the
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physicist

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Vol. 8, number 5
MAY 1971

Registered for posting as a periodical—Category B
DIRECT NUCLEAR REACTION THEORIES
by N. Austern
This is a complete survey of the background and practical development of theories of direct nuclear reactions, furnishing a guide to modern research in this field.
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by E. Nasser
This is a lucid introduction to all phases of gaseous plasmas starting from the neutral state and proceeding gradually to the plasma state. Each chapter begins with the fundamentals and directs the reader to some of the latest advances.
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Vacuum Physics Group of the
Australian Institute of Physics

INTERNATIONAL VACUUM SYMPOSIUM

South Australian Institute of Technology
28th, 29th Feb., 1st Mar. 1972 inclusive

The symposium will be divided into two sections to run concurrently

i. theoretical vacuum physics
ii. applied vacuum physics

A number of invited speakers will give opening addresses at the various sessions.

In addition, titles of contributed papers are now being requested and may be sent to:

Vacuum Symposium Secretary,
School of Applied Physics,
South Australian Institute of Technology,
North Terrace, Adelaide,
South Australia 5000.
Australia.

Abstracts of papers and symposium registration will be called for in a future circular. Accommodation is available in either a university hall of residence or a hotel as required.
Australian Institute of Physics

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The Australian Physicist, May 1971  65
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MODERN PHYSICS AND THE PHYSICAL UNITS OF MEASUREMENT

J. C. Macfarlane
National Standards Laboratory

Recent developments in experimental physics have profoundly affected the field of physical units and standards. Since the adoption in 1960 of the krypton-86 emission wavelength as the international standard of length, there has been a strong trend towards the defining of other physical quantities in terms of atomic properties. There are obvious advantages in having standards which are based on the universal laws of atomic physics and quantum mechanics and which can be established by independent experiments in laboratories throughout the world. Any such experiment which is proposed as the basis for defining or maintaining a standard must of course be capable of yielding measurements at least as precise as those provided by other methods.

The International System of units (SI) comprises seven base units which form a coherent set and are sufficient in that units of all other physical quantities may be derived from them. The base units are: length (metre), time interval (second), mass (kilogram), current (ampere), temperature (kelvin), luminous intensity (candela), and quantity of matter (mole).

The atomic-cesium clock was adopted internationally in 1967 as the standard of frequency and time interval, thus improving by several orders the accuracy of local time-keeping. This standard (in common with other atomic clocks such as the hydrogen maser) is based on the precise frequency of electromagnetic radiation emitted or absorbed by an atom when it undergoes a particular unperturbed hyperfine transition. Recent advances in navigational precision (e.g. the Omega system), and in long-baseline interferometry (used for example in measuring the distance of stars) are directly dependent on the long-term stability of atomic clocks, which lose or gain no more than a few microseconds per month.

There is a subtle distinction to be made between the unit of a particular quantity, and the standard of that same quantity. For instance, the unit of current is defined as 'that constant current which if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 metre apart in vacuum, would produce between these conductors a force equal to 2 \times 10^{-7} \text{ N/m} of length'. Clearly an experiment with such conductors cannot be carried out, and practical determinations of the ampere (to accuracies of about $6 \times 10^{-9}$) are made using a current balance, by means of which the force between two solenoids is balanced against a known mass in a known gravitational field. Even this experiment is difficult and tedious, and working standards of current are maintained in other ways, for example by monitoring the precession frequency of protons in a standard water sample subjected to the magnetic field of a current flowing through a precision solenoid. Again, in many laboratories the current standard is derived from the local working standards of c.m.f. and resistance. This technique may well supplant those already mentioned, even for absolute determinations of the ampere, in the event that the volt (see below) achieves international acceptance as a standard based on the a.c. Josephson effect. At present the volt is regarded as a derived unit, and working standards are provided by assemblies of mercury-cadmium sulphate cells which, under carefully-controlled conditions, remain tolerably stable over long periods. Recent experiments on the a.c. Josephson effect show that a d.c. voltage may be related with high precision to a known microwave frequency. The relationship is absolute in the sense that the frequency/voltage ratio is completely determined by the value of the fundamental quantity $e/h$. The Josephson experiments provide the best means available for monitoring the stability of local voltage standards, and have also yielded the most precise values for $e/h$ yet obtained, but the absolute accuracy of these determinations (relative to the base units) is limited to that of the local voltage standards themselves. Thus any definition of the volt based on the Josephson effect will demand either the assignment of a particular internationally-agreed value to $e/h$, or the determination of $e/h$ in terms of the base units by some independent technique to similar precision (of order $2 \times 10^{-7}$). A further check on the assigned value of $e/h$ could be made by determining the volt by an entirely independent method. One such experiment which is being designed will use an electrostatic voltmeter to measure voltage directly in terms of mass and gravity to high precision. (Latest measurements of gravity have a precision of the order $1 \times 10^{-7}$.)

The ohm is at present the most accurately known of the electrical standards, and is defined absolutely in terms of the standard of length by means of the Thompson–Lampard calculable capacitor. By virtue of the special geometric configuration of this capacitor,
its a.c. impedance may be precisely calculated (to $7 \times 10^{-5}$) from a measurement by interferometric techniques of a single length. The major contribution to the quoted uncertainty comes from the value for the speed of light which enters as $c^2$ in the value for the permittivity of space used in calculating the capacitance.

The unit of length, which as mentioned in the opening paragraph was the first to be assigned an atomic definition (and which in this case is identical with the standard of length), has come under review in the past two years, in view of new developments in laser techniques. The essential breakthrough came with the stabilization of the wavelength of a helium-neon laser. The laser cavity tuning is servo-locked to an extremely narrow spectral line produced when a methane (infra-red line) or iodine-vapour (red line) absorption cell is saturated by the laser light. The stability of this wavelength is reportedly approaching that of atomic frequency standards (parts in $10^{10}$) and this experiment suggests further possibilities of measuring the speed of light to similar precision, using the frequency-wavelength relationship. Frequency measurements in the infra-red however are not yet sufficiently well developed to realize this possibility.

The mass standard has so far resisted the trend towards incorporation in an atomic system of definitions. Experiments in mass spectrometry by which one may relate the atomic mass unit (i.e. precisely one-twelfth the mass of the $^{12}$C atom) to the kilogram, cannot yet be carried out to sufficiently high precision. The International Prototype Kilogramme, a certain piece of platinum-iridium kept in the International Bureau of Weights and Measures, Paris, still constitutes the fundamental standard of mass.

Attempts are being made, using a version of the Josephson effect which occurs in superfluid helium (known as the Anderson–Richards experiment) to determine the mass of the helium atom directly in terms of the kilogram, but experimental difficulties so far have severely limited the attainable precision. Success in this experiment would also lead to an improved definition of the mole and Avogadro's number, which at present are based on electrochemical determinations of the Faraday, and on X-ray measurements of lattice spacings.

