Eugene N. Parker's *Cosmical Magnetic Fields* (Oxford U. Press, 1979), and *Lectures on Solar and Planetary Dynamos*, edited by M. R. E. Proctor and A. D. Gilbert (Cambridge U. Press, 1994).

Solar and Stellar Magnetic Activity is highly recommended for solar–stellar graduate students, for solar physicists wanting to learn more about other stars, and for stellar astronomers who are unfamiliar with recent developments relating to our Sun.

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Laser: The Inventor, the Nobel Laureate, and the Thirty-Year Patent War

Nick Taylor
Simon Schuster, New York, 2000. $27.50 (304 pp.). ISBN 0-684-83515-0

The brief title, *Laser*, is not descriptive of the contents of Nick Taylor's book. The extended title, *Laser: The Inventor, the Nobel Laureate, and the Thirty-Year Patent War*, doesn't quite do it either. The contrast between the motivation of the inventor, R. Gordon Gould, and the scientist–scholar and Nobel laureate, Charles H. Townes, is emphasized throughout this book. But the book's main purpose seems to be to tell the story of the life of Gould—one piece of the laser story remaining to be told.

Joan Lisa Bromberg wrote a well-balanced, scholarly account of laser history, *The Laser in America* (MIT Press, 1991). The life story of Townes is readily accessible in two recent autobiographical volumes, *Making Waves* (American Institute of Physics, 1995), and *How the Laser Happened* (Oxford U. Press, 1999). They carry the main historical line very well. But it is interesting and important to augment the historical perspective with Taylor's account. It is not a scholarly work, but is rather a fast-moving story of the life of Gould, the inventor of the laser, who, in his mid-thirties, was an older-than-average graduate student at Columbia University in the mid-1950s. Gould was working on a doctoral thesis involving optical pumping of thallium atoms, under the supervision of Polykarp Kusch.

In November 1957, Gould had his original ideas about a laser, a word he first coined at that time, and of many possible applications of such a device. He had those ideas witnessed and notarized. He quit Columbia University in the spring of 1958 without obtaining a doctorate and joined forces with a small research company known as TRG. On the basis of Gould's ideas, TRG obtained a major research contract from the Advanced Research Project Agency to develop one or more types of lasers. This project was classified because of the laser's many potential military applications. On the basis of Gould's previous involvement with communist ideas, mainly inspired by a former girlfriend, he was denied security clearance and effectively barred from working on his own invention.

The story continues with a somewhat bewildering array of venture capitalists, patent lawyers, and several companies intent on purchasing Gould's patent rights. Gould was never embittered by the lack of recognition, but he firmly believed in his invention and continued, over three decades, to fight for financial remuneration. He managed to remain actively employed, first at the Brooklyn Polytechnic Institute and later with a small technology company. He enjoyed sailing and traveling. The description of a succession of female friends and wives provides a welcome break from the continuous string of legal and financial issues. The later court proceedings, during which Townes and Peter Franken appeared as witnesses, are described in some detail. It must have been a source of great satisfaction to Gould that, at age 80, he could celebrate, with his early colleagues from TRG, both his final patent-court victories and the publication of Taylor's book.

The book is easy to read, if one is not perturbed by a number of obvious inaccuracies. On page 40, one reads, for example, "The American Physical Society, a sort of Royal Academy for physicists. . . ." On page 51, it is stated that James Gordon, Herbert Zeiger, and Townes published the first successful operation of their ammonia beam maser in *Physical Review Letters*. Actually it was a letter in *Physical Review* of 1954; *Physical Review Letters* was started several years later. There is a one-liner on I. I. Rabi on page 41 that reads, "Rabi was short, about fifty-two, but in no other way was he diminutive." One wonders what is so diminutive about that particular age.

Other well-known scientists who played a role in laser history are mentioned briefly, but usually not more than a few random tidbits are provided. And it seems odd to me, at least, that I was unable to find even one tidbit about my own electromagnetic pumping patent on the three-level maser. The book is aimed at a wide general audience interested in the scientific endeavor and in the social, human, and legal aspects of the pursuit of patents. Laser specialists, physicists, and other scientists will also enjoy reading the story of Gould, which simply had to be told.

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An Introduction to Turbulent Flow

Jean Mathieu and Julian Scott
Cambridge U. Press, New York, 2000. $90.00, $39.95 paper (374 pp.). ISBN 0-521-57066-2, ISBN 0-521-77538-8 paper

Some 20 years ago, an instructor of a turbulence course had a limited choice of textbooks. Even the selection of monographs that could be used to supplement one's notes was not very large. Now a number of books are available. I count that number to be between 20 and 40, depending on how generously I include some special-purpose books. One explanation is clearly that this vast subject is getting further attention because of the strengthening of its ties to mainstream physics and modern mathematics.

Turbulence has excited—though sometimes only fleetingly—the interest of diverse groups of people, ranging from field theorists to practicing engineers, and it is no longer possible to include in a single book all the major developments that have resulted from this interest. Another intrinsic reason for the multiplicity of books is that consensus regarding the significant and essential topics does not exist among those familiar with the field. Different books, emphasizing different aspects of the subject that are at different levels of maturity, are therefore an inevitable consequence.

The authors of *An Introduction to Turbulent Flow*, Jean Mathieu and Julian Scott, have had extensive research and teaching experience in turbulence at their home institution (L' Ecole Centrale de Lyon) and elsewhere. They have drawn on that experience to produce a textbook meant primarily for graduate students in engineering, applied science, and applied mathematics. Their aim is to provide the students with solid grounding in physical ideas, orders of

magnitude estimates, and a mathematical framework.

