integral techniques extensively, and thereby train the student for difficult problems in modern theoretical physics. They cover stochastic methods and show how to calculate observables, stressing the physical connection with path integrals. Broken symmetries and collective motion, both so essential to finite systems, are treated in excellent fashion by Jean-Paul Blaizot and Georges Ripka.

Problems are given in both books, and it is clear that both represent the distillation of much experience with graduate lecture courses in many-body problems.

Having emphasized the elegance and superb pedagogical bent of both books, I must say that—to my mind—neither is complete for a graduate course. More of the nitty-gritty needs to be dealt with, and calculations should be more directly connected with experiment. There is nothing like *The Theory of Quantum Liquids* by David Pines and Philippe Nozières (Benjamin, New York, 1966) for its particular topic, although that book is old and should be updated. The Pines–Nozières book is based very directly on Landau Fermi-liquid theory, which gives it a unity, and it draws rather direct connections with experiment. The Negele–Orland book outlines the Landau theory, but not in such a way that the reader will learn what a central role it plays in describing fermion systems.

Although the authors of these two books have specialized in nuclear theory, Brueckner theory is given short shrift, appearing as a special way of summing a selected set of diagrams. I've always felt the relationship between the elementary two-body force and the effective forces in the nuclear many-body system to be one of the most fascinating and basic nuclear problems; it has been central to understanding the nuclear many-body system. The idea that one can actually *calculate* effective interactions in nuclear systems from the two-body interaction doesn't come out in these books.

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False Prophets: Fraud and Error in Science and Medicine

Alexander Kohn
Basil Blackwell, New York, 1986. 226 pp. $24.95 hc
ISBN 0-631-14685-7

At a time when over 100 members of the Reagan Administration have de-

parted office under either criminal indictment or a cloud of ethical misconduct, it is not surprising to discover that science and medicine (though historically considered more hallowed realms than politics) have had their own share of ethical problems. Such cases as that of John Darsee, who fabricated research data while he was a postdoctoral fellow at the Harvard Medical School, are understandably the most notorious. A closer examination, however, reveals that breaches of ethics cover a broad spectrum ranging from flagrant fraud (including cases of outright plagiarism) to more subtle situations. The latter include multiple submissions of trivial variations of the same paper to several publications, automatic coauthorship for a nonsubstantive contribution to a publication, or a reviewer's lack of impartiality.

Alexander Kohn's *False Prophets* ranges wider, however, as is revealed by its subtitle, *Fraud and Error in Science and Medicine*. In addition to cases of conscious and calculated fraud, there are intriguing examples of "good faith" error originating from negligence, self-deception or whatever. These cases too can be incorporated in the archival literature.

The author is a medical researcher at the Tel Aviv Medical School, and a substantial fraction of recent scientific cheating has indeed occurred in biomedicine. Going beyond merely listing cases, Kohn attempts to examine how the existing state of affairs in a given discipline favors ethical misconduct. He also establishes a broad historical perspective by recalling questionable aspects of the work of some of the great scientific figures of the past.

Experiment and theory often show remarkable agreement when performed in the same laboratory. Kohn's chapter on "Experimenter Ethics" deals with such questions. Evidently bias, albeit subconscious, on the part of the investigator (not to be confused with ethical misconduct) often leads to misguided science. Thus the astronomer William Herschel was observing during March and April 1781 the planet Uranus (his own discovery). He reported an apparent increase in angular size with time, but we know there was actually an apparent decrease during that month. Herschel thought that the planet was actually an approaching comet.

Somewhat unnerving are cases where criticisms of results obtained by a prominent scientist are either rejected summarily or suppressed by the scientific establishment. The

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measurements of rotation of spiral nebulae by the astronomer Adrian van Maanen at the Mount Wilson Observatory were later disproved by Edwin Hubble, working at the same institution. The administration at Mount Wilson attempted to dissuade Hubble from publishing his work on the grounds that such disagreements should be settled "in-house." Evidently van Maanen had read his expectations into the data. Similarly, George Ellery Hale's observations of Zeeman splitting in solar spectra seemed to confirm the presence of a solar magnetic field. Further examination of Hale's plates by others established that the data did not indicate the presence of any measurable magnetic field in the Sun.

