

**Physics on the Fringe: Smoke Rings, Circlons, and Alternative Theories of Everything** by Margaret Wertheim. New York: Walker & Co., 2011. 323 pp. \$27 (paperback). ISBN 0679774009.

I don't get it. I just don't get it. This book is supposed to be about the relation between insider physics and outsider physics. It isn't.

As I read *Physics on the Fringe*, I was increasingly disappointed and frustrated at the amount of space given to Jim Carter, not only his “fringe physics” but also his personal doings. Admittedly he seems quite an interesting person, fun to be with, admirably self-motivated, helpful to others, a good citizen—not unlike quite a lot of other people. But his “circlon theory” isn't an exemplar of fringe physics, it's way-way-out pseudo-science. And Carter is not even typical of way-way-out crackpots: As Wertheim says, Carter atypically is a successful entrepreneur and has a sense of humor.

So the book's title misleads, and unfortunately the book's substance also misleads about science and fringe science and pseudo-science in a number of ways.

For one important thing, there's absolutely no justice in science as concerns the relationship between being an admirable person and producing admirable science, or between having good intentions and producing good science, or between recognizing the failure of modern science to make itself widely comprehensible and being able to do something about it. I could make quite a long list, off the top of my head, of scientists who accomplished great things, and even won Nobel Prizes, and yet were in many ways quite despicable people—self-centered, arrogant, self-important, nasty to others, ungenerous, without sense of perspective or self-knowledge; Nazis, fascists, racists . . . . And I've known and liked quite a few good people trying to do science whose accomplishments are zero, or in some cases worse than that by cluttering the literature with rubbish.

As Wertheim came to appreciate the admirable human being Jim Carter, it appears that her liking of him superseded objectivity about his circlons. The Appendix that summarizes the assertions of circlon theory encapsulates the evidence that it's pseudo-science: purporting to be science but having none of the characteristics of science, in particular its tight interplay between evidence and theory which brought modern science into being starting about half a millennium ago. Near a waterfall, Carter drops a stick and tells Wertheim that it is not gravity that pulls the stick down, it is that the expanding earth moves up to the stick. So (I would have asked), the earth expands to different extents in different places at different times as

various people drop various things? And why was the water falling relative to all the other objects around it?

By focusing on Carter, much of the book's purported inquiry into big questions becomes incoherent. The treatment of Steven Rado (pp. 56–57) similarly confuses questions of personality and of science. In a somewhat similar vein, the book juxtaposes Carter's experiments blowing smoke rings and similar experiments carried out 150 years earlier by such authentic scientists as William Thomson (later Lord Kelvin) and Hermann von Helmholtz; but the accumulation of knowledge during those 150 years makes the juxtaposition substantively meaningless, just a superficial coincidence. Still, I enjoyed learning that volcanoes sometimes emit massive smoke rings and that dolphins generate and play with bubble rings.

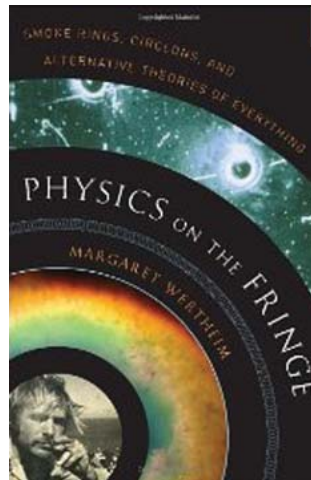
The incomprehensibility of frontier physics *is* a social problem, and perhaps it does motivate some way-out amateur speculation—but there are other consequences too, and more serious ones. The state of science education *is* parlous, and it is woefully matched by parlous coverage of science in the mass media—but the existence of fringe science and of pseudo-science are not the chief causes or consequences, or even the socially most important ones. Wholesale ignorance about straightforward, reliable, uncontroversial 20<sup>th</sup> and 21<sup>st</sup> century scientific understanding wreaks economic and political havoc because, as John Burnham pointed out,<sup>1</sup> “superstition won and science lost”: Gullible belief in the dogmatic pronouncements of official spokespeople for science and medicine replaced authentic popularization of science. Ignorance of elementary axioms of probability and statistics, the lack of competent science journalism, and the coming into being of a bureaucratic science–government–industry complex have led 21<sup>st</sup> century civilization to waste untold effort and resources on such counterproductive ventures as attempts to control global climate or to treat long-standing African diseases as though they were caused by a non-existent retrovirus.