The units of temperature and luminous intensity are also defined in terms of non-atomic or macroscopic quantities (for example by gas thermometry, platinum resistance thermometry, and measurements of luminous flux from hot bodies). Experiments are nevertheless in progress which may result in the Josephson effects being applied to yet another technique, that of noise thermometry. In essence, a Josephson junction is used to detect the fluctuations of voltage occurring across a resistor due to thermal noise. The relationship between voltage and absolute temperature involves only the magnitude of the resistance and Boltzmann's constant, so that the technique may in principle lead to absolute temperature measurements down to the millikelvin region.

In photometry the possibility is being explored of abandoning the present primary standard of light and relating the photometric units directly to the unit of radiant power, the watt. As radiant power is best measured in terms of the electrical watt which itself is defined in terms of the base units mass, length and time, this proposal would relegate the candela to the position of a secondary unit. It has yet to be shown that radiant power can be measured accurately enough to justify the change, but a hopeful sign is that a recent measurement of the Stefan–Boltzmann radiation constant $c$ has been the first to agree closely with the theoretical value calculated from $c$, $h$, and $k$.

THE CALENDAR

**June**
8 Science and Technology in the USA—a point of view (NSW—7.45 p.m., University of Sydney);
Dr B. Hickman, ACI.

28 Ultrasound as a Surgical and Diagnostic Tool
(Uni. of Queensland, also 29 June at James Cook Uni.);
Mr G. Kosloff, Commonwealth Acoustic Laboratories.

**July**
13 Employment for Physics Graduates (NSW—6 p.m.
Univ. of Sydney); joint meeting with Students' Physical Society.

27 Physical Processes in the Solar Corona (Univ. of Queensland);
Dr R. H. Garstang, Univ. of Colorado.

**August**
16–19 The Eighth Australian Spectroscopy Conference
Monash University (see AP, Feb. 1971).

68 The Australian Physicist, May 1971

16–25 Twelfth International Conference on Cosmic Rays
Hobart (see AP, Feb. 1971).

20–22 Eleventh Conference on Physics in Medicine and Biology
(Biophysics Group, Melbourne).

23–27 Ninth International Conference of Medical Biology and Engineering, Melbourne.

**September**
Freeze-Drying of Foodstuffs (Uni. of Queensland);
Dr D. B. Smith, Department of Food Technology,
Queensland Agricultural College.

**October**
8 NSW Branch—one-day visit to Canberra and joint meeting with ACT Branch.

**November**
29–3 Dec. Fourth Australian Conference on Hydraulics and Fluid Mechanics
(Geophysics Group) Monash University.
SUMMER SCHOOL AND CONFERENCE, 1971

The 1971 Summer School and Conference of the Institute was held from 8–12 February at the University of New England with an attendance of 113. The School took the form of three parallel sessions on the subjects of Biophysics, Structure of Liquids, and Nuclear Physics. The lecturers and subjects were as follows.

Biophysics

Cell–Cell Interactions, B. W. Ninham (Applied Mathematics, ANU), three lectures. Macromolecules, P. Mason (Physics, Macquarie University), three lectures. Control Systems, E. P. George (Physics, University of NSW), three lectures. Thermodynamics, H. Coster (Physics, University of NSW), three lectures.

Liquids


Nuclear Physics


In addition, one session was held at which several research papers were presented on Nuclear Physics.

The organization of the School was of the high standard we have come to expect from the University of New England. The only fault lay in the weather, heavy rain prevented early morning tennis and other outdoor recreation and added adventure to journeys between the university campus and the town.

J. S. DRYDEN

NOTES AND NEWS

IUPAP News

International Conferences

Since the publication (Australian Physicist, Feb. 1971) of the list of International Conferences approved by the International Union of Pure and Applied Physics for 1971, two further Class 'C' Conferences have been approved by the Union. (Class C Conferences are small-sized meetings, often by invitation only, where specialists gather to assess progress in a very limited field.)


22. Quantum Solids, Banff, Canada, 5–10 Sept. Prof. J. Bardeen, Uni. of Illinois, Urbana, Ill. 61801, USA.

Additions to the SI System

The Symbols, Units, and Nomenclature Commission of IUPAP reports additions to the first list of units to be used with SI units. They are the atomic mass unit (u), the parsec (pc), and the astronomical unit (A.u.).

The rad (10^-6 J/kg) is given temporary status.

New Table of Atomic Masses

The Commission on Atomic Masses and Related Constants reports progress on its new tables of atomic masses and nuclear reaction energies. The new edition will contain, as well, graphs of nuclear-mass systematics and reaction energies for stable nuclide targets.

Helium Conservation

The International Commission on Very Low Temperatures has made an urgent plea for action on helium conservation. The USA program, begun in 1958, to accumulate $10^{11} \text{ ft}^3 (n.t.p.)$ has now achieved 25 per cent. of its objective, but the costly program may have to be abandoned. The Commission points out that unless fusion by-products or atmospheric separation become feasible (an unlikely short-term prospect), world helium supplies will run low. No other national efforts similar to that of the USA have been reported. The Commission therefore makes the urgent plea that helium conservation be considered a matter of grave importance by scientific organizations and national governments.

Acoustics Information

The International Commission on Acoustics has
set up an Information and Coordinating Centre, organized by Dr Kolmer of Czechoslovakia. It has already distributed one bulletin concerning international meetings of possible interest to specialists in acoustics.

**IUPAP Books in Manuscript Form**

The International Commission on Physics Education reports that two of its books written in collaboration with UNESCO are now in manuscript form. They are:

- ‘Source Book for Teaching of Physics in Secondary Schools’
- J. L. Lewis (UK) editor, and
- ‘New Trends in the Teaching of Physics’
- E. Nagy (Hungary), editor.

**Scope First Meeting**

The Special Committee on the Problems of the Environment set up by ICSU in 1970 has held its first meeting. Three working parties reported on:

(a) materials which significantly alter the biosphere; their determination and biological assessment;

(b) case studies of toxicology of chlorinated aromatic compounds; and

(c) scientific basis for management of man-modified ecosystems.

Further details may be obtained from the ICSU Secretariat (Rome). The matter of noise pollution, for which IUPAP’s representative, Dr A. Lara, was appointed, has not yet been raised.

**The Year of Copernicus**

It was decided at the recent General Assembly of the International Council of Scientific Unions (ICSU) to have 1973 marked by special events to commemorate the 500th anniversary of the birth of Nicolai Copernik.

**Association of Professional Scientists of Australia**

The Institute office has received a number of brochures from the Association of Professional Scientists of Australia (APSA).

