

BOOKS

Radioactives substances (New York, Philosophical Library, Inc., 1961; \$ 2.75) is 'a translation from the French of the classical thesis presented to the Faculty of Science in Paris by the distinguished Nobel Prize winner Marie Curie'. Unfortunately (and this seems to be a common fault with such books from this publishing house), no indication is given of when the thesis was presented. We are told in an introduction that Mme Curie was awarded the Nobel Prize in 1911, also that she was born in Warsaw in 1867, entered the Sorbonne in Paris, in 1891, discovered radium in 1904 (actually 1898, she obtained separated salts in 1902), and died of the effects of its radiation in 1934. But the vital date, which would enable us to put into historical perspective what Marie Curie herself describes as 'an inclusive survey of the actual position', is missing.

The account itself is fascinating. One is struck straight away by its simplicity and directness, so different from much present-day writing. — 'We shall say that uranium, thorium and their compounds emit *Becquerel rays*. I have called *radioactive* those substances which generate emissions of this nature. This name has since been adopted generally'. There is thus little difficulty in following this story of the ideas and the work that led to the separation of the previously unknown substances polonium and radium, and the many investigations of the properties of the new atomic radiations. At the end, Marie Curie's particular contributions are pointed out, but in the main body of the thesis the general pattern of ideas and discoveries of that time is unfolded, with the names of many other scientists, some famous, others long since forgotten.

There is a foretaste of large-scale research to come, with laboratory chemical methods applied on a factory scale to enable a hundred milligrams or so of radium to be extracted from several thousand kilograms of uranium-ore residues. At the same time, their methods, both chemical and physical, were simple, although the care with which they were applied by Mme Curie and her collaborators is evident. That their enthusiasm carried them away, and made them oblivious to probable dangers, is clear from her descriptions of the effects of the radiation — paper became brittle, scorched, and finally full of holes; 'In one experiment, M. Curie caused a relatively weak radioactive product to act upon his arm for ten hours. The redness appeared immediately, and later a wound was caused which took four months to heal'; experiments are mentioned in which animals died in a few days. Yet she complains only that the ionization of the air in her laboratory, caused by the general 'background' of radiation and radioactive dust particles, destroyed the electrical insulation of their measuring apparatus.

In one other sense was Mme Curie blind, and it is very revealing to see how subject these scientists were to the prevailing beliefs, which included the immutability of the atom. She describes many different experiments on what she called 'induced radioactivity', all of which show quite clearly to a modern mind that her radium was emitting a gas that was itself radioactive. Yet she could write: 'Mr Rutherford suggests that radioactive bodies generate an emanation or gaseous material which carries the radioactivity. In the opinion of M. Curie and myself, the generation of a gas by radium is a supposition which is not so far justified. We

consider the emanation as radioactive energy stored up in the gas in a form hitherto unknown'. Their quantitative measurements of this time were well on the way to discovering the laws of radioactive decay, but to them radioactivity appears to have been something like the 'caloric' of an earlier generation. Certainly it was 'a profound and wonderful enigma'.

The translation seems good, apart from one or two glaring faults, but it must be said that the printing, including the number of errors, is not really worthy of the subject matter. The price seems high for such a publication, which is a pity, because the thesis is well worth reading.

A.G.H.

Teilchenbeschleuniger (Particle accelerators), by Rudolf Kollath (Braunschweig, Friedr. Vieweg & Sohn, 2nd edition, 1962; DM 42.—).

The appearance on the market of a new edition of this book is a sure indication that the first edition, now eight-years' old, has been a success with those for whom it was intended by its author, namely students and others interested in the problems of particle accelerators as a sideline to their main field of interest.

A glance at the list of collaborators who have written for this new edition shows also that Prof. Kollath, the editor and chief author, has been able to enlist the support of those who are working at the most advanced centres of accelerator theory and technique. The reader is thus assured of finding the most up-to-date information on the various methods that exist today for the acceleration of elementary particles. Moreover, despite comprehensive descriptions of the various types of accelerator and their corresponding problems, a serious attempt has been made to avoid over-long and complicated mathematical treatments. In style, the book is pleasant to read, and those who want to penetrate more deeply into the subject matter are led easily to the necessary specialized literature. It is, in fact, of great advantage to find a very complete bibliography at the end of the book.