Perhaps my frustration with this book owes something to my background as a chemist. The periodic table was a revelation to me at age 16, as I realized that one could understand and predict an enormous amount of chemistry from the simple notions of valence shown by the numbering of the columns and the easily visualized progression of atomic size down each column, rationalized perfectly and easily by the pairing and exchanging of electrons between atoms. Carter's circlonic rendering of the table has none of those uses, it even masks them. Perhaps my background in chemistry is also why I reject the assertion (p. 262) that theoretical physics “is supposed to be the bedrock of scientific ground”: We chemists sometimes call ours “the central science,” because without it there is no biochemistry

or physiology or geology, and these are the sciences that really matter to human beings in ever-present practical ways. Physics gained much or most of its modern cachet from the successful creation of atomic bombs, but that creation resulted from the work of chemists and engineers and mathematicians more than from that of physicists. Certainly physics can claim the equation  $E = mc^2$ , but it was chemists Meitner and Hahn who discovered the energy-releasing phenomenon of nuclear fission.

Wertheim had been struck by the similarities between a conference on string theory and a meeting of the Natural Philosophy Alliance, and apparently drew the opposite of the right conclusion: She seems to take the pseudo-science of string theory as justifying the scientific status of “fringe physics,” instead of recognizing that string theory is an emperor without clothes, even though she cites the works by Smolin and Woit which demolish the pretensions of string theory. Philosophy owes us a discussion of the limits of feasible human understanding. It seems to me that we can understand—that we can *feel* that we understand—only things and interactions that have a recognizable connection, analogy, similarity to human-scale phenomena; so infinity, multiple universes, and ultimate origins are simply outside possible human comprehension. String theorists and their ilk are attempting the impossible.

Wertheim is quite right—and it is a point worth noting—that the ready availability of computers, PowerPoint, and the like makes it possible to project all the externalities of professional conferences without any of the substance. That illustrates perhaps the most crucial point about trying to judge whether a venture is potentially useful science or not: There is absolutely no substitute for digging into the pertinent evidence and the arguments pro and con. There are no valid shortcuts, not “falsifiability” nor “scientific method” nor “consensus” nor any of the other proposed approaches: The demarcation problem is insoluble.<sup>2</sup> I felt embarrassed for Wertheim for the suggestion that Carter’s theory of gravity qualifies as scientific because it is falsifiable (p. 226). Her discussion of criteria for credibility is certainly correct on the point that formal credentials, degrees, do not suffice; but I demur from Wertheim’s open-ended question, whether theoretical physics belongs to a category like brain surgery where credentials and experience matter or to the category of art and literature, “open to anyone who wants to have a go.”



If theoretical physics is science, then its criteria are not those appropriate to art and literature, because physics has to jibe with external material reality. I also demur from the suggestion that “one of the purposes of science is to help us feel ‘at home in the universe’,” and that Jim Carter and the NPA are calling for a reformation of science analogous to the religious Reformation instigated by Martin Luther et al. Science is simply impersonal.

The book gives a useful history of the Natural Philosophy Alliance (NPA); but citing NPA as exemplar misleads by dodging the central issue of potentially believable versus rank pseudo-science and the long spectrum between those extremes. Wertheim cites the NPA’s website and its listing of “dissident scientists” which lumps together highly competent insiders who happen to espouse unorthodox views but are nevertheless acceptable in mainstream circles (for instance, Maurice Allais, Hermann Bondi, I. J. [Jack] Good); highly competent insiders who espouse some unorthodox views not acceptable in mainstream circles (Kary Mullis, Nobel Prize for inventing Polymerase Chain Reaction; Martin Fleischmann among other researchers of “cold fusion”; Halton Arp and other non-Big-Bang scientists; Tom Van Flandern) but also others whose activities left and will leave no mark in the advance of science (say, Wilhelm Reich<sup>3</sup> and several of his acolytes; Immanuel Velikovsky and several prominent neo-Velikovskians—as well as a host of names that Google knows nothing about). Many on the list have no warrant to be called scientist at all. (I should mention that my own name appears on the list. I had not been asked or invited.)

If this book’s aim is to illuminate fringe physics, the bibliography ought to help readers to other works dealing with the fringes of science, yet it lists only two: De Morgan’s *Budget of Paradoxes* from 1872 and Jeremy Bernstein’s essay collection from 1993. There have been quite a few others in the last half century or so, following Martin Gardner’s *Fads and Fallacies in the Name of Science*.<sup>4</sup> Just as Jim Carter wants to do physics ab initio, so this book sets out to do philosophy of science and science studies ab initio.