APSA was formed in 1960, and is the body which represents scientists employed in private industry in proceedings before the Commonswealth Conciliation and Arbitration Commission. It is in fact the only body able to approach the Commission for Awards and salary increases for such scientists. It is an exclusively professional organization, the basic membership qualification being a BSc degree or equivalent. Since its formation, APSA has achieved substantial increases in the salaries of scientists employed in industry, and other scientists have benefited indirectly.

APSA maintains an office with staff under the direction of a full-time Executive and Industrial Officer, whose advice is freely available to members. The Association is able to negotiate directly with employers when the interests of its members are jeopardized. A recent example occurred with the closure of the Cresco Fertilizers Plant at Westernport, when three APSA members were retrenched. Intervention by APSA resulted in considerable improvements in their severance pay and other conditions.

Members of the AIP are urged to consider membership of APSA. The Entrance Fee is $2 and the Annual Subscription, which is deductible for taxation purposes, is $20.

Further information is available from the AIP office or from The General Secretary, Association of Professional Scientists of Australia, 5th Floor, 114 King Street, Melbourne, Victoria 3000.

**Australian Fracture Group**

The objects of the Group are as follows.

1. To foster study of fracture in Australia by:
   (a) providing a means for the circulation of reports between workers in the field of fracture,
   (b) making and maintaining contact with international bodies in the field of fracture, and
   (c) maintaining records of the study of fracture research in Australia.

2. To advance the application of knowledge to industry through standardisation of terminology and test methods in Australia.

On 18 February 1971, a meeting of the temporary officers of the Australian Fracture Group was held in Melbourne. At this meeting a constitution was drafted for presentation at the Annual General Meeting. If the AFG is to be successful, an active membership must be obtained and a call for members is now being made. The basic aim of the group is to encourage the exchange of ideas between all people working in fracture; hence all people interested, in, or working in, the field of fracture, whether on metals or non-metals, on the micro or macro scale are urged to become members. All persons wishing to become members or to obtain further information can do so by writing to the provisional secretary: Dr E. Banks, c/o BHP Research Laboratories, Clayton, Victoria. A membership fee of $2.00 is being asked for (students free), which will primarily be used to cover the cost of literature distribution.

When writing all persons are asked to list their areas of interest and if engaged in research or development work to briefly outline the project. This information is required for the records of current fracture work in Australia. A seminar dealing with fatigue is being planned to coincide with the Annual General Meeting.

**International Chemical, Petroleum and Gas Industries Exhibition for Australia in 1972**

Plans have been announced for a large international exhibition of equipment, machinery, and services provided by companies supplying to the chemical, petroleum, and gas industries, to be held at the Sydney Showground from 26 to 30 June 1972.

The exhibition is sponsored principally by the Australian Chemical Industry Council, the Heavy Engineering Manufacturers Association, the Chemical Engineering Association, The Institution of Gas
5. **Physics and Biology**

(a) Physical Environments of Plant Communities
(b) Radiation Biophysics
(c) Cellular Biophysics
(d) What is Biophysics?

In addition to invited papers, which will be presented at all five symposia, contributed papers will form part of symposia numbers 1 and 5.

**Queensland Branch**

Talks have been given on 23 March by Dr S. N. Milford, Head of Geo-Astrophysics Research in the Grumman Aircraft Corporation and Visiting Professor at the State University of New York, on 'The Dispersion of Pollutants around New York City' and on 6 April by Dr A. J. Lynch, University Fellow, Department of Mining and Metallurgical Engineering, University of Queensland, on 'Physicists and the Mining/Mineral-Processing Industry'.

**University of Melbourne**

The University of Melbourne has announced the appointment of two Professors in the School of Physics.

Dr Bruce J. H. McKellar, has accepted appointment to the Chair of Theoretical Physics which becomes vacant when Professor C. B. O. Mohr retires at the end of 1971. Dr McKellar will take up appointment in January 1972.

Dr McKellar is a graduate of the University of Sydney. He obtained his BSc degree with a University medal in 1962 and his PhD in 1966. He was appointed a lecturer in theoretical physics at Sydney University in 1965 and has subsequently been a Senior Lecturer in the same University. In 1967 and 1968 he was a member of the School of Natural Sciences in the Institute for Advanced Study, Princeton. Dr McKellar's research interests have been mainly in nuclear and high-energy physics and, at the age of 29, he has already published some 30 papers in these fields. His teaching experience at Sydney University has included courses in all years of the science course.

Dr Herbert H. Bolotin has accepted appointment to the Chamber of Manufacturers Chair of Physics.

Dr Bolotin obtained his PhD from Indiana University in 1955. He worked for three years with the US Naval Radiological Defense Laboratory and in 1958 accepted a Research Fellowship at the Brookhaven National Laboratory. In 1961 he was appointed an Assistant Professor at Michigan State University and in 1962 he took up his present position as a senior member of the staff of the Argonne National Laboratory in Illinois.

Dr Bolotin is an experimental physicist whose research interests are in low-energy nuclear physics, a field in which he has a wide reputation. He has more than 60 publications to his credit.

It is expected that Dr Bolotin will arrive in Australia in the middle of 1971.
On Walkabout

Dr A. G. Hearn

Dr Hearn will be arriving in Brisbane at the end of April to take up the H. C. Webster Fellowship in Physics at the University of Queensland. A Cambridge graduate, he took his PhD at the Cavendish Laboratory, then held various positions at the Harwell and Culham Laboratories of the UKAEA. Subsequently, he has worked briefly at JILA and the High Altitude Observatory, Boulder, at the Harvard College Observatory and, most recently, at the Observatoire de Nice where he held an ESRO Senior Research Associateship. Dr Hearn's research interests include the effects of departures from local thermodynamic equilibrium on the ultraviolet emission lines of hydrogen and helium, the interpretation of neutral helium absorption lines in early-type stars in terms of the helium abundance, and, more generally, problems associated with extended stellar atmospheres. During his year in Brisbane, Dr Hearn will work with Professor Mugglestone's theoretical astrophysics group.

Professor Krishnaji

Professor Krishnaji joined the Department of Physics at the University of Queensland a year ago as the first holder of the H. C. Webster Fellowship in Physics. He is Professor of Physics at the University of Allahabad, and his research interests are principally in the field of microwave spectroscopy: in particular, the study of inter-molecular forces in relation to spectral line widths and shifts. He is also concerned with the determination of molecular structure through microwave spectroscopy, and with dielectric relaxation in liquids. During his stay in Brisbane, Professor Krishnaji has worked with Professor Parsons' microwave spectroscopy group, and has participated in the teaching programme of the Physics Department. He hopes to visit Monash University before returning to Allahabad at the end of April.