The difficult task of finding German equivalents for English terms that have become well established in the international vocabulary of accelerator theory has been overcome skilfully (though this has not prevented the creation of 'Runzelröhre' for 'disc-loaded waveguide').

To sum up, the book can be recommended to the German-speaking reader who wants to become acquainted with the problems arising in the theory and practice of particle accelerators, and it can safely be used as a quick reference source by the more experienced reader.

F. Ferger

The Pergamon Press, Oxford, which is well known for its publications concerning nuclear physics and for its large collection entitled **Progress in Nuclear Energy**, has brought out a new volume devoted to **Law and Administration** (Volume III, 1962, edited by Jerry Weinstein; £7).

In view of the extremely rapid development of nuclear science, the Pergamon Press has catalogued the subjects covered, and the publications in the series *Progress in Nuclear Energy* have been subdivided into various groups.

The latest volume mentions the following twelve groups :

- I Physics and Mathematics
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- III Process Chemistry
- IV Technology and Engineering
- V Metallurgy and Fuels
- VI Biological Sciences
- VII Medical Science
- VIII Economics
- IX Analytical Chemistry
- X Law and Administration
- XI Plasma Physics and Thermonuclear Research
- XII Health Physics

The editor of the first two volumes of *Law and Administration* is Herbert Marks of Washington, D. C., a lawyer and legal adviser to various associations concerned with nuclear questions, whereas the editor of Volume III, the latest, is Jerry Weinstein, a lawyer educated in England, who occupies the post of 'Counsellor in charge of legal questions' at the O.E.C.D. in Paris.

The collection *Law and Administration* consists of two main elements. Part of it is devoted to the publication of the text of agreements and laws relating to nuclear subjects (Volume II and the annex to Volume III). Since the circles consulted seem to be on good terms with the American Administration, a number of internal US executive regulations have been included. All laws are quoted in English : the reader is therefore dependent on translations when the laws concerned are not those of an English-speaking country.

On the other hand, the greater part of *Law and Administration* is a collection of articles by various distinguished authors on the legal questions posed by nuclear development. There can be no question that the choice made by the editors is a wise one.

Volumes I and III contain numerous articles showing the many different aspects of the problems, comparing the legislation of different countries and discussing international agreements.

Personal legal theories are presented and defended with verve, which is perfectly natural. The books are intended both to give information and stimulate discussion. The questions raised are handled by writers whose professional work places them at the hub of such problems : it is a pleasure to note that the trend of atomic law is to abolish or attenuate the effects of geographical frontiers.

Frédéric Lehmann

Reactor Safeguards, by Charles R. Russel (Oxford, Pergamon Press, 1962 ; 80 s.), is a recent volume in the series of **International Monographs on Nuclear Energy** produced by Pergamon Press.

Safe operation of nuclear reactors has been a subject of concern ever since the first pile was successfully operated in Chicago in 1942. From that time on, attention to safety problems has gone hand in hand with the development of nuclear energy, and their study and solution today form a major part of the whole atomic-energy programme.

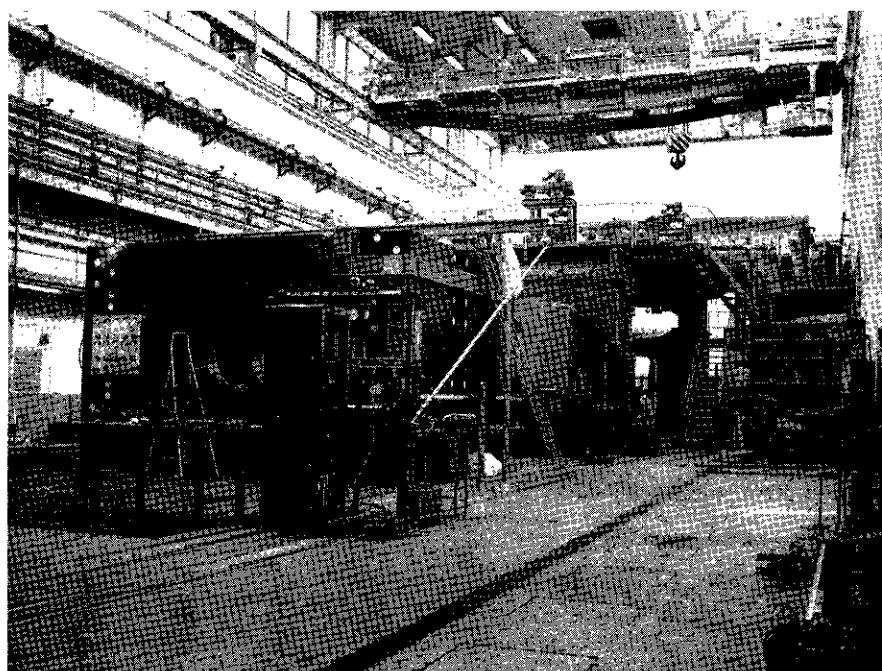
This book deals primarily with the way in which reactor safeguards have been developed in the United States, how the problems were studied, and how they were solved for existing reactors in the light of research and experience. Sufficient basic information on radioactivity and reactor physics is given to enable the safety problems to be judged effectively, and there is an impressive review of artificial reactor 'accidents' carried out to gain knowledge on the precautions that should be taken.

