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BOOK REVIEW

Everyman's Physics

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PHYSICS ON THE FRINGE: Smoke Rings, Circlons, and Alternative Theories of Everything. Margaret Wertheim. x + 323 pp. Walker and Company, 2011. \$27.

Many people enjoy doing physics, and the vast majority of them work as professional scientists. Margaret Wertheim's *Physics on the Fringe*, however, is about the minority, those who devote a significant portion of their lives to investigating the structure of the universe at their kitchen tables while their families sleep. These individuals (those she discusses are, with one exception, all men) did not train as scientists and then fail to find employment in their chosen field. And they are not amateurs who study physics textbooks and read scholarly journals. They are at the fringe, a place most of us ignore completely.

That is because the fringe is, well, fringy. Among Wertheim's protagonists are those who deny quantum mechanics, postulate new structures for atoms, revive the ether or reject special relativity, and just about all of them despise general relativity. They self-publish their theories—sometimes they just photocopy handwritten manuscripts—and circulate them among scientists worldwide, who usually end up tossing them in the wastebasket. Wertheim, an accomplished science writer, has collected such texts for years now and sympathetically narrates many of them for us. Such ephemera are very hard to come by, given their frequent encounters with the trash heap, and her archival efforts are to be lauded (as is the renewed attention she brings to

mathematician Augustus De Morgan's delightful 1872 book, *A Budget of Paradoxes*, which catalogs the rejectamenta of the science of his day). She wants us to take these "outsider physicists" seriously, not as a kooky cultural phenomenon, but as people actually *doing science* in a way that demands as much attention from mainstream science as folk art now claims from the elite art community.

The analogy with art is a touchstone for Wertheim. Her attraction to these theories is at root deeply aesthetic. She is fondest of those fringe physicists who have an eye for the catching illustration or the beautiful color scheme, and she has curated the work of one of them, Jim Carter, for an art gallery and also made a documentary film about him. (Sadly, there are not enough images in the book.) Much of her narrative is devoted to the story of Carter, who has not just a breathtakingly broad theory of life, the universe and everything—from the Big Bang (or, as he puts it, the Grandfire) to a four-sex theory of human relationships—but also a deft artistic sense.

Wertheim really likes Carter. And, reading this at times beautifully written book, we like him too, and we like her for liking him. The most vividly crafted and strongest parts of the book are devoted to Carter's curious path to physics, and also the explications of his theories. One wishes for even more of the latter, especially the mind-blowing nongravity theory. Carter lives in his own trailer park in rural Washington state and loves to do what he considers theoretical physics, without the ornate mathematics of cutting-edge string phenomenology or inflationary cosmology. Since he makes quite a good living (a great story in itself, having to do with a brainstorm he had while abalone diving), he can afford to pursue his physics for the joy of it. And unlike many of his peers in the half-invisible world of fringe physics—many of them members of the Natural Philosophy Association—Carter bears silence from the establishment "stoically," convinced that he is right and will win out in the end.

Wertheim thinks it is wrong that men like Carter are frozen out of mainstream science. Wouldn't the world be better if, in the evocative phrase of Mao Zedong, we let "a hundred flowers blossom" and granted these men some recognition? She stakes her claim using a historical case study and a contemporary one. In order to show that Carter's theory of "circlons"—toroidal coiled springs of various sizes that he believes undergird all matter and energy—is worth scientists' regard, she narrates the theory of vortex atoms proposed by Peter Guthrie Tait and William Thomson (later known as

Lord Kelvin). In 1867, Tait and Thomson experimented with smoke rings to explore a hypothesis that had been mathematically elaborated by Hermann von Helmholtz in 1858, and in Wertheim's account their childlike joy at discovery is a wonder to behold. Well over a century later, Carter built his own smoke-ring generator and rediscovered the same phenomena. He likes to figure things out for himself and does no library research, or he would not have had to reinvent this particular wheel. This neglect of past accomplishments, which Wertheim considers exemplary Baconian empiricism, is important, and I will come back to it.

Carter “insists on a universe he can comprehend” and has no patience for mathematical virtuosity like that of Helmholtz. This stance—which he shares with just about all fringe physicists, who find the symbolic infrastructure of field theory alienating—has sparked consternation within the halls of the establishment. But so has string theory, with its multiple dimensions and its “landscape” of 10^{500} possible ground states, each equally mathematically consistent and equally inaccessible to experiment. Wertheim argues that if string theorists can spin theories of “sheer bizarreness” and still call themselves scientists, why not Carter?

Why not, indeed? There are several centuries of philosophy and at least 50 years of research in the history of science that articulate some detailed answers to this question, and Wertheim engages with none of it. The crux is what I call the “Central Dilemma”: The established scientific community can set the bar for candidate scientific theories relatively high, in which case what gets discussed is likely to be reasonable, although such a course risks stifling innovation. Or scientists can lower that bar and let in more radical theories (theories like special relativity in 1905 or quantum mechanics in 1925), at the risk of also admitting a host of fringe theories that will consume time and energy to debunk. This is why the border of the fringe is policed so assiduously with wastebaskets.

For Wertheim, physics, like art, should be open to all, not the exclusive domain of experts (a status she grants to brain surgery). She recognizes that this could allow the entertainment of creationism as a candidate for a scientific theory. Yet Wertheim considers the risk marginal, noting that whereas creationists “reject much of academic science, fringe physicists love science and are thrilled by its power.” Some creationists might hate science, but if you spend 30 minutes with the writings of George McCready Price, the architect of flood geology, or those of his latter-day disciple Henry

Morris, you will find discussions of sedimentary columns and hydrodynamics, and indeed all the hallmarks of sincerity and passion for inquiry you could wish for. Should AIDS-HIV denialism and Immanuel Velikovsky's cosmic catastrophism also have their day in court? These theories likewise ignore the large edifice built by science (just as Carter ignores the history of vortex atoms) and attempt to erect new structures. This neglect of all the potential constraints on a theory make scientists' hostility more than blatant prejudice. Fringe physicists can do their physics, but they cannot demand that they be heard. Neither can establishment scientists, many of whom also toil in obscurity.

Wertheim shows us just how muddy the waters are on the border between what is classed as "legitimate" and what as "fringe." However, a murky boundary does not imply that one might just as well drink from any part of the river.

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