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Book Reviews

Steven C. Gustafson, Book Reviews Editor

Practical Laser Safety, Second Edition

D. C. Winburn, Vol. 18 in Occupational Safety and Health Series, Alan L. Kling, series editor, x + 241 pp., illus., index. ISBN 0-8247-8240-2. Marcel Dekker, Inc., 270 Madison Ave., New York, NY 10016 (1990) \$59.75 hardbound.

Reviewed by Leon Goldman, M.D., Naval Hospital, Department of Dermatology, San Diego, CA 92134-5000.

With his long practical experience as a laser safety officer at Los Alamos National Laboratory in the Laser Research and Technology Group "without an incident of permanent biological damage," D. C. Winburn should write good books on laser safety, and he does. He indicated that his goal is a "guide in applying fundamental principles of good laser safety practices."

There is extensive necessary use of Z136.1, Z136.2, and Z136.3. The most significant area in the book is the portion on eye safety. Emphasis on eye safety is made by numerous case reports. The multiple and difficult eye safety concerns of Nd:YAG harmonics and the different wavelengths of the flash-pumped dye laser are emphasized. For UV and IR, Winburn does believe that side shields are necessary.

ANSI, in thier review sessions, should consider Winburn's critiques for Z136.1 and his recommendations on page 142. Regarding Z136.3, "Laser Safety in Health Care Facilities," subsection 4.5.2.2, "Patient Eye Protection," he comments that suggestions should be given by Z136.3 for eye protection when protective glasses are not adequate; in particular, he suggests heavy pads over the eyes or specially folded heavy towels.

Since several fatalities from electricity in lasers have occurred among experienced electrical engineers, the section on electrical safety should be emphasized. Chemical safety is important, of course, with chemical lasers and the carcinogenic dyes and methanol of the flash-pumped dye lasers.

It is curious that discussions of laser hazards often do not include hazards of material processing of toxic materials with their plume frag-

ments and the possible presence of active viruses, especially AIDS, in laser surgery.

For a good practical book on laser safety for the shop, laboratory, biomedical facilities, and even for laser art, this book is highly recommended.

The Fabry-Perot Interferometer: History, Theory, Practice and Applications

J. M. Vaughan. Part of the Adam Hilger Series on Optics and Optoelectronics, E. R. Pike and W. T. Welford, series editors, xix + 583 pp., illus., subject index, reference/bibliography list, 20 appendixes. ISBN 0-85274-138-3. Adam Hilger, IOP Publishing Ltd., Techno House, Redcliffe Way, Bristol BS1 6NX, England (1989) \$130 hardbound.

Reviewed by James C. Wyant, Optical Sciences Center, University of Arizona, Tucson, AZ 85721.

While the Fabry-Perot interferometer is an extremely useful instrument, this reviewer would have never dreamed that a person could write a 583-page book on the subject, but J. M. Vaughan has done so, and indeed the result is extremely well written and interesting.

The book consists of 10 chapters and 20 appendixes. There is also a short biographical sketch on Charles Fabry and Alfred Perot at the beginning of the book. There are 55 pages of references at the end of the text and three pages of historical references at the end of the first chapter.

Chapter 1 gives historical background of the Fabry-Perot interferometer. It is interesting to note that George Airy, an English astronomer, had actually performed a theoretical analysis of the interference phenomena due to waves successively reflected between two parallel thinly silvered plane glass plates 60 years before Fabry and Perot did their work. While Fabry and Perot did not actually invent the instrument that bears their name, they did realize that the sharp, multiple-beam fringes offered great precision for a wide range of applications in metrology and spectroscopy, and they published a series of brilliant papers that developed the underlying

principles, described several superbly constructed interference instruments, introduced and evaluated experimental methods and techniques, and illustrated the potential applications with thorough measurements.

Chapter 2 introduces a number of basic optical and spectroscopic tools, both mathematical and technical, with particular emphasis on those appropriate to Fabry-Perot interferometry. Chapter 3 gives a detailed development of the theory and practice of the plane interferometer on the basis of the simple ray treatment. The important parameters of light gathering, finesse, resolving power, and overlap of orders and the effect of plate imperfections are discussed. Chapter 4 then discusses the technical aspects of the design and operation of plane Fabry-Perot interferometers.

The spherical Fabry-Perot interferometer is described in Chap. 5. The discussion of the spherical Fabry-Perot is the most complete discussion on the topic known to this reviewer. Chapter 6 gives a description of the use of multiple and multipass Fabry-Perot interferometers.

The last four chapters discuss various applications of the Fabry-Perot interferometer. Chapter 7 discusses the applications to atomic spectroscopy, which date back to the early days of the Fabry-Perot interferometer. Applications to astronomy and astrophysics are discussed in Chap. 8. It is estimated that a third of the Fabry-Perot interferometers in use are devoted to astronomical research or astrophysics. Chapter 9 discusses the applications to light scattering studies of materials. Chapter 10 discusses various applications to metrology, optical bistability, velocimetry, infrared, sensors, plasma physics, and miscellaneous devices. The book concludes with 20 appendixes on topics such as the first Fabry-Perot interferometer, intracavity effects, fundamental limits to the precision of spectroscopic measurements, piezoelectric materials and transducers, Gaussian beam propagation, use of retroreflecting prisms in multipass operation, and channel spectra for continuum and absorption line studies.

Overall, the book is excellent. References are good, figures are good, and the writing is excellent. The book will be useful for many years to come. ☺