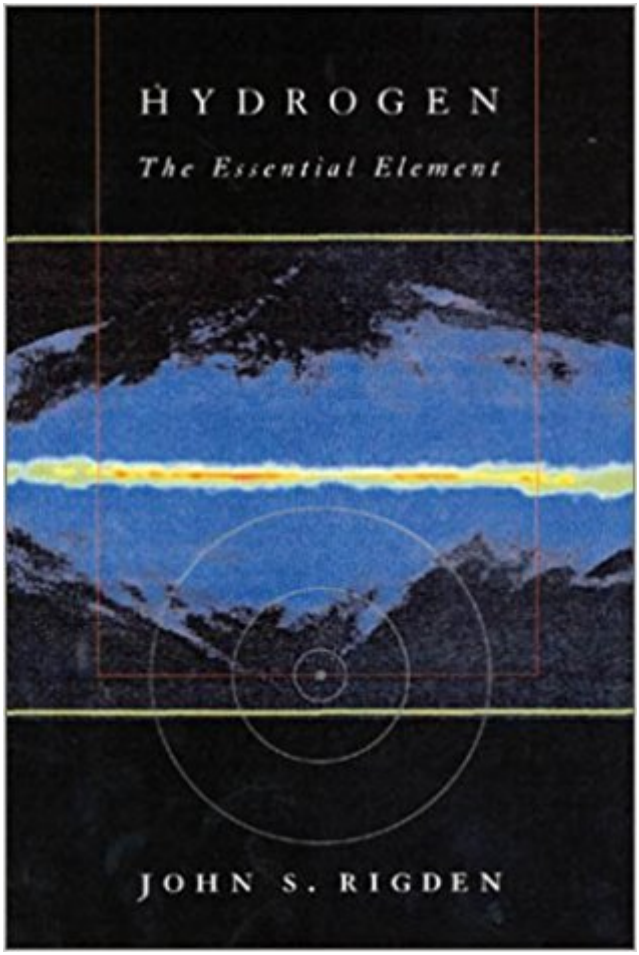
Hydrogen: The Essential Element



Synopsis

Seduced by simplicity, physicists find themselves endlessly fascinated by hydrogen, the simplest of atoms. Hydrogen has shocked, it has surprised, it has embarrassed, it has humbled--and again and again it has guided physicists to the edge of new vistas where the promise of basic understanding and momentous insights beckoned. The allure of hydrogen, crucial to life and critical to scientific discovery, is at the center of this book, which tells a story that begins with the big bang and continues to unfold today. In this biography of hydrogen, John Rigden shows how this singular atom, the most abundant in the universe, has helped unify our understanding of the material world from the smallest scale, the elementary particles, to the largest, the universe itself. It is a tale of startling discoveries and dazzling practical benefits spanning more than one hundred years--from the first attempt to identify the basic building block of atoms in the mid-nineteenth century to the discovery of the Bose-Einstein condensate only a few years ago. With Rigden as an expert and engaging guide, we see how hydrogen captured the imagination of many great scientists--such as Heisenberg, Pauli, SchrÃ¶dinger, Dirac, and Rabi--and how their theories and experiments with this simple atom led to such complex technical innovations as magnetic resonance imaging, the maser clock, and global positioning systems. Along the way, we witness the transformation of science from an endeavor of inspired individuals to a monumental enterprise often requiring the cooperation of hundreds of scientists around the world. Still, any biography of hydrogen has to end with a question: What new surprises await us?

Book Information

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Customer Reviews

Justly acclaimed for his lucid biography of physicist I. I. Rabi, Rigden here shifts his focus from person to problem, chronicling how one enduring conundrum--that of explaining the element hydrogen--has challenged two centuries of brilliant scientists. Beginning with the British chemist William Prout's pioneering hypothesis defining hydrogen as nature's fundamental building block, Rigden recounts episode after episode in which the mysteries of the simplest element--a bare proton and electron--have yielded their secrets to intellectually daring and resourceful researchers. In the process, he clarifies for general readers the nature of the scientific enterprise, in which elegant theories must meet the test of empirical verification. Nor does Rigden neglect the often-quirky personalities of the humans who frame the theories and conduct the experiments: we share, for example, in the frivolous musical ditties composed by Bloch and in the irreverent jokes circulated about Dirac. Readers will marvel that in its very first square, the periodic table holds so much science, so much history, so much humanity. Bryce ChristensenCopyright Â© American Library Association. All rights reserved

Justly acclaimed for his lucid biography of physicist I. I. Rabi, Rigden here shifts his focus from person to problem, chronicling how one enduring conundrum--that of explaining the element hydrogen--has challenged two centuries of brilliant scientists...Readers will marvel that in its very first square, the periodic table holds so much science, so much history, so much humanity. (Bryce Christensen Booklist 2002-03-15)There can be no understanding of either the microscopic world or the cosmos at large without an understanding of hydrogen. Rigden's book is, on one level, a history of this most basic element, from its discovery in the 18th century to today's cutting-edge experiments...But Rigden is also telling us the story of modern physics...If you love physics, you'll enjoy this book. It is thoughtful, clever and rich in detail. (Dan Falk National Post 2002-04-13)There is almost magic eloquence in the practice and insights of science at its highest orders--which when transformed into the written word can produce splendid literature. A recent effort to do just that is Hydrogen...For many reasons, this book grabbed me from the start and held my attention to its finish...For its literary quality, its memorable parade of scientific superheroes and the richness of its material, this is a book I heartily recommend. (Michael Pakenham Baltimore Sun 2002-05-11)Rigden's easy narrative style provides one of the most accessible descriptions of the importance of laboratory experimentation in developing our current understanding of fundamental physics that I know of. Also, he demonstrates how theorists have at times led the way, sometimes with jumps of intuition, sometimes with reliance on fundamental notions like symmetry and sometimes with sheer stubborn persistence. Finally, readers will particularly benefit from seeing