The book presents a fairly comprehensive discussion of numerous scientific discoveries that were later disproved as being due to error, self-deception, confirmation of governmental policy, poor judgment or outright cheating. Some issues remain question marks. For example, it is still unclear how much recognition Harvey Fletcher (father of James Fletcher, NASA's current administrator), a graduate student working with Robert Millikan, deserves for his role in the oil-drop experiment, which measured the charge of the electron and for which Millikan received the Nobel Prize. Kohn also raises questions about Isaac Newton's treatment of his data, how well Gregor Mendel counted his peas, the information Margaret Mead obtained from Samoan girls and ethical problems in science popularization. He also covers several famous cases of wrong science: N rays, the Allison effect and polywater.

Perhaps the saddest instance of science gone wrong is the Lysenko era (1929–65) in the USSR, when Marxist ideology supported the political program of a pseudoscientist. Much harm was inflicted on agronomy and plant physiology in particular, adversely affecting Soviet agricultural progress. Some of the most prominent scientific experts were dismissed from their jobs, jailed or worse as a result of the authorities' interpreting Lysenko's brand of science as suitably supporting the class struggle.

Kohn's chapters on documented cheating and forgery include discussions of the Piltdown hoax and several biomedical projects using fictitious data. Toward the end of the book, he attempts to "digest" the earlier information in his chapters dealing with the pursuit of honesty and how to handle fraud in science. These discussions, along with occasional moralizing in the earlier chapters, are not strong points; however, the book is distinctly worth reading. Kohn has a fine writing style and he has carefully researched the factual data. The work illustrates what many scientists are still unwilling to admit, namely that the "ivory tower" of scientific research is not fully insulated from the questions of ethics and integrity that plague most human endeavors in the "real" world.

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Explorers of the Nucleus: Cyclotron Experiment 190

Audio-Visual Center, Indiana Univ., Bloomington, Ind., 1987. 60 min. color.
$700.00 16-mm film; $180.00 ¾" U-matic; $180.00 ½" VHS (rental $35.00 each)

Physics is the world view espoused by the community of people called physicists. Some of them use a common facility with many other physicists to increase the cost-effectiveness of the facility. The life style of such physicists shares many features with a wide variety of professions that use very expensive equipment. For example, personal time schedules are forced to serve the efficient schedule of the equipment as much for television producers as for cyclotron physicists.

Explorers of the Nucleus is a leisurely look at a team of physicists studying deuteron scattering with the cyclotron facility at the University of Indiana. The film illustrates the advanced planning required, the cooperative scheduling, the typical delays for particle-beam difficulties and vacuum leaks, the successful collection of the data, and the creative element of data analysis and explanation. The main characters are interesting, kindly white men with traditional life-styles who share a strong interest in physics. They and their wives are introduced and allowed to tell us a bit about themselves and the physics they do. For students planning a career in physics, this film can serve as a visual introduction to the life style of large-facility users.

But some aspects of the film bother me. It seems to me like a 1950s film in the 1980s. The film implies that physics is harder than other forms of human intellectual activity. I doubt if that's really true, although we physicists like to believe it, and I object to physicists allowing it to be claimed for them. The film shows physicists claiming both constructivist and mechanistic views of physics. One physicist sees doing physics as being like composing music or exploring a foreign country; another one stopped writing poetry when he became a physicist. These two opposing views would make a good classroom discussion, but they pass through the film with no comment. Finally, for a variety of reasons the culture of the US has turned women and some minorities away from physics as a career. Ought we to have yet another film showing only white men doing physics? We certainly cannot hide the racial and the sexual demography of the physics community, but in an era of pluralism we probably should not advertise them.

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BOOK NOTE

Darkness at Night: A Riddle of the Universe

Edward Harrison
Harvard U. P., Cambridge, Mass., 1987. 293 pp.
$25.00 hc ISBN 0-674-19270-2

"Darkness at Night," chapter 12 of Edward Harrison's *Cosmology: The Science of the Universe* (Cambridge U. P., New York, 1981), a remarkably lucid semitechnical text, contains historically and philosophically flavored reflections on the question, why is the sky dark at night?—still often called Olbers's paradox. Now Harrison has written a book with the same title. *Darkness at Night* informs lay readers about the groping attempts over the centuries to answer that seemingly trivial inquiry.

Before the 19th century, when Heinrich Wilhelm Olbers proposed an (incorrect) answer, Johannes Kepler, Edmond Halley and Jean-Philippe Loys de Chéseaux all had pondered the question and its implications for a model of the universe. Just as in a dense forest any line of sight will intersect a tree, so in the infinite Newtonian universe any line of sight eventually would intersect the surface of a star. Neither absorption of light by interstellar—or intergalactic—smog nor the cosmological redshift from the expansion of the universe can sufficiently account for the night sky's dimness.

Harrison has suggested that darkness at night results largely from a universe that is finite in time: The universe is too young for the starlight