Professor E. P. George

Professor Paul George, Head of the School of Physics at the University of New South Wales, has proceeded on sabbatical leave for approximately 9 months from February 1971. He will be spending 4 months at the Space Sciences Laboratory, University of California, Berkeley, with Dr Luiz Alvares on a research project on nuclear interactions of high-energy mu-mesons. While there, he will visit several American Universities to investigate current developments in biophysics and will take the opportunity to study trends in First-Year teaching methods, use of television, audio-visual booths, etc. From July to October he will be visiting Birbeck College, University of London and will undertake research work there on biophysics of macromolecules and polymers. In the first half of November Prof. George will be visiting the University of Moscow and will be attached to the Institute of Biophysics, which is under Professor Tarasov. He will give five seminars on research in biophysics being done at the UNSW.

In the latter half of November he will visit the University of Tokyo, where he will be contacting Professor Kohatake and studying their current work in biophysics, before returning to Sydney early in December.

Dr Ray Simons

Dr Ray Simons of the School of Physics, University of New South Wales, has recently returned from study leave at the Polymer Department of the Weizmann Institute of Science in Rehovot, Israel. While abroad Dr Simons worked with Professor Ora Kedem on some aspects of desalination by the method of reverse osmosis. He also continued his research into the electrical properties of bipolar fixed charge membranes with theoretical studies of the 'punch through' effect and the application of the new theory of network thermodynamics for determining the a.c. properties of the membranes.

Dr J. N. Stephens

Dr Jim Stephens, Senior Lecturer in Physics at the Wollongong University College, has recently returned from a period overseas on study leave, most of it at the University of Exeter at the top of 'Conn's Tower', the palatial new physics block from which can be seen a quarter of glorious Devon.

Undaunted by the stench of acres of uncultivated garbage he braved the London scene, attending conferences on infra-red astronomy and Fourier-transform spectroscopy at Queen Mary College and Imperial College. There he was able to discuss with Professor Ring the design of his new 60-inch infra-red telescope at Tenerife and with Professor Mcgee (from Canberra) the most promising development of the Spectracorn, a device which could revolutionize astronomy.

Invited by the Astronomer Royal to the Royal Greenwich Observatory at Herstmonceux Castle, he was lucky enough to see the 98-inch Isaac Newton telescope floating serenely above the fog and was much impressed by the enthusiasm of the young and talented research groups which have revitalized that venerable institution under the breezy guidance of Sir Richard Woolley, soon to retire to establish his third observatory in the back blocks of Cape Province, South Africa.

Dr J. R. Bird

Dr Roger Bird (AAEC Research Establishment) spent four weeks recently in the USA and Canada. He attended conferences on Charged-Particle Accelerators (in Chicago) and on Neutron Cross-Sections and Technology at Knoxville, Tennessee. Dr Bird also visited the Argonne National Laboratory, Oak Ridge, the National Bureau of Standards, Duke and Maryland Universities, and University of British Columbia.

Mr G. Fletcher

Guy Fletcher, Physics lecturer at Macquarie University, recently returned from England, after spending six months as a Visiting Fellow at the Open University. This is a new university catering for students aged
more than 20. There is no formal matriculation requirement, though of course there are more applicants than places. It began teaching in January this year with an enrolment of 7000 in its first year 'Foundations of Science' course, out of a total student enrolment of 25000. Teaching is chiefly by carefully structured correspondence materials, with a $250 kit for home experiments, half-hour television and radio programs each week and a fortnightly tutorial at a local study centre.

THE REGISTER

CHANGES IN MEMBERSHIP FROM 8 FEBRUARY 1971 TO 19 MARCH 1971

FELLOWSHIP

Transfers

Goodwin, G. L.  Weapons Research Establishment, SA
McInnes, B. A.  University of Sydney, NSW

ASSOCIATESHIP

(a) New Elections

Heywood, E. F.  Royal Melbourne Institute of Technology, Vic.
Hulme, G. E.  Caulfield Institute of Technology, Vic.
Whittingham, I. B.  Royal Melbourne Institute of Technology, Vic.
Wolfe, J. A.  Department of Education, Qld.

(b) Transfers

Bellair, D. T.  University of Melbourne, Vic.
Hargrave, N. J.  Commonwealth X-Ray and Radium Laboratory, Vic.
Horsfield, R. S.  University of New South Wales
Moon, A. R.  Secondary Teachers' College, Vic.
Poole, R. T.  Preston Institute of Technology, Vic.

GRADUATESHIP

(a) New Elections

Box, M. A.  University of Sydney, NSW
Campbell, S. J.  Monash University, Vic.
Comins, H. N.  University of Sydney, NSW
Enting, I. G.  Monash University, Vic.
Entwisle, M. J.  University of Melbourne, Vic.
Epstein, G. N.  University of Sydney, NSW
Fagan, M. J.  University of Melbourne, Vic.
Gallagher, E.  Department of Mining and Metallurgy, Qld.
Quinn, J. D.  Defence Standards Laboratories, Vic.
Stewart, P. K.  Monash University, Vic.
Thornton, D. B.  Education Department of Western Australia
Vorlicek, G. C.  University of Sydney, NSW
Wild, L. M.  University of Melbourne, Vic.

(b) Transfers

Powell, W. D.  West Australian Petroleum Pty Ltd, WA
Warren, R. C.  University of New South Wales

(c) Deceased

Oliphant, M. J.  (Vic.)

ADDRESS UNKNOWN

It would be appreciated if any member knowing the present address of any of the following could advise the Hon. Registrar, AIP, PO Box 52, Parkville, Vic. 3052:

Mr J. L. Aitchison (St-Vic.)
Mr B. M. Bartlett (Grad.-SA)
Mr P. G. Browne (St-ACT)
Mr A. G. Clark (St-Tas.)
Mr E. J. Clayton (St-ACT)
Mr P. M. Colman (Grad.-SA)
Mrs M. A. Crawford (Grad.-NSW)
Mr E. C. Finkenstein (St-Vic.)
Mr A. J. Flavell (Grad.-WA)
Mr I. R. Forrest (St-NSW)
Mr M. J. Groth (St-SA)
Mr K. V. Habere (St-Vic.)
Mrs B. J. Heseltine (Grad.-NSW)
Mr G. L. Hollis (Grad.-SA or O/S)

Mr R. M. Hoogenraad (Sub.-SA or O/S)
Mr H. D. Hsu (Grad.-NSW)
Dr A. R. Hyland (St-USA)
Mr A. S. Kent (Grad.-WA)
Mr C. S. Landau (Grad.-ACT)
Mr J. M. Mayfield (Assoc.-SA)
Mr J. K. Newman (Grad.-NSW)
Lt RAN P. G. Phillips (St-Vic.)
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Mr W. H. Shorter (St-NSW)
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Dr K. A. Thomas (Assoc-Tas.)
Mr A. J. Tudor (St-SA)
Mr I. D. Whiteley (Grad.-SA)
Mr C. G. Wilson (Fellow-SA)
BOOK REVIEWS


Reviewed by B. H. J. McKellar, School of Physics, University of Sydney.

