

Waals forces: The force between macroscopic objects is not simply the sum of pairwise van der Waals forces. (The force can be repulsive or attractive, and intuition is no guide as to which it should be in different geometries. The same is true for conductors; Casimir thought that a conducting spherical shell would have an attractive force, whereas Timothy Boyer in 1968 found that the force is actually repulsive.) In the limit of dilute media, however, the nonadditive effects are small and the pairwise approximation is accurate. I thought that was well known—albeit subject to divergence issues—but the author credits recent work for the demonstration that “for tenuous media the Casimir effect and the sum of molecular van der Waals forces are identical.”

Milton concludes that “remarkably little” has been learned about Casimir effects “in the more than 50 years since Casimir’s brilliant observation.” His book, however, proves that this has not been for lack of first-rate theoretical work.

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Laser Remote Sensing of the Ocean: Methods and Applications

Alexei Bunkin
 and Konstantin Voliak
Wiley, New York, 2001. \$99.95
(244 pp.). ISBN 0-471-38927-7

Although hydrographic applications are the focus of Alexei Bunkin and Konstantin Voliak’s *Laser Remote Sensing of the Ocean*, the title belies the book’s breadth: nearly half of the text is devoted to general, nonmarine techniques in laser remote sensing. The diverse range of topics covered includes airborne terrain mapping, Doppler measurement of wind speed, and the measurement of atmospheric composition, thermodynamic states, aerosol concentrations, and gaseous pollutants.

The book does not cover the most recent developments in the fast-moving area of ice and vegetation canopy-mapping lidars, made possible by advanced detector arrays and digitizers. It does, however, provide a review of much of the earlier literature, both Soviet and American. It also acts as a bridge between the hydrographic

work through the 1980s of the General Physics Institute (GPI) of the Russian Academy of Sciences and US airborne laser practices at NASA’s Wallops Flight Facility in Virginia. This kind of remote-sensing research has many implications for remote environmental monitoring from aircraft.

Airborne and orbital lidars typically direct more than 10^{18} photons toward Earth’s surface each second. Some photons are scattered elastically at their original wavelength from the ground, and by Rayleigh and Mie scattering from water and clouds. A handful may be detected at the receiver. Time of signal arrival is the primary interest for mappers, whose spectral window is intentionally restricted to the transmitted frequency. In the visible spectrum—using doubled neodymium yttrium aluminum garnet (Nd:YAG) lasers at 532 nm—laser bathymetry can reach up to ten times the characteristic optical attenuation range, 50 m or more, before the signal is lost. Such penetration also makes possible the mapping of photosynthetic pigments and suspended particles in depth, through scattering and induced emission. For inland and coastal mapping, aircraft lidar mapping with satellite navigation provides

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decimeter accuracy and is more cost-effective than sonar.

Inelastic (Raman, Brillouin) scattering yields additional information about the molecular composition of the atmosphere and hydrosphere. The authors provide a detailed theoretical and experimental treatment of the response of gases and liquids to laser illumination. The spectral scattering properties of the ocean may be digitized as functions of time. Spectral components of the Raman-scattered light depend on water-column temperature and salinity. Fluorescence of pigmented algae and inorganic material competes with Raman scattering in the temporally varying spectrum of returned light. Fluorescence permits quantification of sediment load and, through phytoplankton fluorescence, the major biota as well. Illuminated in the UV, petroleum oil spills may be identified: Fluorescence from lighter Ekofisk petroleum persists much longer than that from Arabian heavy oils.

This book should be a useful reference primarily for specialists in remote studies of the oceanic biosphere. Subjects are not always accurately indexed, the illustrations are monochromatic, and the equipment described is sometimes dated. But the book provides an excellent overview of the theory and practice of spectral lidar remote sensing for the evaluation of marine environments.

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New Books

Acoustics

Sound-Flow Interactions. Y. Aurégan, A. Maurel, V. Pagneux, J.-F. Pinton, eds. *Lecture Notes in Physics* 586. Proc. sch., Corsica, France, June-July 2000. Springer-Verlag, New York, 2002. \$57.00 (286 pp.). ISBN 3-540-43332-5

Astronomy and Astrophysics

AMiBA 2001: High-Z Clusters, Missing Baryons, and CMB Polarization. L.-W. Chen, C.-P. Ma, K.-W. Ng, U.-L. Pen, eds. *Astronomical Society of the Pacific Conference Series* 257. Proc. wksp., Taipei, Taiwan, June 2001. Astronomical Society of the Pacific, San Francisco, 2002. \$57.00 (342 pp.). ISBN 1-58381-097-8

Astronomical Instrumentation and the Birth and Growth of Astrophysics: A Symposium Held in Honor of Robert G. Tull. F. N. Bash, C. Sneden, eds. *Astronomical Society of the Pacific Conference Series* 270. Proc. symp., Austin, Tex., Oct. 2000. Astronomical Society of the Pacific, San Francisco, 2002.

