Book Review

Review of Physics on the Fringe

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Abstract

This book is all about people who are looking for alternative ways of doing physics that does not use the mathematics of quantum mechanics and general relativity. So the book is limited in scope and ignores the more interesting work. The impression it gives is that all "outsider" physicists are doing research of this sort. This is not the case. If you look through the physics categories of viXra you may find that about 50% of the papers make it clear that the author does not accept the standard models of physics and is trying to find an alternative. That is a lot but it leaves another 50% who at least believe they are working within the accepted paradigm. Although I am quite critical of the book, it is full of interesting facts and presents a thought-provoking point of view on the whole. I think that anyone involved in fringe physics would enjoy the read.

Key Words: Physics on the Fringe, alternative approach, fringe physics, mainstream.

"I dream of a new age of curiosity. We have the technical means for it; the desire is there; the things to be known are infinite; the people who can employ themselves at this task exist. Why do we suffer? From too little, from channels that are too narrow, skimpy, quasi-monopolistic, insufficient. There is no point in adopting a protectionist attitude, to prevent "bad" information from invading and suffocating the "good." Rather, we must multiply the paths and the possibility of comings and goings."

Those are not *my* words. They were written but 20th century philosopher Michel Foucault, but if I had the same gift for words I would like to say things like that. This was quoted at the front of "Physics on the Fringe", a book by Margaret Werthem that I read last month while I was on holiday. The book is about "outsider" physicists who work on their own theories outside of the physics mainstream. This is a subject of special interest to me as founder of viXra where many independent physicists (and other scientists and mathematicians) can publish their research, so I was keen to see what kind of picture the author painted. ViXra is not mentioned in the book. Instead there is a chapter about the Natural Philosophy Alliance, another web-based initiative for fringe physicists which has been around much longer.

You can read the manifesto of the NPA on their home page which has statements like "*Reigning paradigms in physics and cosmology have for many decades been protected from open challenge by extreme intolerance, excluding debate about the most crucial problems from major journals and meetings.*" Let me first make my own position clear. I have written articles on this blog about how some new ideas in the history of science have been attacked as "crackpot" only to be found right. In some cases you could say that the reigning paradigms were protected in that

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way, so this statement is not completely out-of-order. However, they are talking here about quantum mechanics, general relativity, the big bang theory and the standard model of particle physics. These things have extensive support from experiments performed over a wide range of scales. We know that they are not the final word because there are untested scales where they become inconsistent. They must ultimately be replaced by some new ideas that are likely to look very different from the existing theories. This is what professional physicists work on so presumably the NPA is referring to something more radical. Everyone is entitled to their own view and viXra is open to anything, but personally I don't think that standard physics is that radically wrong.

"Physics on the Fringe" is all about people who are looking for alternative ways of doing physics that does not use the mathematics of quantum mechanics and general relativity. The impression it gives is that all "outsider" physicists are doing research of this sort. This is not the case. If you look through the physics categories of viXra you may find that about 50% of the papers make it clear that the author does not accept the standard models of physics and is trying to find an alternative. That is a lot but it leaves another 50% who at least believe they are working within the accepted paradigm. Many of these also have what professional physicists would consider to be obvious errors but there remains a smaller percentage where the ideas may still be radical and highly speculative, but they are mathematically sophisticated and apply to the physical regimes where experiment has not yet reached. Personally I think there is value to be found in the full spectrum of research from the craziest ideas to the most sublime, some are more like creative works of art with very little real science, but they may still inspire interesting ideas. Others may contain obvious errors but could still have a gem of knowledge buried within that someone might find. Perhaps a few are genuine new theories that could turn out to be right. This is why I believe that everything should be allowed to be published in non-peer-reviewed archives such as viXra. This does not mean that I do not value peer-review, but peer-review takes many forms. I don't like peer-review as a closed process that is hidden and determines whether someone's work is fit to be seen. I would like to see criticism that is public and where the author can respond. Perhaps now that the closed journal system is being taken apart we will see some new better ways to do peer-review.

So the book is limited in scope and ignores the more interesting work, but what does it have to say? Chapter 3 tells an interesting story about 19th century mathematician Augustus de Morgan who wrote a book "A budget of Paradoxes" about his collection of theories by outsiders. It may be surprising to learn that the phenomena of amatures with crazy ideas goes back well before the existence of the internet. De Morgan was himself an almost outsider who had rejected a position at Oxford (or was it Cambridge?) because he objected to signing their theological test. Instead he worked at the newly founded University College London. His work on logic may seem ordinary to us now but at the time it was radical. Mathematics was going through a transition from a subject which studied quantity and form to more general ideas founded on pure logic and abstraction and de Morgan was at the forefront of the revolution. The obstacles to acceptance he faced may have given him some affinity with the "paradoxians" who touted their mad ideas at his door. It makes for interesting reading.

