of the universe—but they also show (and this I do indeed deplore) an almost naive confidence in the various hypotheses, some of which are quite half-baked. These, I suppose, have been proffered for the rational explanation of the observed patterns of radiation. The book would have been so much more valuable if statements such as "This is due to . . ." had been replaced by "Some astronomers have suggested that this can be explained by . . ." But then they do point out instances where explanations of certain phenomena (such as M 82, on page 186, or Cygnus A, on page 216), which were generally accepted some years ago, turned out to be false.

The lay public will hardly be impressed with the reliability of a fast-moving science when they find positive statements from one or two decades ago flatly contradicted in the contemporary literature. An assessment of the probability that a certain statement will be substantially revised in the foreseeable future requires a perspective that is more profound than that of most science writers. And yet this caution is necessary when one addresses, as the authors do, anyone but the inner circle of the cognoscenti.

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book note

Maxwell on Saturn's Rings
Edited by Stephen G. Brush, C. W. F. Everitt and Elizabeth Garber
199 pp. M.I.T. Press, 1983.
$25.00

Saturn's rings are an interesting subject not only for the physicist or planetary astronomer, but also for the historian of science. Galileo discovered the rings in 1610, but never understood their nature. In his simple telescope the rings appeared to him as protrusions from the planet, and only in 1656 did Christiaan Huygens, using a much better telescope, identify the phenomenon as rings.

Today, notwithstanding close scrutiny by space probes, the dynamics of the ring system remains a mystery. It was enough of a mystery for James Clerk Maxwell, who until 1856 never had expressed any interest in astronomy, to incite his mathematical study of the stability of the ring system, resulting in an essay that won the Adams Prize for the year 1856.

In this essay, entitled "On the Stability of the Motion of Saturn's Rings," Maxwell rules out the possibility that the rings can be solid or liquid, and concludes that "the rings must consist of disconnected particles; they may be either solid or liquid, but they must be independent." The volume also contains letters Maxwell exchanged with scientists and astronomers while he was working on the essay. Included are his correspondence with Harvard astronomer George Bond and several working papers. The essay and working papers give an especially interesting glimpse of how Maxwell tackled an extremely difficult problem by masterfully applying Newtonian mechanics, often with an uncanny awareness of the limitations of the mathematical tools available at his time. —AH

new books

Theory and Mathematical Physics

Advances in Applied Mechanics. Vol. 24. J. W. Hutchinson, T. Y. Wu, eds. 376 pp. Academic, New York, 1984. $89.00. *Compendium*

Methods in Radiative Transfer. W. Kalkofen, ed. 450 pp. Cambridge U.P., New York, 1984. $49.50. *Compendium*

Molecular Quantum Electrodynamics: An Introduction to Radiation-Molecular Interactions. D. P. Craig, T. Thirunamachandran. 324 pp. Academic, New York, 1984. $58.00. *Advanced text*

Asymptotic Behavior of Mass and Spacetime Geometry: *Lecture Notes in Physics.* Proc. Conf. at Oregon State Univ., Corvallis, Oregon, October, 1983. F. J. Flaherty, ed. 213 pp. Springer-Verlag, New York, 1984. $10.50

Boundary Integral Equation Analyses of Singular, Potential, and Biharmonic Problems: *Lecture Notes in Engineering.* D. B. Ingham, M. A. Kelmanson. 173 pp. Springer-Verlag, New York, 1984. $12.50. *Monograph*

The Experimental Foundation of Solid Mechanics: Mechanics of Solids I. J. F. Bell. 813 pp. Springer-Verlag, New York, 1984. $36.00

Fluctuations and Sensitivity in Nonequilibrium Systems: *Springer Proceedings in Physics 1.* Proc. Int. Conf. Univ. of Texas, Austin, Texas, March, 1984. W. Horsthemke, D. K. Kondepudi, eds. 273 pp. Springer-Verlag, New York, 1984. $28.00

Global Riemannian Geometry. T. J. Willmore, N. J. Hitchin, eds. 213 pp. Wiley, New York, 1984. $64.95. *Compendium*

Local Density Approximations in Quantum Chemistry and Solid State Physics. J. P. Dahl, J. Avery, eds. 851 pp. Plenum, New York, 1984. $125.00. *Compendium*

Mathematical Methods with Applications to Problems in the Physical Sciences. T. C. Bradbury. 702 pp. Wiley, New York, 1984. $37.95. *Text*

Atomic, Molecular and Chemical Physics

Surface Enhanced Raman Vibrational Studies at Solid/Gas Interfaces. *Springer Tracts in Modern Physics.* I. Pockrand. 164