have shown accept the reality of paranormal phenomena mainly come to the conclusion that it is best to keep quiet about this belief. The present focus is still very much on calculating, even if horizons have now expanded somewhat.

All in all, this is a very instructive book, telling of historical events that are not very widely known.



**BRIAN JOSEPHSON**