This volume in this well-known series contains some of the lectures given at the 1969 Karlsruhe Summer Institute on Weak Interactions. Anyone working in this field will be grateful to the publisher for reducing the delay between the giving of the lecture and the printing of it to about 12 months—especially so as the lecturers have chosen to discuss with admirable lucidity areas where much can still be done.

There are two discussions of weak interactions at high energies where the present theory (which has changed remarkably little since Fermi’s pioneering 1934 paper) breaks down completely. Gehlen approaches the problem by discussing the possible forms that the cut-off which must come in at high energies may take, while Barut shows how one may construct an S matrix theory which is consistent with unitarity.

In the other lectures, Primakoff discusses the various ways in which delicate experiments in nuclear physics, such as those which look for double beta decay, can shed light on the nature of the weak interaction, while Gatto describes various speculative theories relating the Cabibbo angle to other small parameters of particle physics such as those which measure chiral-symmetry breaking and a conjectured non-electromagnetic violation of isospin symmetry.


Reviewed by Walter Boas, Metallurgy School, University of Melbourne.

This book is one of a series of texts intended to alleviate the difficult transition from school to university or college. They will deal with topics frequently neglected in school or with those which need a more extensive treatment. The present volume clearly belongs to the first category, since mechanical properties of matter are usually very poorly dealt with in schools.

The author aims to give a survey of the field both from the macroscopic and the atomic points of view suitable for first-year university students. He deals with elastic and plastic deformation of solids and their fracture under various conditions, including fatigue; the flow and viscosity of liquids and gases; and finally with surface effects such as the surface free energy and the total surface energy, capillary effects, the shape of a liquid drop on a plane surface, methods of determining the surface free energy for liquid-vapour interfaces.

To treat such a wide field in 135 pages of text is an extraordinarily difficult task. In order to introduce the students to a subject which is strange to them and to stimulate their interest, the author should have given them an understanding of the natural phenomena and concentrated on essential principles. However, the author introduces a lot of terminology and gives detailed mathematics, for instance in discussing elasticity and viscosity, and uses words like crystals, lattice, and imperfections without defining them or giving their significance. Often terms are used and explained a few pages later. Students new to the subject will be irritated and those who have some knowledge of it will wonder how the mathematical formalities are relevant to the principal phenomena which they hope to understand. This is not a book which can be recommended particularly, since there are books (one of them with the same title) which treat the subject with superb clarity, give a balanced view and provide real understanding. This book does not achieve what it sets out to do, and is disappointing to those who hoped for a stimulating exposition of an exciting subject.


Reviewed by J. W. G. Wignall, School of Physics, University of Melbourne.

This book presents an account of most of the mathematical methods required by physicists, with a more or less conventional arrangement and approach. It begins with chapters on vector and tensor analysis and coordinate systems, followed by one on linear algebra and elementary group theory, and then pursues the standard topics of analysis: infinite series, functions of a complex variable, differential equations, and the usual ‘special functions’; it concludes with chapters on Fourier series, integral transforms, integral equations, and the calculus of variations.

There are, I think, two main features which give this book an ‘edge’ on some of its numerous competitors. First, both in the text and in the problems it gives a wealth of physical applications for each piece of mathematics. Secondly, it is a very ‘practical’ book, including much commonsense about numerical methods and computing problems. Added to these features is its bright, readable style and the adoption of just about the ‘right amount’ of rigour.

A book of this nature should reflect to some extent the changing trends in physics and, accordingly, there are some subjects I would like to have seen done in more detail, perhaps, to save space, at the expense of some of the more specialized analysis. One is the subject of group theory; in particular, a treatment extending to Schur’s lemma and other aspects of representation theory would be very valuable. Another useful inclusion would be the rationale of chasing physical quantities into the complex plane, a game very popular these days in many fields of physics. Perhaps these topics might be taken up in a future edition.

All in all, Arfken’s book is a first-class exposition which will be of lasting value, both for teaching and for reference.

Reviewed by L. W. Davies, AWA Laboratories Pty Ltd, Rydalmeres, and The University of New South Wales.

This book becomes the most complete, and of course the most up-to-date (about 1968), of the sequence of monographs on semiconductor and device physics which followed Shockley’s original monograph, published at the time the junction transistor first appeared (1951). Since then there have been many developments, the physics of almost all of which is touched on in this book. One can only marvel at Dr Sze’s versatility in covering such a wide field.

The book is concerned specifically with the physical principles of semiconductor devices—barely at all with their circuit applications, nor with their technology. There are five Parts—semiconductor physics, p-n junction devices, interface and thin-film devices, opto-electronic devices, and bulk-effect devices. Some introductory understanding of solid-state physics and transistor theory is assumed, and the book would be of most use to students at the postgraduate or senior undergraduate level (in Australian universities), or to research workers concerned with solid-state devices.

One could argue with Dr Sze’s treatment of some device properties, or point out misprints, or perhaps complain at the quality of one or two of the Figures. However, these are relatively minor blemishes; when one considers how comprehensive is the coverage of the book, and how useful will be the extensive list of references in each of the 14 chapters, there should be nothing but praise. The book is strongly recommended.

PHYSICS OF SOLID STATE DEVICES, T. H. Beeboth and H. J. Goldsmid, Pion Ltd, 1970. viii + 204 pp. £3.00 (£2.30 student edition).

Reviewed by L. W. Davies, AWA Laboratories Pty Ltd and The University of New South Wales.

This book is an introductory text for undergraduates or graduates with a slight preliminary knowledge of solid-state theory. Its strength lies in the way in which physical principles are related directly to known useful devices, placing many branches of solid-state physics in their correct perspective.

In the first chapter, “Transport effects in semiconductors” (29 pp) we find these effects related to a fairly wide range of devices: thermistors, thermoelectric energy converters, Hall effect and Gunn effect devices, and acoustic amplifiers. The discussion is necessarily somewhat compressed in this chapter, but a list of references is given for the reader who requires more detail.

The physical principles of a very full range of solid-state devices are described in the remaining 7 chapters on semiconductor diodes, transistors, photodetectors, lasers and lasers, magnetic materials and devices, dielectricity, and superconductors. The interested reader can learn of electrophotography, or piezoelectric spark generators and bimorphs, or microwave ferrites, to name a few examples.

The book is one of a new applied physics series, edited by Professor Goldsmid. The publication of 5 further titles announced to date, principally in the solid-state field, will be awaited with interest.


Reviewed by F. W. G. White, Canberra, ACT.