The central section of the book covers the work of Jim Carter and his theory of circlons. This is an example of work at the extreme end of fringe physics. Jim Carter did a degree in engineering and made money from his invention of a divers lifting bag. He had a good intuition for physics but his mathematical ability did not match. Like so many people of this ilk he formed his own alternative ideas that tried to explain the world in more mechanical and less mathematical terms. He used experiments where smoke rings are formed and allowed to interact to demonstrate his ideas. Wertheim has spent much time with Carter at his country adobe and has a sympathetic attitude towards his work, but she quite rightly regards it as more like a creative work of art than a valid scientific theory. Experiments with smoke rings are well-known to people who work on fluid dynamics and are great fun, but can they tell us anything about fundamental physics? If you study the mathematics of the soliton like vortexes that maintain surprising stability you will indeed find ideas that are used in quantum field theory, but of course this is not what Carter is doing. Valuable new ideas can indeed be formed in this way but mathematical ability is required. That is the way nature works.

So could the writings of someone like Carter inspire original ideas in others at least? Let me give another example of his ideas. Carter believes that the force of gravity does not really exist. Instead, he says, everything is expanding at an exponential rate and it is the ground accelerating up that appears to make us cling to Earth. This he thinks is a much better idea than general relativity which is all wrong. Physicists would laugh but there is a deep irony underneath. The theory that the Earth expands in this way is actually highly unoriginal and has been proposed many times. It is possible that such a crazy idea was known to Einstein. Perhaps when he discussed physics and philosophy with his friends at their "Olympia Academy" one of them may have proposed something similar as a topic for discussion. Einstein with his better analytic mind would have seen immediately that such an idea can only explain terrestrial gravity. In space everything would just fall towards the centre of the expansion. planetary orbits would require a different theory but that would be a step back to pre-Newtonian physics that undid the highly successful unification of gravity. However, Einstein was at that time an outsider himself unable to get a professional position as a physicist so he had more sympathy for crazy ideas. He might have seen that there was still some part of the theory that was right. Gravity really is like the pseudo forces caused by acceleration as experienced when in a moving lift. In time this would lead to the equivalence principle and the realisation that the idea would work if the explanation was that spacetime is bending instead of objects expanding. This was the birth of general relativity. In "Physics on the Fringe" Wertheim does not seem to appreciate this aspect of such ideas.

It the turn of the twentieth century Carter's ideas could have been inspirational, but 100 years later I doubt that they have much value beyond the esthetic. Other more advances ideas at the other end of the fringe physics spectrum however, can be more useful. A good example is the work of Ed Fredkin who has published in viXra. He is well-known for his ideas about cellular automata as an underlying theory of physics (similar to Wolfram but predating) . Fredkin was an IT pioneer who invented some of the concepts used in modern operating systems and he was a professor at MIT, but his greater interest is in physics. Because of his position and his warm personality he has been able to discuss his ideas at length with Feynman and 't Hooft amongst others. His explanations of computing to Feynman led to the foundation of

quantum computing and it is probably no coincidence that 't Hooft's first paper on the holographic principal uses a cellular automata as a model. So Fredkin has been influential with his theories but of course he is not satisfied if they don't accept his underlying idea. The problem is that a cellular automata is at odds with the principles of both relativity and quantum mechanics. Fredkin is not dissuaded by arguments that something is impossible. He was told the same thing about reversible computing and found a way to do it. He also likes to point out that cellular automata have the power of universal computation so there is no limit to what they can do. Sometimes the most interesting thoughts lie behind the craziest ideas.

There is one other chapter in the book that is worth commenting on. Wertheim describes her experience of attending a conference about quantum cosmology with its talk of multiverses, eternal inflation and the like. She compares this with the crazy ideas she had seen at an NPA conference, leaving the impression that the only real difference is that one set of crazy ideas is produced by outsiders and the other by insiders. Here's my opinion for what it is worth. I think string theory will turn out to be important in physics and will be the answer to unifying quantum gravity once we can work out the maths that underly it although for now we can only speculate about how that will work out. The multiverse landscape is another layer of speculation on top that I like philosophically but speculation on top of speculation has to be seen for what it is. Eternal inflation is yet another layer of speculation on top of that and I think the base of temporal causality and fluctuation from nothing are just bad philosophy so I just don't believe it. I still think that it is right to explore that kind of theory but it should be shown for what it is, i.e. it is speculation upon speculation upon speculation. As Werthhiem recognises, this physics is popular because it sounds great on science documentaries and is promoted by a culture of superstar physicists (she mentions). Personally I am more excited by the work of someone like Nima Arkani-Hamed on non-locality and emergent spacetime that comes from Super Yang-Mills scattering amplitudes, but this kind of thing is harder to present on prime-time TV. Just my opinion, you are entitled to differ.

Nevertheless, there is a qualitative difference between such work on quantum cosmology and the theories presented by the NPA. The former assumes that quantum mechanics, general relativity and the big bang theory are correct up to the points where they are untested and theory suggests they will break down. Mathematics is used along side speculative ideas to try to understand what is possible within the constraints of logical consistency and confirmed observation. The physicists of the NPA throw all that away (OK to be fair that is too much of a generalisation to cover the wide range of ideas they present but that is how it is presented.) This means that it is more likely to lead to important new ideas that tell us something real about the world we live in.
Looking back at what I have written I see that I have been quite critical of the book, but on the whole it is full of interesting facts and presents a thought-provoking point of view. I think that anyone involved in fringe physics would enjoy the read.

References

1. Margaret Wertheim, *Physics on the Fringe: Smoke Rings, Circlons, and Alternative Theories of Everything*, Walker & Company (2011).

2. http://blog.vixra.org/2012/05/09/physics-on-the-fringe-book-review/