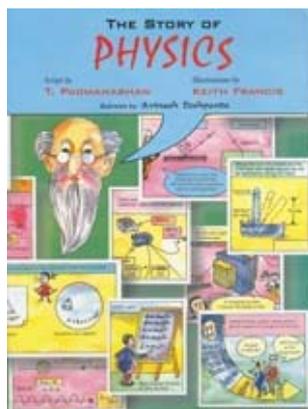


BOOK REVIEWS



The Story of Physics. Script by T. Padmanabhan. Illustrations by Keith Francis, Redrawn by Avinash Deshpande. Vigyan Prasar, C-24, Qutub Institutional Area, New Delhi 110 016. 2005. 48 pp. Price: Rs 85.

Steven Weinberg, in his advice to students at the start of their scientific careers (*Nature*, 2003, **426**, 389) says 'Finally, learn something about the history of science, or at a minimum the history of your own branch of science. . . More importantly, the history of science can make your work seem more worthwhile to you. . . you can get great satisfaction by recognizing that your work is a part of history'. I think that the advice holds true for working scientists as well as school kids aspiring to go into a career in science. Several internet sites, notably the one by APS, provide an illustrated tour of the history of physics. Of course, not all the students in India have high-speed internet access and, with the risk of sounding a bit old-fashioned, internet browsing does not even come close to the sheer pleasure of stretching out on a couch and reading a book. For children, and some enlightened adults, comic books are fun, captivating and one can never have enough of them. Thus, it is great that the author has told the story of physics in a comic book format. The narration is, to a large extent, smooth with lots of humour and the illustrations are nicely done.

The first part describes, not surprisingly, the development of classical mechanics, since the motion of the sun, moon and stars have always been a source of curiosity and wonder. Aristotle, Copernicus, Brahe, Kepler, Galileo and Newton being the main players, occupy a significant portion of the text. Wave vs particle as represented by Huygens vs Newton, the laws of Kepler, and the gradual eroding of Aristotle's hold are presented well. The part on electricity and magnetism is highlighted by the critical contri-

butions due to Cavendish (although he was trying to determine the earth's density rather than the mass or the gravitational constant), Volta, Ampere, and Faraday and culminates with the grand synthesis by Maxwell. Somehow, Nikola Tesla got left out! Still, the sequence of events leading up to Maxwell's unification of electricity and magnetism is described nicely in the book. I liked the fact that the particle vs wave fight, being one of the all time favourite bone of contention, has been given ample space with some really funny lines. A couple of pages are reserved for the whirlwind description of the creation of thermodynamics. Students would be familiar with most of the names like Joule, Carnot, Kelvin, Clausius (misprinted as 'Classius' a.k.a Muhammad Ali) and Boltzmann.

The rise of relativity and Einstein's contributions is probably the best written part of the entire book. The author manages to get across the excitement and finishes with a funny clip. The next fifteen or so pages is in real fast forward, accounting for the creation of quantum mechanics to the unification of weak and electromagnetic forces. Probably a little too quick, but then all of the story had to be told in fifty pages! Rutherford, Planck, Bohr, Schrödinger, Heisenberg, Dirac, Fermi, Bose, Yukawa, Schwinger, Tomonaga, Feynman, Gellmann, Salam, Weinberg, . . . whew! In comparison, the relatively recent book, not a comic book though, by Cropper (*Great Physicists – The Life and Times of Leading Physicists from Galileo to Hawking*) is 500 pages long.

Given that this book is into a second edition, I am amazed at the number of typographical errors. Some are rather innocuous, but there are certain errors that should have been weeded out in advance. For example, Boltzmann has been mentioned as K. L. Boltzman and S. Boltzmann. Similarly, Clausius is Classius, A. J. W. Sommerfeld is M. Sommerfeld, R. H. Fowler has become R. C. Fowler – minor errors surely, but they do stand out in a book dealing with the history of physics. In the details on Rutherford's experimental set-up, the labelling of the scintillating screen S is missing. More seriously, the binomial expansion of $(a + b)^4$ has a term $4ab^4$ and the Bohr's quantization lists the possible quantum number values of $n = 1/2, -3$. Along the same lines, an expression for the entropy (reversible or not) on the balckboard says $S = \int dQ$; Newton's gravitation force goes like G^{-2} , Young's destructive interference illustration is wrong, the periodic table

(also shown on the cover of the book) has sodium (Na) in place of neon (Ne), and seemingly bosons can have a spin of π ! Then there is a sketch which labels Newton's magnum opus as *Principia Mathematica*. There is a serious need for proper proof-reading of this book.

Surprisingly, C.-S. Wu (parity violation), Yang-Lee, Kammerligh-Onnes, Bethe, Chandrashekar, Glashow (although Salam and Weinberg, with whom he shared the Nobel, are shown), Born, Debye, Landau and many other stars of physics do not find a place in this book (except for one frame about the A-bomb project). Cosmology (Hubble, Friedman, Gamow, . . .) and condensed matter (Brillouin, Drude, Bloch, Kohn, . . .) are almost absent, but I hope the next edition will consider adding a few more pages to do justice. The book seems to credit Boltzmann with the expression for pressure as obtained by kinetic theory of gases. This cannot be right since Bernoulli and Maxwell had already worked it out. Moreover, in 1845 Waterston (an unsung hero, see S. G. Brush's three volumes on kinetic theory of gases) had already obtained this expression during his stay in India as an officer of the East India Company! At the same time the book does not do justice to the development of classical mechanics from Poincaré onwards. One page on nonlinearity, chaos (Lorenz, May, . . .) and turbulence (Reynolds, Prandtl, . . .) would have added tremendously to the content and illustrated the diversity of the subject. I hope the next edition will take this and the aforementioned comments into account.

In the very end of the book is a remark which borders on being flippant – the most fashionable pastime nowadays is based on a formalism called 'superstrings'. No, I am not a string theorist, but such remarks do not have any place in a book meant for high-school students with their impressionable minds. However, I am impressed with the amount of effort that has gone into the making of this book and appreciate the thought behind creating the book. With some more effort this book will get better and perhaps many children will pick up a copy along with the usual *Asterix* and *Tintin* classics!

SRIHARI KESHAVAMURTHY

Department of Chemistry,
Indian Institute of Technology,
Kanpur 208 016, India
e-mail: srihari@iitk.ac.in