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## Review of *Elegance and Enigma: The Quantum Interviews*

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### **Comments**

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**Elegance and Enigma: The Quantum Interviews** Maximilian Schlosshauer (ed.). 311 pp. Springer-Verlag, Berlin Heidelberg, 2011. Price: \$69.95 (hard-cover) ISBN 978-3-642-20879-9. (Reviewed by Matthew S. Leifer.)

Max Schlosshauer's latest book is a collection of interviews with seventeen prominent researchers in the foundations of quantum theory. The closest precursor to this is "The Ghost In The Atom" (P. Davies and J. Brown eds., Cambridge 1986), which consisted of interviews taken from a series of BBC radio broadcasts, but there are several key differences. Firstly, "Ghost" was a popular science book, whereas this book is aimed at a more academic audience. Secondly, whereas the chapters of "Ghost" are organized by interviewee and different questions were asked to each person, this book is organized by question and the same questions are asked of each participant. As such, this book provides a better base for comparing the different points of view. Finally, and perhaps most importantly, twenty five years have passed since the publication of "Ghost" and the field has progressed enormously since then. In particular, a lot of new work has been inspired by the development of quantum information and computation. Although this has not completely transformed the landscape of possible ways of understanding quantum theory, it has refocused attention on what might be called "neo-Copenhagen" approaches, wherein the notion of information plays a central role. This is reflected by a pretty clear split in the opinions of the interviewees, each of whom either embraces these new ideas or rejects them as fashionable nonsense. Almost all the contemporary approaches to quantum theory are well-covered by this book, although the lack of an advocate of the consistent/decoherent histories approach is a significant omission.

It would be impossible to summarize all of the views presented in this book, so I will make do with a few short comments. For me, the most surprising responses come from Arthur Fine and Daniel Greenberger. Fine holds a non-mainstream view of Bell inequality violations, which for him are indicative of a breakdown of classical probability theory rather than of nonlocal influences. He also holds a pluralist view of interpretations in which the goal is not to arrive at the "one true" interpretation, but rather to find mutual illumination in a variety of viewpoints. Greenberger introduces some left-field thought experiments highlighting the role of relativistic notions such as proper time in even non-relativistic quantum theory, which provide food for thought. Most of the other participants cover more familiar themes, but their responses are nonetheless lively and engaging. In particular, Chris Fuchs writes with his trademark Wheelerian eloquence, which has been responsible for more than one quantum information researcher entering the field, this author included. Sheldon Goldstein's down to earth realism is both clear and persuasive, and Jeff Bub's responses bubble with enthusiasm for the latest developments coming from quantum information, which he describes in some detail. There are insights to be had from all the interviewees in this book and I hope the other participants will excuse me for not mentioning them explicitly by name.

Overall, the book is an entertaining read for a researcher in quantum foundations, but is not essential reading for this group because most of the material is familiar. The book would be much more useful to those working in other fields who want to get a feel for how the main issues in quantum foundations currently stand. It would also be useful for students who are trying to decide whether to do research in quantum foundations, and, once decided, which research program to pursue. Given this, it is a shame that there are no references to the research literature, even when the interviewees refer to specific recent results. Having said that, a quick search on the arXiv or Google will turn up the required references, which leads me to my final point.

As I was reading this book, I often had the urge to comment on the answers given by the interviewees and get involved in a back-and-forth debate. If quantum foundations is "humming with more activity than ever" as Schlosshauer asserts (p. 293) then surely there would have been a good case for

structuring this project as a living document, as in the “Living Reviews” series (<http://www.livingreviews.org>), rather than as a fixed snapshot that will go out of date fairly quickly. With modern technologies, it would have been relatively easy for Schlosshauer to set up a question-and-answer website that would allow people to comment and for the interviewees to dynamically refine their answers in response. For wider dissemination, a book could then have been extracted from the best responses at a later date. This would also have enabled a greater number of researchers to participate and it would have allowed new questions to be posed and added as the landscape of foundational ideas changes. Perhaps this book will serve as an inspiration for a future project along these lines.

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