In the preface to the first edition of this book (published in 1958) the authors explain that in any scientific book the reader encounters words that possess a specific and unique meaning and that some of these words are the names of scientists who have investigated a particular phenomenon, discovered some scientific law or relation, or who have worked in some field with which their name has become historically connected.

This third edition of the dictionary lists in alphabetical order the names of some four hundred scientists who have achieved this distinction. With each entry is a brief description sufficient only to remind the reader of the nature of the law, phenomenon, or mathematical formula that is commonly associated with the scientist named.

The authors’ stated intention is to provide a dictionary that will enable the reader of any scientific book rapidly to check the meaning of a named relation, rule or law which may be encountered but into which he may not wish to delve very deeply. The dictionary certainly fulfils this intention, for the entries are concise and well written and taken as a whole, cover the whole history of these sciences from the earliest times to the present.

Most working scientists and particularly students would find this dictionary inadequate if they wished to inquire more deeply. The work of the authors would be greatly enhanced if references to original scientific publications were to be included with each entry where this is possible. Even to give the year of the named discovery, which is included in a few of the entries, would be helpful.

It is surprising that a book published in England in 1970, and containing an appendix on named units of measurement, should make no reference to the SI units now being adopted in that and many other countries of the world. The definitions of units in this appendix are a strange mixture of the old and the new; for example, the joule is given in c.g.s. units while the newton is given in SI units.

There are many ways in which the progress of science may be described; to do so by listing the names of contributors and describing their work is an interesting approach.

This is a useful addition to the library of works of reference that enables the scientist to gain ready access to the growing volume of scientific and mathematical literature.

The Australian Physicist, May 1971

Reviewed by G. Major, School of Public Health and Tropical Medicine, The University of Sydney.

The teaching of physics to medical students, and for that matter to all students of the biological sciences, is a problem which has been with all universities for generations. Within the University of Sydney students of medicine, pharmacy, veterinary science, agricultural science, and zoology make up a high percentage of the 1500 first year students who study Physics 1B—Physics 1A is for those students who propose to go on to the Honours Year. Physics 1B is a good service course of some 78 televised lectures, a satisfactory practical course and tutorials—but is it suitable for medical and similar students?

Although printed in Great Britain this book is clearly intended for the land of PSSC and Harvard Physics—aluminum, fiber, and traveling give the game away and indicate that these modern approaches to teaching physics in schools have not thrown up medical students who have no need for a fairly traditional course in physics. Although many first-year students of biological sciences would complain that this book contains too much material not relevant to their vocational needs, a thorough study of the work provides considerable ammunition with which to counter this charge.

Take for example the twenty-page chapter on statistics. If all Australian medical practitioners could answer the following problem from the book, some of the sorry arguments between the Commonwealth Department of Health and a minority of doctors would not arise.

The average monthly cost of drugs per member of the population prescribed under the British National Health Service in one region of the country was 56.5 pence in 1967, with a standard deviation of 14 pence. In any practice where the comparable figure for a month is 50 per cent above the regional average, the doctors are asked to justify their high figure. From a statistical point of view, is this a reasonable basis to adopt?

That the authors have taken trouble to introduce modern material which should interest students of the biological sciences is seen in many of the 521 printed problems and answers which should be a gold-mine for diligent teachers.

The authors have not hesitated to introduce mathematics into their book although they have not assumed any prior mathematical knowledge—the standard of the mathematical treatment is such that the high-quality students entering on medical courses should if sufficiently motivated have little difficulty with it.

This is a good book, well thought out and presented. The material is up-to-date, SI units are used throughout, and the illustrations are clear and informative.

There may be too much material for a one-year course but, no doubt, it could be judiciously selected without too much loss.

Whilst the book is unlikely to make any person except a physicist declare with R. W. Wood that 'physics is fun', it should help medical and similar students towards understanding some of those aspects of physics essential to their education and vocation, and prepare them for the brand of physics necessarily expounded in later years by their teachers of biochemistry and physiology.


Reviewed by B. M. Spicer, School of Physics, University of Melbourne.

This is the second of a three-volume set with the above title; the first volume was reviewed in The Australian Physicist of April 1970.

This second volume contains most of the real meat of theoretical nuclear physics. It is divided into four sections which are titled, respectively, 'Nuclear Particles and their Interactions', 'Nuclear Forces and Potentials', 'Scattering and Reaction Models in Nuclear Physics', and 'Nuclear Models'. These are four quite standard divisions of nuclear physics. However, the allocation of material within these divisions is not always standard. For example, the discussion of stripping reactions is found under the first section—the interactions of the deuteron—rather than under 'Direct Reactions'. It loses a little because of this displacement.

The treatment of all topics presented in this volume is aimed at providing understanding of the phenomena discussed. In general, an introductory, simplified discussion of each phenomenon is followed by a more detailed formal treatment. The authors give very adequate references to both authoritative reviews and original papers on many topics, so that the reader may readily seek a more detailed treatment than it is possible to give in a single volume.

The approach is that of a text-book rather than a reference work; the level is that of an advanced undergraduate or graduate course. This book represents a significant contribution to texts on nuclear physics.


Reviewed by D. G. Sargood, School of Physics, University of Melbourne.

This book is intended as a text suitable for use by first-year research students. The author covers scattering theory, the compound nucleus, and direct-reaction theories, approximately half the book being devoted to direct reactions. It contains no reference to the impulse-approximation deuteron-stripping theory of the Sydney group.

It is not a stimulating book: the subject matter is presented in a purely conventional manner, and a student who has difficulties with some topic in the standard
literature is not likely to get any help from reading this book. It contains a great deal of algebraic derivation of formulae, but, with the possible exception of the chapter on the optical model, far too little explanation or justification of this algebra.

However, whilst this book does not contribute anything new in its presentation of material, it does bring a lot of useful information together under one small cover, and for this reason it is a convenient reference. Further, it contains an extensive bibliography, and so serves as a useful access to the literature.


Reviewed by D. G. Sargood, School of Physics, University of Melbourne.

Here is a book which nuclear physicists will welcome with open arms, whether they be experimentalists or theoreticians. The subject of direct-nuclear-reaction theories is covered with meticulous care: no step is taken without a full explanation and justification, in fact the outstanding feature of the book is the very clear and informative verbal discussion it contains, yet the algebra is all there too.

The book starts with a treatment of wave packets, followed by a verbal discussion of direct reactions. Then after a brief introduction to formal scattering theory, there is a chapter on basic direct-interaction theories. Then follows a comprehensive account of applications of the distorted-wave method, including inelastic scattering, deuteron stripping, more complex types of stripping reactions, knock-on, and heavy-particle stripping. This chapter also deals with the zero-range approximation and finite-range corrections. Most of the rest of the book is taken up with tying up the loose ends, with chapters on coupled channels, spectroscopic factors, polarization, and exchange effects. The Sydney group’s impulse-approximation theory of deuteron stripping is not discussed.