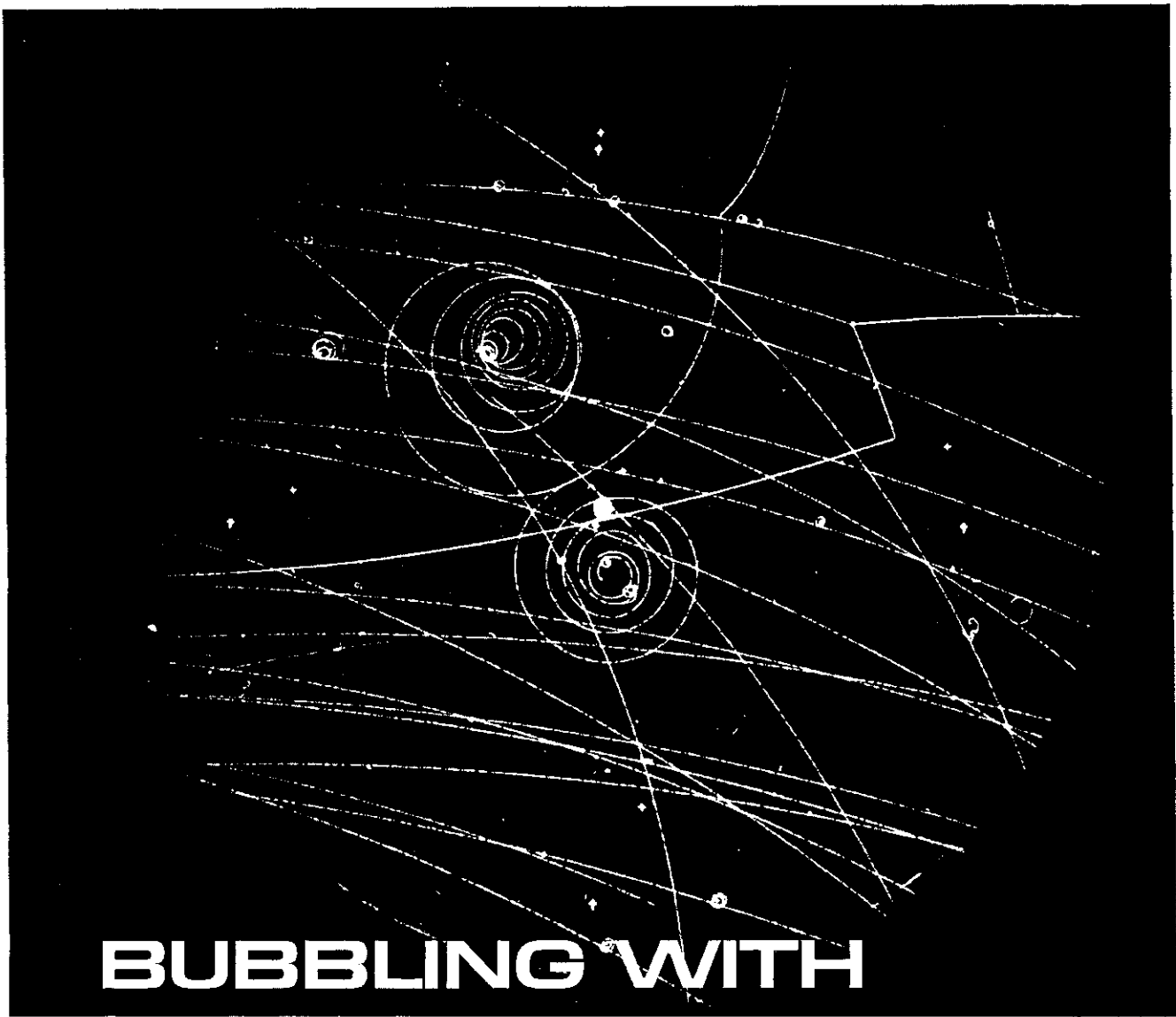
A large part of the book is devoted to detailed descriptions of every accident in the United States that has been accompanied by a significant release of nuclear energy and radiation. These make very interesting reading. It should be pointed out, however, that the book is not particularly suited as a reference book for reactor, or other, safety procedures ●