A brief summary might alert the reader to the book's contents: The first three, introductory, chapters are followed by the basic theory of single-point statistics arising from the equations of motion (chapter 4) and examples of classical engineering flows (chapter 5). Chapter 6 is a description of spectral (and multipoint) analysis, and chapter 7 deals with Andrei Nikolaevich Kolmogorov's ideas (in both 1941 and 1962). The book ends with a description in chapter 8 of numerical simulation of turbulent flows; direct numerical simulations, large eddy simulations, and engineering closure schemes are described briefly. The material is more or less standard for a course taught in a US engineering science department to students with a moderate background in fluid dynamics.

The character of a book is determined at least partly by the care with which the material is presented, and this one amply demonstrates the care that the authors have invested. For instance, their treatment, in chapter 3, of length and time scales is lively and refreshing, and their description of the physics of shear flows, without much use of mathematical equations, though somewhat longish, makes rewarding reading. The authors have succeeded in the task they set out to do, and I recommend the book to all students of turbulence, no matter what their persuasion. Patient students who work their way through the authors' arguments will be rewarded by an improved intuition for the subject.

What, then, are its shortcomings? One could say that some details of the analysis of the turbulent boundary layers are slightly unconventional (and the appendix A to chapter 5 is hard to penetrate); the references are sometimes idiosyncratic and incomplete; the book avoids mention of such controversies as logarithmic versus power laws in the intermediate layer of the boundary layer and the existence or otherwise of power laws in the inertial range; and so forth. These issues and more modern developments will perhaps receive their due share of attention in the second volume the authors have promised. And, for a book aimed essentially at students, it would have been better had it included some exercises on which students could test their understanding and mastery.

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Handbook of Medical Imaging. Volumes 1–3

Volume 1: Physics and Psychophysics
Edited by Jacob Beutel, Harold L. Kundel, and Richard L. Van Metter
$110.00 (949 pp.).
ISBN 0-8194-3621-6

Volume 2: Medical Image Processing and Analysis
Edited by Milan Sonka and J. Michael Fitzpatrick
$130.00 (1218 pp.).
ISBN 0-8194-3622-4

Volume 3: Display and PACS
Edited by Yongmin Kim and Steven C. Horii
$110.00 (512 pp.).
ISBN 0-8194-3623-2

SPIE, Bellingham, Wash., 2000.
$315.00 set (2679 pp.).
Set no. PM81Z

Handbook of Medical Imaging, published by SPIE (The International Society for Optical Engineering) Press, is a three-volume edited reference providing a comprehensive overview of the theory and current practice of medical imaging.

Volume 1: Physics and Psychophysics, edited by Jacob Beutel, Harold L. Kundel, and Richard L. Van Metter, contains 20 chapters. Part I consists of 8 chapters devoted to the physics principles of medical imaging, and Part II covers psychophysics. *Volume 2: Medical Image Processing and Analysis*, edited by Milan Sonka and J. Michael Fitzpatrick, contains 19 chapters presenting the ideas and the methods of image processing and analysis that are at work in the field of medical imaging. *Volume 3: Display and PACS*, edited by Yongmin Kim and Steven C. Horii contains 13 chapters, with the first 7 on image display technology and the rest on PACS (Picture Archiving and Communication Systems).

These three volumes are probably one of the most comprehensive collections of topics in medical imaging available today, both in theory and practice. Each chapter is written by researchers in medical imaging who have participated frequently in the annual SPIE conference in medical imaging in southern California; for this reason, the chapters reflect the respective authors' accumulated knowledge, gained through years of interaction with colleagues in their field of expertise. Each chapter in these three volumes is self-contained and can be understood without referring to other chapters. The volumes can be used as a reference for the professional or as a textbook in medical imaging.

For educational purposes, chapters can be selected to form senior or graduate courses; the prerequisite would be a one-year course in image processing. The instructor can select different chapters according to the medical imaging curriculum and supplement with outside readings based on references given in the chapter. In addition, the instructor may want to formulate problem sets and experiments to augment the class lectures. The descriptions in each chapter of problems remaining to be solved could provide excellent ideas for dissertation research.

Medical imaging is physics, engineering, technology, and human acceptance and interaction. Although physics principles are the driving force in medical imaging, the roles of engineering and technology evolve through time and are dictated by user requirements and demand. The readers are cautioned that today's prevailing medical imaging technology may render itself obsolete in a very short time, because of technological advancement, human, and social factors. Medical imaging is not just the practice of science, but also the practice of art.

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Shoemaker by Levy: The Man Who Made an Impact

David H. Levy
Princeton U. Press, Princeton, N.J., 2000. $27.95 (303 pp.).
ISBN 0-691-00225-8

David H. Levy's *Shoemaker by Levy* is a love story. It is the story of Eugene M. "Gene" Shoemaker's love of geology, the story of the loving relationship between Gene and his remarkable wife, Carolyn, and it is the story of Carolyn's midlife discovery of a passion for comet and asteroid hunting alongside her husband and scientific colleague, Gene.

Levy is an astronomer well known for his comet discoveries. He met Gene and Carolyn in 1988, and developed a unique friendship and collaboration with them. The trio's mutual interest and complementary experience in comet observing quickly melded them into an observing team.

This is a book for anyone interested in modern planetary sciences, in the progression and expansion of classical