Overall, this book makes a very useful contribution to the literature on nuclear reactions.


Reviewed by J. C. Kelly, University of New South Wales.

The level of treatment is aimed at the senior undergraduate student of physics or at the physics graduate making his first serious approach to electron diffraction. Although the emphasis is on general principles, the author’s detailed knowledge of diffraction equipment keeps breaking through. The number of ampere-turns of coils, the size of apertures, some drawings that could almost be given to the workshop as they stand (and probably have been), recur throughout the more experimental chapters which deal with diffraction equipment for both high-energy and low-energy electrons. For the budding experimentalist this is a considerable advantage since the detail is not oppressive and book is inevitably readable. Even the old hands at the game will find amongst the footnotes and aside a number of interesting points.

There are chapters on the ‘Kinematic theory of electron diffraction’, ‘The interpretation of electron diffraction patterns’, ‘Refraction effects’ and ‘Dynamical theory of electron diffraction’, this latter chapter being confined to the two-beam approximation. For those of us who have limited our activities to bouncing electrons off solids it is well to be reminded that one of the most successful applications of electron diffraction has been to the study of the structure of molecular gases. The chapter on ‘Electron diffraction by gases’ does this. The final chapters ‘Electron interference’ and ‘Diffraction effects in the electron microscope’ relate electron diffraction to the wider fields of physics and should be read by all students who worry about the length of electron wave trains.

There are a few worked examples which could with advantage be increased in number in view of the intended readership. Aside from a short validiction in the preface the ångstrom is not used, the book being in SI units throughout. I suppose we will grow accustomed to thinking of the unit cell of KCl as 628 pm instead of 6.28 Å but I for one won’t like it.


Reviewed by P. E. Ciddor, CSIRO National Standards Laboratory, Sydney.

This advanced undergraduate text covers practically the same topics as Born and Wolf: geometrical optics, aberrations, interference, diffraction, coherence, dispersion theory, and metal and crystal optics. The treatment and notation follow Born and Wolf, but with much less mathematical rigour. At the same time there is a distinct lack of clarity, of narrative explanation, and of the practical, numerical cases which enrich Born and Wolf. This is particularly noticeable in the chapter on Interference, which is remarkably restricted in range and depth.

The numerous problems frequently introduce additional material or applications but no solutions are given. The text is copiously illustrated with line diagrams, but these are often overloaded with symbols. (Fig. 12.8 on Huygens’ construction for reflection and refraction has about 20 symbols and 10 arrows in 10 cm².) There are few captions, so it is difficult to relate figures to the text. Fig. 5.20(a) shows a spurious minimum in the transmittance of a multiple-beam interferometer. In Problem 7.3.3 it is wrongly implied that the fringe spacing in Michelson’s stellar interferometer depends on the separation of the outer mirrors.

The section on Photometry is marred by some unusual notation and an excessive use of the innumerable units which bedevil this subject. The chapter on e.m. theory uses Gaussian, rather than SI, units.

The printed text occupies only 2/3 of each page. Perhaps one page in 10 has a small diagram in the margin. This wasteful layout results in a large and heavy book.
The grammar and punctuation are frequently confusing. On p. 221 the absence of a comma leads to the assertion that two identical frequencies can be obtained by splitting the output of a single source and frequency-shifting one component.

This book does serve to assemble for the student the major contents of several modern texts such as Born and Wolf, Goodman, and O’Neill, at a modest price. However, it adds nothing novel to the existing range of texts in modern optics.


Reviewed by J. F. McNell, CSIRO, Division of Chemical Physics, Clayton, Victoria.

This book is not, as the title suggests, a text-book on optical technology, but is an edited version of 57 papers presented at the ICO Conference at Reading in July 1969. The papers vary widely in quality and style; the resultant lack of coherence is perhaps inevitable in a multi-author publication.

The book has been divided—presumably by the editor—into six parts.

Part I—New techniques and instruments for spectroscopy—has 6 papers: a 6-page gem from P. Connes on Fourier spectroscopy, and five others of interest.

Part II—Recent developments in optical production techniques and materials—has 16 papers, half of which are either irrelevant or misplaced. Scott, of Perkin-Elmer, on advanced optical shop techniques, Dyson on an interferometer-controlled ruling engine, and Cordelle on holographic, stigmatic concave gratings are singled out for mention.

Part III—Optical metrology and optical data processing—has 13 papers, two of which appear misplaced. A first-class paper by J. M. Burch on the theory of Interferometry with Scattered Light, and papers by Leendertz and by Archbold on the applications thereof are noteworthy.

Part IV—Advances in assessment and specification of optical instrument performance—has 8 papers: five of them, all good, relate to the use of the o.t.f. in optical instrument design, measurement, and specification.

Part V—Image forming systems of essentially novel design—has 7 papers, of which one appears misplaced. A beautiful paper by Glaztel on new developments in photographic objectives, and papers by Wynne and Hopkins deserve mention.

Part VI—Systems design of astronomical instruments—has 7 papers, of which one appears misplaced. A good review of astronomical telescope systems by Fellgett, with three specific design papers by Mertz, Rumsey, and Brown, and one by Coulman on astronomical ‘seeing’ were noted.

The book is attractively produced, and there are few misprints. The classification of papers appears to follow the St Swinfin’s system for classifying examination candidates. The index could well have been omitted. At the price of £7 sterling, it is for institutional libraries only.


Reviewed by J. W. G. Wignall, School of Physics, University of Melbourne.

This book contains a quite mixed assortment of semi-review, semi-original articles on the theory of particles and fields. Topics discussed include applications of the quark model, the Veneziano model, and various sum rules to the interpretation of experimental data; quantum field theories with singular interactions and indefinite metric; and the phenomenology of neutrino absorption by nuclei and of K-meson decay.

Many of the articles will be of considerable interest to specialists in the relevant fields; but one wonders about the wisdom of publishing them in this form. In these days, when everyone has too much to read, it would seem much better to publish them in the appropriate journals, where they would be more readily accessible; the luxury of hard covers should be reserved for monographs or for collections of articles on reasonably well-defined subject areas.


Reviewed by J. C. Macfarlane, National Standards Laboratory.

This is a collection of 17 essays by authorities in science, engineering, commerce, and government, who attempt to forecast how some of the currently developing fields of science and technology will shape the world of 30 years hence. Subjects discussed range from oceanography, through bio-engineering and cities of the future, to electrical communications and the creative society. A regrettable number of pages are filled with wordy monologues which make tedious and not very enlightening reading. This review will therefore touch on some 5 or 6 chapters which surpass the others both in effective communication of facts or ideas, and in entertainment value.