J. Baarli

* * *

At the beginning of March work was well under way again around the magnet of the British national hydrogen bubble chamber, in preparation for the arrival of the chamber itself and other associated equipment. This picture of part of the East bubble-chamber building shows the British chamber in front of the CERN 2-m bubble chamber, on which also steady progress is being made. In the right background is the nearly completed hydrogen refrigeration plant for the CERN chamber.





BUBBLING WITH NEW IDEAS AT -270°C

*Tracks of high energy particles
in a bubble chamber.*

The National Institute for Research in Nuclear Science has asked British Oxygen to design and build a refrigerator for use with a liquid helium bubble chamber. With this the institute will be investigating the paths and interactions of high energy particles.

The refrigerator, believed to be the largest of its kind in the world, will operate continuously at -269° to -270°C for periods of 30 days with an accuracy of $\pm 0.05^{\circ}$. It will provide 80 watts refrigerating capacity at these temperatures, plus another 500 watts at -193°C .

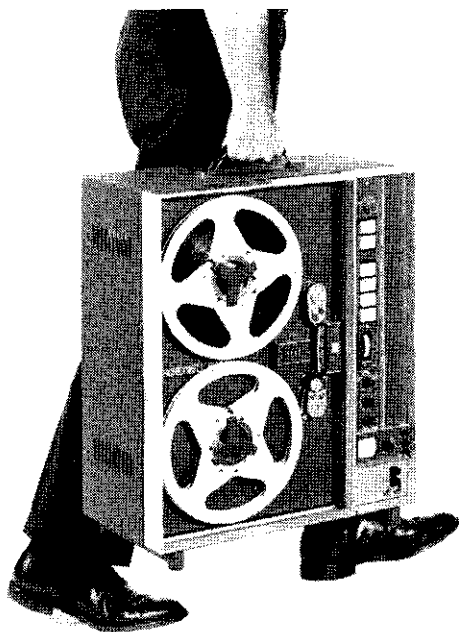
To meet this exacting and unique specification, the refrigerator is being specially designed by British Oxygen's Scientific Division. Many new techniques are being employed such as expansion turbines running on helium gas lubricated bearings at up to 350,000 r.p.m., and pipe-work lagged with reflecting layers of aluminium interleaved with glass fibre.

The plant will be constructed by British Oxygen's Engineering Division at Edmonton and will be installed and operating in 1964.

