somewhat less so. Nicolaides nevertheless turns his welcome sensitivity to complexity toward the question of why the Greeks were the first to develop a robust program of natural inquiry.

The book's second half draws a series of comparisons between the core intellectual traditions of pre-Socratic philosophy and foundational issues in modern physics. Nicolaides finds echoes of the modern quest for a theory of everything in Thales's notion of sameness as a universal principle; he sees Empedocles's conception of force as a prelude to the standard model of particle physics. Those comparisons are often strained and superficial, but they do offer a competent and accessible reconstruction of the views of noteworthy Greek philosophers and an introduction to the current frontiers of physical inquiry. Even if direct connections between ancient and modern science fall flat, Nicolaides succeeds in communicating his admonition to consider today's scientific progress within the broader sweep of human history.

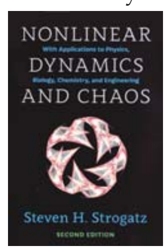
Reading Weinberg and Nicolaides side-by-side makes it clear that a whiggish approach does not imply a consensus narrative. Whiggishness involves reading the past through the lens of current values—but whose values? For Weinberg, the independence of science from other human affairs is its most necessary and powerful attribute. Nicolaides sees science as but one incarnation—albeit the most successful—of the impulse that drives all essentially human activities. *To Explain the World* and *In the Light of Science* diverge in their historical interpretations because their authors advocate different perspectives on the values science does and should embody. In that sense, the two books are as much philosophical as historical and as much about the present as the past.

Nonlinear Dynamics and Chaos

With Applications to Physics, Biology, Chemistry, and Engineering

Steven H. Strogatz
Westview Press, 2015. 2nd ed.
$60.00 *paper* (528 pp.).
ISBN 978-0-813-34910-7

It's clear from the books he has written that Steven Strogatz—a prolific and able writer and a professor of applied mathematics at Cornell University—has broad interests and knowledge in many scientific fields, including physics: In 2014 he was elected an American Physical Society Fellow. For popular audiences, he has penned such engaging works as *Sync: How Order Emerges from Chaos in the Universe, Nature, and Daily Life* (Hachette Books, 2003) and *The Joy of "x": A Guided Tour of Math, from One to Infinity* (Houghton Mifflin, 2012).



Strogatz's latest book, *Nonlinear Dynamics and Chaos* (2nd edition), is aimed broadly at scientists and engineers and is suitable as an undergraduate or graduate course textbook. That's no accident since much of the content of this book, and the first edition (Westview Press, 1994), originated from a course Strogatz taught at MIT and Cornell. The new edition has a friendly yet clear technical style; it feels like concepts are not just printed on the page but are being spoken to the reader. Strogatz enhances his already engaging tone with historical notes and nods to things not yet understood, in the same way a good lecturer enlivens a class discussion. A course based on this book could be an excellent elective in a physics department; it might even draw students from other STEM fields due to the intrinsic interest of the material or the usefulness of its techniques.

In presenting the subject, the author draws from the past 30 years of developments that have advanced our understanding of dynamics beyond the linear examples—for instance, harmonic oscillators—that permeate current physics curricula. The advances came from theoretical and computational scholars, and the book does a great job of acknowledging them. The methods and techniques that form the bulk of the book's content apply useful concepts—bifurcations, phase-space analysis, and fractals, to name a few—that have been widely adopted in physics, biology, chemistry, and engineering. One of the book's biggest strengths is that it explains core concepts through practical examples drawn from various fields and from real-world systems; the examples include pendula, Josephson junctions, chemical oscillators, and convecting atmospheres. The illustrations, in particular, have been enhanced in the new edition.

The techniques needed to understand the behavior of nonlinear systems are inherently mathematical. Fortunately, the author's excellent use of geometric and graphical techniques greatly clarifies what can be amazingly complex behavior. For example, in carefully working through the development and behavior of the Lorenz equations, Strogatz introduces a simple waterwheel machine as a model to help define terms and tie together such key concepts as fixed points, bifurcations, chaos, and fractals. The reader gets a feel for the science behind the differential equations. Moreover, for each concept, the mathematics is accompanied by clear figures and nicely posed student exercises.

This is fast becoming a staple book among practitioners of nonlinear dynamics. Both my theory and experimental colleagues often recommend it to their students. Other books in the same genre are worth mentioning: Edward Ott's *Chaos in Dynamical Systems* (2nd edition, Cambridge University Press, 2002) is an excellent introduction at a graduate level, and Robert Hilborn's *Chaos and Nonlinear Dynamics: An Introduction for Scientists and Engineers* (2nd edition, Oxford University Press, 2001) is quite reader friendly. This second edition of *Nonlinear Dynamics and Chaos* is a great addition to our communal bookshelf. It serves for a wide range of uses and will be of interest to audiences with diverse backgrounds and levels of expertise.

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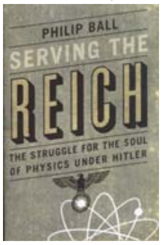
Serving the Reich

The Struggle for the Soul of Physics Under Hitler

Philip Ball
U. Chicago Press, 2014. $30.00
(320 pp.). ISBN 978-0-226-20457-4



Several books have been written about the German scientists who worked under the Nazi regime. One early classic was Alan Beyerchen's *Scientists Under Hitler: Politics and the Physics Community in the Third Reich* (Yale University Press, 1977). Other examples are Mark Walker's *Nazi Science: Myth, Truth, and the German Atomic Bomb* (Plenum Press, 1995) and the more recent monograph edited by Walker and Dieter Hoffmann, *The German Physical Society in the Third Reich: Physicists Between Autonomy and Accommodation* (Cambridge University Press, 2012).

Most of that literature is motivated by such underlying questions as the following: How could men like Max Planck, Werner Heisenberg, and other pioneers of modern physics proceed with their work while Adolf Hitler ruled their country? Did they display moral qualms? Philip Ball, a freelance writer with 20 years of experience as an editor for *Nature*, attempts to answer those questions in *Serving the Reich: The Struggle for the Soul of Physics Under Hitler*. Has he anything new to add to this oft-debated topic?

The notes and bibliography show that Ball is aware of the most pertinent literature, including a good deal of the extensive German-language contributions and some archival sources, such as the Rockefeller Foundation Archives and the Samuel A. Goudsmit Papers at the American Institute of Physics (which publishes PHYSICS TODAY). In addition to Planck and Heisenberg, Ball focuses in particular on Peter Debye, who in 1938 signed an infamous letter requesting the resignation of Jews who had remained members of the German Physical Society.