\$57.00 (159 pp.). ISBN 1-58381-110-9

Astronomical Site Evaluation in the Visible and Radio Range: IAU Technical Workshop. J. Vernin, Z. Benkhaldoun, C. Muñoz-Tuñón, eds. *Astronomical Society of the Pacific Conference Series* 266. Proc. wksp., Marrakech, Morocco, Nov. 2000. Astronomical Society of the Pacific, San Francisco, 2002. \$57.00 (615 pp.). ISBN 1-58381-106-0

Census of the Galaxy: Challenges for Photometry and Spectrometry with GAIA. V. Vansevičius, A. Kučinskas, J. Sudzius, eds. Proc. wksp., Vilnius, Lithuania, July 2001. Kluwer Academic, Norwell, Mass., 2002. \$69.00 (194 pp.). ISBN 1-4020-0596-2

Highlights of Astronomy. Vol. 12. H. Rickman, ed. Proc. symp., Manchester, UK, Aug. 2000. Astronomical Society of the Pacific, San Francisco, and International Astronomical Union, Paris, 2002. \$95.00 (785 pp.). ISBN 1-58381-086-2

The Origins of Stars and Planets: The VLT View. J. F. Alves, M. J. McCaughrean, eds. *ESO Astrophysics Symposia*. Proc. wksp., Garching, Germany, Apr. 2001. Springer-Verlag, New York, 2002. \$49.95 (515 pp.). ISBN 3-540-43541-7, CD-ROM

Particles and Fields in Radio Galaxies. R. A. Laing, K. M. Blundell, eds. *Astronomical Society of the Pacific Conference Series* 250. Proc. wksp., Oxford, UK, Aug. 2000. Astronomical Society of the Pacific, San Francisco, 2002. \$57.00 (505 pp.). ISBN 1-58381-090-0

Relativistic Flows in Astrophysics. A. W. Guthmann, M. Georganopoulos, A. Marcowith, K. Manolakou, eds. *Lecture Notes in Physics* 589. Proc. conf., Mykonos, Greece, Oct. 2000. Springer-Verlag, New York, 2002. \$57.00 (241 pp.). ISBN 3-540-43518-2

Stellar Collisions, Mergers and Their Consequences. M. M. Shara, ed. *Astronomical Society of the Pacific Conference Series* 263. Proc. symp., New York City, May-June 2000. Astronomical Society of the Pacific, San Francisco, 2002. \$57.00 (426 pp.). ISBN 1-58381-103-6

Tracing Cosmic Evolution with Galaxy Clusters. S. Borgani, M. Mezzetti, R. Valdarnini, eds. *Astronomical Society of the Pacific Conference Series* 268. Proc. wksp., Alto Adige/Südtirol, Italy, July 2001. Astronomical Society of the Pacific, San Francisco, 2002. \$57.00 (468 pp.). ISBN 1-58381-108-7

Atomic and Molecular Physics

Optical Harmonics in Molecular Systems: Quantum Electrodynamical Theory. D. L. Andrews, P. Alcock. Wiley-VCH, Hoboken, N.J., 2002. \$110.00 (241 pp.). ISBN 3-527-40317-5

Popularizations

Encyclopedia of Science and Technology. J. Trefil, ed. Routledge, New York,

2001. \$50.00 (554 pp.). ISBN 0-415-93724-8

A Matter of Degrees: What Temperature Reveals About the Past and Future of Our Species, Planet, and Universe. G. Segrè. Viking, New York, 2002. \$24.95 (300 pp.). ISBN 0-670-03101-1

Patterns in the Void: Why Nothing Is Important. S. F. Odenwald. Westview Press, New York, 2002. \$27.00 (270 pp.). ISBN 0-8133-3938-3

The Physics of Baseball. 3rd edition. R. K. Adair. Perennial, New York, 2002 [1994]. \$12.95 *paper* (169 pp.). ISBN 0-06-008436-7

Platonic & Archimedean Solids. D. Sutton. *Wooden Books*. Walker, New York, 2002 [1998, reissued]. \$10.00 (58 pp.). ISBN 0-8027-1386-6

The Red Limit: The Search for the Edge of the Universe. 2nd edition. T. Ferris. Perennial, New York, 2002 [1983, reissued]. \$14.95 *paper* (286 pp.). ISBN 0-688-01836-X

The Science of Soccer. J. Wesson. IOP, Philadelphia, 2002. \$24.00 *paper* (199 pp.). ISBN 0-7503-0813-3

Seeing in the Dark: How Backyard Stargazers Are Probing Deep Space and Guarding Earth from Interplanetary Peril. T. Ferris. Simon & Schuster, New York, 2002. \$26.00 (379 pp.). ISBN 0-684-86579-3

Slicing Pizzas, Racing Turtles, and Further Adventures in Applied Mathematics. R. B. Banks. Princeton U. Press, Princeton, N.J., 2002 [1999, reissued]. \$16.95 *paper* (286 pp.). ISBN 0-691-10284-8

Stonehenge. R. Heath. *Wooden Books*. Walker, New York, 2002 [2001, reissued]. \$10.00 (58 pp.). ISBN 0-8027-1385-8

Towing Icebergs, Falling Dominoes, and Other Adventures in Applied Mathematics. R. B. Banks. Princeton U. Press, Princeton, N.J., 2002 [1998, reissued]. \$16.95 *paper* (326 pp.). ISBN 0-691-10285-6

The Two-Mile Time Machine: Ice Cores, Abrupt Climate Change, and Our Future. R. B. Alley. Princeton U. Press, Princeton, N.J. 2000. \$17.95 *paper* (229 pp.). ISBN 0-691-10296-1

What Are the Chances? Voodoo Deaths, Office Gossip, and Other Adventures in Probability. B. K. Holland. Johns Hopkins U. Press, Baltimore, Md., 2002. \$24.95 (141 pp.). ISBN 0-8018-6941-2

Society and Government

Radiation Protection: A Guide for Scientists, Regulators, and Physicians. 4th edition. J. Shapiro. Harvard U. Press, Cambridge, Mass., 2002 [1990]. \$69.95 (663 pp.). ISBN 0-674-00740-9

Space and Planetary Science

The 23rd Cycle: Learning to Live with a Stormy Star. S. F. Odenwald. Columbia U. Press, New York, 2001. \$18.00 *paper* (207 pp.). ISBN 0-231-12079-6