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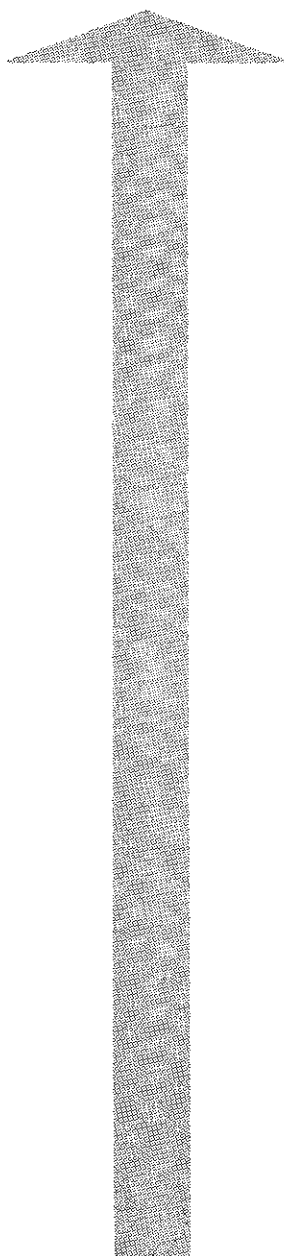
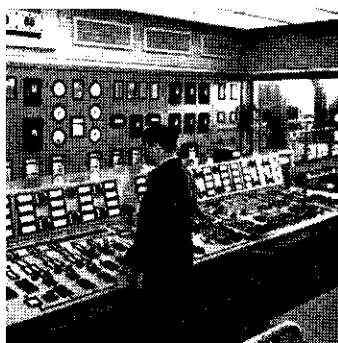
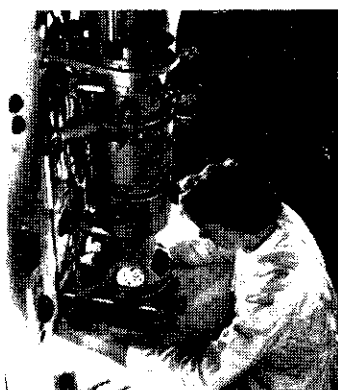
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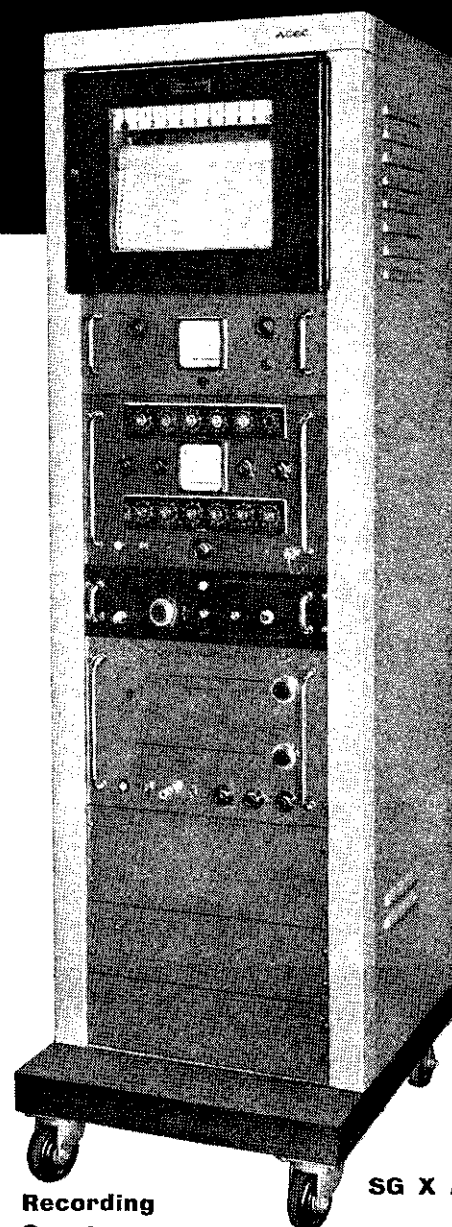
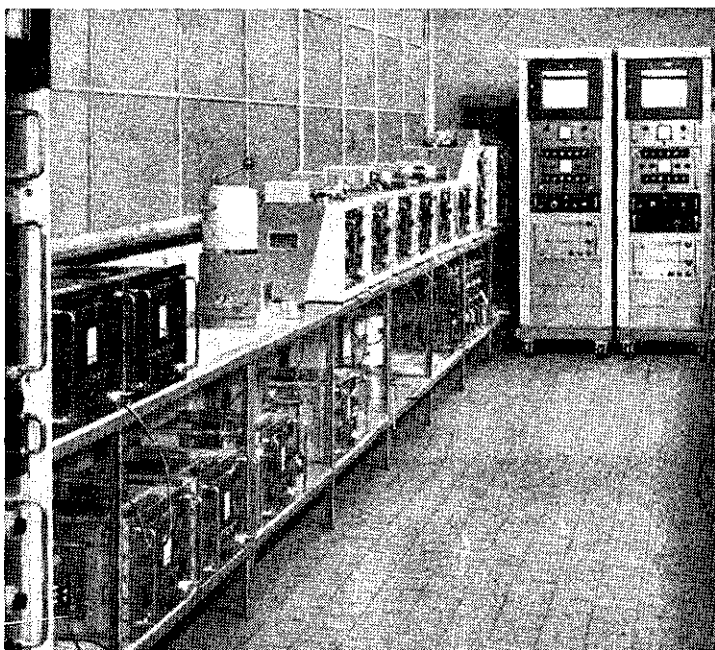
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