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Peer reviewed
Book Review


Jose Wudka has written a very different book from the one the title led me to expect. All three pieces, “space-time,” “relativity,” and “cosmology” suggest Einstein (with perhaps his contemporaries) and beyond. But “Enter Einstein” is the beginning of chapter six out of nine. Editor Rigden said he would wait to see my review before deciding whether to read the book. My short answer is, “No, John. Not worth it,” with the same advice to anyone else who might see these remarks, many of which are intended to convey information that I think should have been in the book. The volume arose out of a history of science class taught for nonmajors at the University of California, Riverside, first by others, and later by Wudka. This is undoubtedly part of the explanation for what we find in the book, but it is not, I think, a justification.

“Every novel,” said writer Peter De Vries, “should have a beginning, a muddle, and an end.” The same, I think, is true of any book that tries to tell a story, including the stories of science, where the “muddle” period is typically one with many competing hypotheses. Let’s therefore look at the first few pages, the central ones, and some at the end of *S-T, R, and C*.

The author begins with Aristotle, and on page three tells us that “A Syllogism is a logically incorrect generalization.” The example he gives suffers from an undistributed middle, and so is not actually a syllogism, though it is certainly incorrect. Indeed, he seems to feel that deductive reasoning has no place in modern science, though just how one is supposed to come up with tests for a given hypothesis except by deducing its implications (“If inflation occurred, then space-time will be very close to flat.”) is not clear. He accepts, of course, the need to challenge hypotheses until they have passed so many tests that they can be called theories.

Skip to the middle, where, on page 153 of 306 of text, we land in the middle of electromagnetism, with “Maxwell’s Second Law: There are no lone magnetic poles.” There are truly no equations anywhere, not even hidden in an appendix of fine print. The absence of equations is explained and perhaps even justified by the book’s origins and goals, but I have two objections, one of content and one of style. “There are no lone magnetic poles” does contain the same information as

$$\nabla \cdot \mathbf{B} = 0.$$

But “Maxwell’s Fourth Law: Currents and changing electric fields generate magnetic fields” does not have the full content of

$$\nabla \times \mathbf{H} = \mathbf{j} + \frac{\partial \mathbf{D}}{\partial t}.$$

Thus, even the most numerate reader will not be able to figure out how one might test the statement. The style complaint arises from my opinion that one of the purposes of “breadth” courses is to introduce students to the vocabulary of a field, so that they can ask questions and be taken seriously enough to get accurate answers. I don’t think I have
ever heard a physicist speak of “Maxwell’s laws.” It is always “Maxwell’s equations.” And it took a good deal of staring at the words to be sure that the laws were actually intended to be the equivalent of the equations in the usual order.

Skip to the end, which is a chapter on stellar structure and evolution that doesn’t really fit into the main narrative, except to lead the reader to one of the ways to form black holes. Just bad luck, perhaps, that my eyes lit first on Box 9.1, which declares that the 1054 supernova (whose remnant is the Crab nebula) was “about as bright as the full moon.” If this had been so, then its total absence from European records of the time would be totally incomprehensible, however many clouds the Middle Ages might have been having at the time. When first spotted by Chinese and Japanese astronomers, it was about as bright as Venus. The supernova of 1006 (reported from Switzerland, though just barely above the horizon there) was about as bright as a quarter moon. And none of the Galactic supernovae (the book unfortunately says “supernovas,” another acculturation failure) seen over the past thousand years has been any brighter than 1006.

The real end of the story the author has set out to tell is in chapter 8, on “The Relativistic Universe.” Not too bad as far as it goes, though a 1933 study of the mass of the Coma cluster of galaxies is said to have been of individual galaxies (that the two give very different answers is a core part of the evidence for dark matter). And it is attributed to a certain Swiss astronomer, “F. Swicky.” Fritz Zwicky lived and worked in the United States from 1927 until his death in 1974.

A good deal more distressing is the 2006 copyright date with no warning that the discussion leaves off with the “state of the universe” at least a decade earlier. I articularly felt the lack of any description of “consensus cosmology” as first recognized in 1997 and now rather firmly established. This is the idea that the combination of details of (a) brightness fluctuations and polarization of the 2.7 K cosmic microwave background radiation, (b) apparent brightness of Type Ia supernovae (the index unfortunately says IA), (c) Big Bang nucleosynthesis (yields 3/4 hydrogen and 1/4 helium, plus trace amounts of deuterium and lithium), (d) measured large-scale clustering of galaxies, (e) the measured masses of neutrinos, and (f) a precise value for the Hubble constant from the Hubble Space Telescope now provides a very accurate inventory of the amounts of cold dark matter, hot dark matter (very small, but non-zero), dark energy (or cosmological constant), and baryons in the universe, as well as its age and some critical parameters of the initial fluctuation spectrum for which inflation or some alternative must eventually account.

In short, I perceive major problems with the beginning, the middle, and the end of Wudka’s book that transcend what might be justified by its origins in an introductory, nonmajor course and that preclude a recommendation that Editor Rigden or any other friends should read it.

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“All cats have fur. A dog has fur; therefore a dog is a cat.” Compare the classic, correct syllogism: “All men are mortal. Socrates is a man; therefore Socrates is mortal,” a deductive conclusion supposed confirmed by experiment in 399 BCE.