The best is undoubtedly Chapter 3, ‘Exploring the Mysteries of the Planets and Cosmos’ by Arking and Justrow. It is concise, factual, and almost free of rhetoric. In 26 pages, a well-documented picture is presented of the current (1970) knowledge of the moon and near planets; a more general account of supernovae, infra-red sources, X-ray sources, neutron stars, quasars and pulsars, follows. In short, a useful ‘crash-course’ in the highlights of modern astronomy.

Chapter 5, on Transportation (Nelson and Shulkin) looks at traffic problems (mainly in the USA) and how traffic engineers hope to overcome them. The motor car seems destined to remain at least until 2000, but will...

increasingly be replaced in urban centres by semi-
automatically controlled vehicles. Greatly improved
(and in some cases free) public transport, using tracked-
air-cushion vehicles and perhaps gravity-vacuum-tube
trains (reminiscent of early English experiments last
century) will cater for fast intercity and suburban
traffic.

Doxiadis' 'Cities of the Future' looks beyond the
looming nightmare of Megalopolis to Ecumenopolis,
and attempts to lay plans for coping with such an
environment.

'A Guide to Elementary Particles' by Rosenfeld and
Goldhaber, is excellent, even though it stops short of
the quark-hunters' latest successes (?); and 'Materials
for Tomorrow' (Westbrook) is a useful sketch of a wide
and quickly-changing field.

The most disappointing contribution is by the
eminent physicist F. Seitz who presents a rather boring
history of the growth of modern technology, para-
doxically entitled 'Science Futures'.

Inevitably, pollution is an issue in several chapters.

The book as a whole is well produced with excellent
diagrams, although a few errors were detected; notably
in the wavelength table on p. 192, and again on p. 207,
where 1Å is equated to 10–8 m.

The lack of an index is a serious drawback.

All persons interested in the impact of science and
technology on society would find something of value
in this book, but it is unlikely that many individual
readers would consider it worth the money. It would
be a useful acquisition for certain libraries.

**PHYSICS, K. R. Atkins. John Wiley and Sons,
New York, second edition 1970. xii + 774 pp. $12.55.**

*Reviewed by Moira Welch, Presbyterian Ladies College,
Pyrmont, NSW.*

This is a general text which, although written for a
particular course for non-science specialists in the United
States, covers most of the topics at present included in
the second-level (full) and first-level Physics courses
for senior high-school students in New South Wales.
The author's aim is to present basic physical principles
rather than applications, and to show that physical
theory can display those qualities of beauty and elegance
which are more usually associated with art, music, and
literature. The book conveys the sense of excitement and
discovery which is so desirable for a student, and
which is in sympathy with the aims of the Harvard
Project Physics currently being tried in some New
South Wales schools.

The contents are fairly evenly divided between classical
and modern physics, with a very detailed section on
fundamental particles and quantum mechanics, and a
most readable and convincing account of relativity.

The chapters on wave motion, while adequate for a
second-level student, do not cover the syllabus for first
level. The mathematical sections do not make use of
the calculus. In certain sections, for example, rotational
mechanics, energy, and the gas laws, formulae have been
stated where simple derivations are within the mathe-
matical scope of the book, and their inclusion would
have strengthened the arguments. Each chapter is
followed by graded problems and stimulating questions
for discussion.

To summarize, this is an interesting book with a
philosophical approach, which should provide second-
level (full) and first-level physics students with valuable
background reading to supplement the somewhat
skeletal texts at present available for these courses.

**FUNDAMENTALS OF RADIATION PROTECTION, H. F. Henry. Wiley-Interscience, New York,
1969. xviii + 485 pp. $18.40.**

*Reviewed by R. J. de Groot, Cancer Institute,
Melbourne.*

When a physicist writes a book for his fellow physi-
cists it will stand or fall mainly on its physics content.
When he writes for physics students he must truly
expound, but at least he should have sympathetic
eager readers. When he writes for people in other
disciplines who are not necessarily sympathetic but
constrained by virtue of their work to 'get with some of
this physics nonsense'—Ah! That is the test of the
Complete Physicist. On this basis we must judge
Dr Henry.

The literature on radiation hazards and protection
is as voluminous as that on pollution and it contains
as much hysteria and bunk. It suffers also from an
intolerable amount of national and international, statu-
tory and non-statutory decrees and regulations. What
shall our man distil from this indigestible mass? He
must state the nature of the hazards, the means of their
identification and measurement, the physical and
biological bases of their control, and the principles of a
radiation protection programme. It is all there and is
readable too. In a volume of this modest size much
must be superficial. The professional health physicist
will say 'Ah! But what about . . .' Well he knows
where to go for further information. The biologist
may wince a trifle at a physicist's slick biology—too
bad! The general effect is good and on our opening
criterion Dr Henry has not failed, in fact he deserves
honours, although no one writes the perfect text or
pleases everyone. Quibblers will be found. One
may take exception to some statements and to minor
methods of presentation and subjectively to the relative
emphasis on some of the hazards.

The book is not a desk companion for the specialist
in health physics, but physicists will find it a very easy
and useful introduction to unfamiliar areas. At the
end of each chapter there are adequate references to
further general reading, followed by questions which
are numerous, short and to the point. Although the
price is high this book would be an excellent teaching
text.

This book is a worthy contribution towards the edu-
cation of the ever increasing numbers in the medical,
scientific, and administrative professions whose work
involves ionizing radiation in one form or another.

The Australian Physicist, May 1971 79
A conference on radiation damage in solids, sponsored by the Australian Institute of Physics, is to be held in Sydney, 8-11 February 1972.

Programme
Invited and contributed papers on:
(a) Theories of irradiation damage by neutrons and charged particles.
(b) Effect of damage on the mechanical properties of solids.
(c) Effect of damage on transport properties.
(d) Experimental techniques including diffraction, microscopy, and channelling.

Speakers from overseas will be attending.

Preliminary abstracts of contributed papers should be submitted by 15 October 1971.

Accommodation
Accommodation is available at Goldstein College for $9.00 per day full board, or $5.50 bed and breakfast.

Registration
The conference fee will be $20.00 with concessional rates for students. This fee includes the conference dinner.

APPLICATION FORM
To be returned to: Dr C. J. Howard, Conference Secretary,
Australian Atomic Energy Commission Research Establishment,
Private Mail Bag, Sutherland, NSW 2232,
by 15 October 1971.

Name: 
Address: 

I wish to attend the Radiation Damage Conference and enclose cheque/money order/postal note for the $2.00 conference deposit.

I intend to submit a paper and enclose title/abstract. YES □ NO □

I wish to reserve accommodation in Goldstein College for ....... persons for the period from ...../2/72 to ...../2/72, and enclose a further $5.00 as deposit

YES □ NO □
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