extremely important practical technologies that the original experimenters may never have dreamed of. For a picture of how physics really progresses--with gritty details filled in, along with ingenious experiments and glimpses of physicists who push the forefronts of knowledge--Rigden's brief ode to hydrogen is a refreshing alternative to some of the speculative musings dominating the physics sections of bookstores. (Lawrence M. Krauss New York Times Book Review 2002-07-14)Rigden is deeply enamored of physics, physicists and the historical anecdotes that bind them together. These passions are reflected in Hydrogen's format--short essays about different aspects of the hydrogen story, focusing on its physicist-heroes...Great stories, beautifully told...Rigden has done physicists a service with his touching love letters to their favorite atomic quarry. (Graham Farmelo New Scientist 2002-09-07)John S. Rigden...has taken on the challenge and produced an accessible, congenial book for the general reader...His book deserves praise for introducing a wider audience to the rich story of hydrogen. (Peter Pesic American Scientist 2002-11-01)Rigden writes well and admiringly of the characters involved and emphasises the benefits of pure research. (Steven Poole The Guardian 2004-01-24)What this slim biography of 280 pages lacks in size, it more than makes up for in scientific revelations. Its subject, hydrogen, beneath a mask of simplicity, is clearly an element on the move. Such is the importance of this primordial element, that its biography mirrors that of the universe. As science--at least the modern physics part of it--is such an international enterprise, and is not carried out in a social vacuum, the book subtly provides a brief history of the world...If you are an admirer of progress in science, this book is for you. (Dozie Azubike Materials World 2005-01-01)These chapters clearly demonstrate that hydrogen is an effective vehicle for presenting a good deal of modern physics…This book is part history of science and part primer on fundamental physical concepts. Moreover it includes interesting vignettes about the scientists involved in these various discoveries, especially I. I. Rabi, the subject of an earlier biography by the same author…The book is well written with clear explanations and good references. It should be accessible to an educated lay audience and of particular interest to chemists. (A. Truman Schwartz Journal of Chemical Education 2004-01-01)

This is a wonderful little book, and is the second time I've purchased and read it (since the first time over ten years ago). It was that good. It is an easy read but has a interesting history and description of our knowledge of the atom as it has been revealed to us over time, and the people and events surrounding the discoveries. It describes why and how much of what we know about the atom is based on the spectrum of the Hydrogen atom.

I’m a math and science hobbyist. This book helped me understand a bit more about how quantum theory is being developed.

Great book. Very clean. Excellent condition.

Thank you.

still reading

An excellent description, not only of the Hydrogen atom, but the way that very simple structure informed scientists about more complex structures in the universe. Very well written and not mathematically intense.

the smorgasbord approach is rarely satisfyingin a scientific excursion as proved here severaltimes (23) over -- there is no depth to this bookwhatsoever -anyone with a smattering of generalscience background will find the ground all toofamiliar and trying ---- add to this the author’sannoying and offputting arrogance as witnessed byhis uncalled for swipes against certain 19th centuryastronomers (simply because they couldn’t guess theshape of the future) -- directly following his insults,this idiot proceeds to mangle the most basic informationthat our species has ever uncovered - the em spectrum! --his value for visible light being wrong by a factor of--wait for it -- one thousand!!!if only those past scientists were available for a rebuttaljustice might be served -- although come to think of it, maybethey wouldn’t bother -- after all, they were astronomersnot entomologists

Written for the layman, the author takes you through the history of modern physics through a series of essays on the historical quest to understand the simplest atom.John Rigden was very clever in the layout. It was not until the third chapter or so that I realized he was doing this by writing short 7 - 10 page vignettes on those physicists most important in developing a model of hydrogen that explains its observed properties. Obviously, one could see that by looking at the chapter headings but for some reason I missed that the first time I read the book.By focusing on the one physicist at a time, and the specific question that physicist was trying to answer at a particular time, Rigden is able to walk you down a path that actually suggests you might understand quantum mechanics (QM) and the wave function, which united QM with Einstein’s theory of relativity. Rigden uses almost no

formulas in the book; the few that he does is simply to give the reader an example of how simple some of the concepts can be when placed in mathematical formulas. You won't understand the symbology, but you will be amazed at the elegance of the formulas. None is as good as Einstein's E = mc^2 but they come close.It is very, very good. Along the way you will meet some very interesting physicists, most who had very humble beginnings. As interesting as the physicists themselves are, the implications of their discoveries and the strangeness of the simplest atom will have you re-reading the book.This is a relatively compact book -- I have the hardback, which I see is now going for $60 and more through resellers on -- perfect for your carry-on. The short essays allow for easy reading during even the shortest of flights.I highly recommend this for summer reading for the advanced high school student planning to major in physics, chemistry or biology, and to read it between the junior and senior year of high school, or the summer before going to college. I would assume this book is already considered a classic and is being recommended by college science professors for "recreational" reading.If you have any doubt about whether you want to read this book, read the 2 1/2 page epilogue while visiting your favorite bookstore and you will be hooked.

Aromatherapy Recipes for Everyone) How trace element selenium affects men’s health: Discover how selenium can affect: prostate problems, eczema problems, asthma breathing, and 9 other health problems Five Element Constitutional Acupuncture, 2e Five Element Constitutional Acupuncture, 1e Harlequin in His Element: The English Pantomime, 1806-1836