I dislike writing so negative a review, especially when this book is an easy read with much interesting narrative. To reassure myself that I was not being unfair, I looked for other reviews of the book; and I was astonished to read such comments as “fascinating, bizarre, and provocative new book . . . brilliant thesis: that the ‘cranks’ and ‘crackpots’ lurking on the fringes of the scientific establishment are manifesting the same esthetic impulses that drive outsider artists . . . finely wrought, sympathetic, and stimulating survey of gonzo ingenuity in the service of science”;<sup>5</sup> or “very thought-provoking book . . . an important book, one which raises in an interesting way fundamental issues about how people think about and conduct research into fundamental theoretical physics,”<sup>6</sup> from Peter Woit, who has revealed

string theory as pseudo-science. Michael Shermer, otherwise a fierce debunker of pseudo-science, calls the book “enlightening. In an elegant narrative Ms. Wertheim has taken on one of the knottiest conundrums in the philosophy of science, the demarcation problem—that is, how to find criteria to define the boundary between science and pseudoscience. . . . Ms. Wertheim has convinced me that I may be too hasty in pre-emptively dismissing . . . especially . . . Jim Carter.”<sup>7</sup> If Shermer cannot dismiss circlon theory, then he has no business posing as a judge of what is and what isn’t science or of what is and what isn’t pseudo-science. Eventually I was reassured by finding some other reviews that express the same reservations as I have: by Michael Gordin in *American Scientist*,<sup>8</sup> by Jesse Singal in the *Boston Globe*,<sup>9</sup> and indeed Peter Woit, having declared the book “thought-provoking,” admits that he has “essentially zero sympathy for this kind of thing [Carter’s work] as science.”<sup>6</sup> I’m unable to shake the sense that the laudatory comments about this book stem from empathy with the author, for whom this was clearly a work of love and fascination. If so, this is a sort of condescension and not a service to readers of book reviews.

I do agree with the favorable reviews that the book is fetchingly written and that Carter is a fine fellow worth knowing. We also learn about some interesting but obscure tidbits in the history of science. But the book does not illuminate the differences among mainstream science, unorthodox views within mainstream science, and the outsider claims that range all the way from possibly valid to blatantly nonsensical. Nowadays journalists seem increasingly to regard their job as gathering information by interviewing people; but science journalism calls for looking into the substantive evidence, for without that the journalist cannot judge the degree to which the interviewed experts, insiders or outsiders, can or cannot be trusted.

### Notes

- <sup>1</sup> John C. Burnham, *How Superstition Won and Science Lost*, Piscataway, NJ: Rutgers University Press, 1987.
- <sup>2</sup> Larry Laudan, “The demise of the demarcation problem,” pp. 111–127, in *Physics, Philosophy and Psychoanalysis*, edited by R. S. Cohen & L. Laudan, Dordrecht: D. Reidel, 1983.
- <sup>3</sup> Reich’s orgone energy is nonsense. It is irrelevant that his approach to psychotherapy has been of practical help to some number of individuals.
- <sup>4</sup> Martin Gardner, *Fads and Fallacies in the Name of Science*, Dover, 1957. [First edition, *In the Name of Science*, G. P. Putnam’s Sons, 1952]
- <sup>5</sup> Paul Di Filippo, In the Margin column, *The Spectator*, May 25, 2012, [barneshttp://bnreview.barnesandnoble.com/t5/In-the-Margin/Physics-on-the-Fringe/ba-p/6101](http://bnreview.barnesandnoble.com/t5/In-the-Margin/Physics-on-the-Fringe/ba-p/6101)

- <sup>6</sup> Peter Woit, December 24, 2011, <http://www.math.columbia.edu/~woit/wordpress/?p=4246>
- <sup>7</sup> Michael Shermer, "On the margins of science," Bookshelf column, *The Wall Street Journal*, December 10, 2011.
- <sup>8</sup> Michael D. Gordin, "Everyman's physics," *American Scientist*, Jan/Feb 2012, 81–83.
- <sup>9</sup> Jesse Singal, Book Review, *The Boston Globe*, December 26, 2012, [http://articles.boston.com/2011-12-26/arts/30556119\\_1\\_physics-outsider-theory](http://articles.boston.com/2011-12-26/arts/30556119_1_physics-outsider-theory).

**HENRY H. BAUER**

*Professor Emeritus of Chemistry & Science Studies*  
*Dean Emeritus of Arts & Sciences*  
*Virginia Polytechnic Institute & State University*  
*hhbauer@vt.edu, www.henryhbauer.homestead.com*