Neutron Physics. By K. H. Beckurts and K. Wirtz, translated by L. Dresner. Springer-Verlag New York Inc. (1964). 444 pages, $17.00.

This book represents the third stage in the evolution of a text based on some lectures given by K. Wirtz at the University of Gottingen beginning in 1951. An expanded version of these lectures *Elementare Neutronenphysik* by K. Wirtz and K. H. Beckurts was published in Germany in 1958. The present book represents a new edition rewritten almost exclusively by the junior author. The uniformly excellent English translation is by Lawrence Dresner of ORNL.

The purpose of the original lectures was to introduce the student of physics to the work of an experimental neutron physics laboratory. This flavor has been retained although the book has been greatly expanded to include several new chapters on experimental methods and on the theory of neutron slowing down and diffusion in nonmultiplying media. The book is divided into four parts, the first of which deals with general methods of producing neutrons and measuring their nuclear interactions. Part II deals with the general theory of neutron fields. Part III deals with special methods of measurement of neutron spectra. It includes such topics as foil activation and the theory of foil perturbations, threshold detectors for fast neutrons, neutron flux and source standardization, and the measurement of the spectrum of low-energy neutrons in bulk media. Part IV deals with the experimental determination of neutron transport parameters such as neutron ages and transport mean free paths by stationary methods and the recent investigations of neutron thermalization by pulsed-neutron and other nonstationary techniques.

The subject matter of *Neutron Physics*, while therefore quite wide, is generally handled with skill and restraint. The emphasis is always on physical ideas and on clarity of understanding. The book would make an excellent text for a course in experimental neutron physics or experimental reactor physics. While such courses are not usually given in this country, they might well be initiated in applied physics curricula. It is unfortunate that the price of the book is a bit high as a general text for students ($17.00).

By far the best sections of the book are those on neutron thermalization, which are very thorough and up-to-date. The sections on neutron sources and detectors are also excellent. In some areas we would have preferred a more expanded discussion, in some areas less. For instance, the material on solutions of neutron slowing-down and diffusion problems tends to become too categorical, or 'Wallace and LeCainish.' The discussion of epithermal neutron activation leans too heavily on the imperfect Westcott recipe. The discussion of the relationship between flux and power in research reactors is imprecise. The discussion of resonance absorption of neutrons covers only the old narrow resonance formula for homogeneous systems and little of the experimental work of the past several years.

In general, the book is spotty in its treatment of U. S. work, particularly that prior to 1956. Thus the section on sigma piles does not cover such early U. S. work as the cadmium shutter technique, the methods of source placement to eliminate low-order harmonics or the use of image theory. However, we learn that Heisenberg and others also used the cadmium shutter technique during the 1940s but in spherical rather than prismatic geometry.

There are many handy short tables and appendices which will be appreciated by the experimentalist even though such tables rapidly become obsolescent. The appendices include thermal-neutron cross sections, dilute resonance integrals, tables of E_n functions, and tables useful for the correction of foil activation data.

On the whole, this is an intelligent and intelligible book.

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About the Reviewer: Jack Chernick started his career as a pure mathematician. Since 1947 Mr. Chernick has been noted primarily for his theoretical reactor physics studies at Brookhaven. In addition to making contributions of his own to the theory of reactor statics and dynamics, as leader of a group of reactor physicists at Brookhaven he has run an "international school" which has produced many leading research workers in these fields. He initiated a number of novel breeder reactor and research reactor concepts including Brookhaven's HFBR. He is a Fellow of the American Nuclear Society.

Fundamentals of Heat Transfer. By Samson Semenovich Kutateladze. Academic Press Inc., New York City. (1963) 485 pages. $14.50.

Professor Kutateladze has written a heat transfer text that will be a pleasant surprise to those in this country working and teaching in the field, because of the universal pertinency of its treatment of the subject. It is, in addition, quite complete for its size; the coverage is well-organized and up-to-date and has a consistent and suitable depth.

After a descriptive introductory chapter, there are five 8- to 10-page chapters that give the fundamental equations for the topics of heat transfer to a moving medium; hydrodynamics; turbulence; boundary conditions; dimensional analysis and similitude. These chapters are concise but give the significant material—for instance, the last one shows the derivation of dimensionless ratios from the differential equations as well as from Buckingham's theory. The first of the longer chapters, VII, integrates the steady-state equations, including fins and heat generation, and has an excellent table of two- and three-dimensional conduction cases. Chapter VIII covers transient conduction and provides a full set of temperature-response curves for step and ramp changes with slabs, cylinders and spheres. Chapter IX starts convective heat transfer with detailed conventional descriptions of boundary layers and turbulence, and Chapter X gives the integrated results for laminar and turbulent flow at high and low Prandtl numbers. The next four chapters cover incompressible boundary layers, gases at high velocity or high vacuum, and natural convection. Chapters XV and XVI describe condensation in detail, including free-falling and high-velocity, liquid jets, and XVII and XVIII cover boiling and critical heat fluxes. Chapters on radiation from solids, gases, flames and furnaces, on heat-plus-mass transfer, and on mean temperature difference in heat exchangers, complete the book.

The above listing shows the coverage but not the detail. Frequently, novel treatments, results, or conclusions, which have not been generally known here because they were never translated or previously emphasized, will be found in the developments of conventional topics. The clarity and continuity of the presentation, developing from fundamentals to applications and to the analysis of empirical results, is particularly noteworthy.

On the other hand, there are departures from U.S. practice that will make this book somewhat less convenient to use here. Although there is a Table of Contents with the titles of the 21 chapters and 172 sections, there is no alphabetized index. The equations are photocopied from the Soviet edition, and in casual use may be somewhat inconvenient to transliterate (e.g. k is used for the overall coefficient U, α for h, F for heat transfer area A, γ for density ρ, A for the heat equivalent J, w for velocity u, etc.). All page numbers are missing from the bibliography, which may be a drawback in ordering photocopies or checking in books. Other references to significant data or conclusions are frequently by the author's name alone, without the publication or date. However, they would have appreciably lengthened the volume and, since the reader will be favorably impressed as to its reliability, a balance of factors might well justify their omission.

It is only natural for a book written in and for Russia that some 90% of the bibliography consists of Russian authors. For the U.S. specialist this will be no serious inconvenience—quite the contrary, it will provide him with an invaluable listing and coordination of the Soviet work in a form that can conveniently complement his own bibliographies. The printing and English are excellent, and typographical errata are practically nonexistent.

In summary, Professor Kutateladze's book will be a useful addition to the library of anyone in research, development or teaching in heat transfer or related fields. The editor, translator and publisher, as well as the author, deserve our congratulations on their venture.

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Inorganic Ion Exchangers. By C. B. Amphlett. Elsevier Publishing Company, Amsterdam, London and New York. (1964) 141 pages, 36 drawings and index. $6.50.

Although inorganic ion exchangers were the vehicle that brought the phenomenon of ion exchange to chemists' notice more than a century ago, the bulk of industrial applications have been based on organic ion-exchange resins. Nevertheless, soil scientists have always maintained an active interest in inorganic ion exchangers, ion exchange in the clay minerals being one of the chief factors determining soil fertility. Recently, soil scientists, ecologists and health physicists have become interested in ion exchange in soils