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Sánchez. Mayagüez: University of Puerto Rico  
Mayagüez Publications Center, 2003, xii + 194 pages**

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*Physics as Philosophy: The Philosophical Import of Some Key Concepts in Physics*, Halley D. Sánchez. Mayagüez: University of Puerto Rico Mayagüez Publications Center, 2003, xii + 194 pages.

*Anderson Brown*

Professors have two basic sources of material for books: they can publish versions of their doctoral theses, and they can develop books from long-developed class notes. In this professor's opinion, the latter tends to be far the better method. There are many fine thinkers in academe whose audience is limited to passing classes of students, but if their notes and lesson plans continue to be refined over ten or twenty years, the product can grow very fine. Halley Sánchez has been teaching his very popular Philosophy of Science course at the University of Puerto Rico, Mayagüez since the 1970s, and now comes his distillation of years of experiment presenting philosophically interesting aspects of the history of physics to undergraduates. This book will probably be most rewarding to readers with some physics who wonder what philosophers have to say about the field, and will be a good reference tool for teachers of the history and philosophy of physics. It will also supplement more general sources in the history of science. It is not afraid of formal notation, but is not so dense with equations as to frustrate the lay reader as is the case with so many books in this genre.

While arranged chronologically, it is really a survey of philosophically interesting points in the history of physics, as the subtitle states, rather than a comprehensive history. The first chapter, "Ancient Roots," has nice short discussions, notably of Pythagoras and Archimedes, but a more substantial discussion of Aristotle's influence unfolds later in the book. Sánchez believes that Aristotle and his medieval followers held back the development of physics by emphasizing sense-data (empiricism) over mathematical reasoning (rationalism). The great contribution of Descartes, following this line, was to open up a more mathematics-based mechanics, thus opening the way for Newton and (perhaps more controversially) the subsequent movement of physics increasingly away from "mechanical philosophy." The short study of Newton in chapter Four is useful for non-physicists (philosophers tend to overlook the centrality of Newton in philosophical discussions of his time), but the discussion of Descartes in chapter three is the high point of the first half of the book and should be illuminating to physics people who want to learn more about the role of philosophy and mathematics in Seventeenth

Century science. A more detailed treatment of Sánchez's brief for Descartes as corrective to Aristotelean Scholasticism could profitably be developed; perhaps we shall see this in the future.

The second half of the book does not have as clear a narrative structure as the philosophical agenda recedes and we are given a history of modern physics from field theory through relativity to quantum mechanics. Professor Sánchez has taken on the Herculean labor of offering short explanations of important developments in physics, from Michelson-Morley to Bell's Theorem, for generations of undergraduate students, and the reader who is also a teacher can only applaud his often deft sketches. However, there is a tension here concerning the identity of the book. Sánchez's real strength is in pointing out the philosophical significance of various famous experiments, figures, and movements in physics. The readers who will benefit the most from this strength are those who already have some familiarity with physics, and thus don't need a short introduction to, say, Maxwell's equations, or the famous arguments between Einstein and Bohr. Meanwhile, readers who are looking to understand physics today have a long shelf full of popular histories and explanations. For the moment, this book will be a useful supplement to students of the history of science who want to develop their understanding of physics, and quite a good source for students of physics who want to be familiar with the philosophical import of major developments. However, what Sánchez is really in a position to contribute, I think, is a book aimed at physics scholars who need a source of quick glosses of epistemological issues in familiar highlights of modern physics, and this is not (quite) that book.

A very nice feature of the book is a philosophical dialogue presented as coda, featuring the philosophers Al, Bob, Marty, and Van. The last two are meant to represent the views of Heidegger and Quine, respectively, but I confess it was not obvious to me who Al and Bob were meant to be. This is a well-written *faux* discussion of popular philosophical arguments, including the role of science in shaping social values and *vice versa*, "continental" relativism vs. "analytic" positivism, Plato's metaphysics (which seems to be rattling around under the whole text somehow), and Sánchez's cryptoKantian musings on subjectivity and the possibility of rational transcendence thereof. It is playful and interesting and, like a good professor with a couple of classes a year, shines in obscurity.

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