The Australian Physicist

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Cover:
Three members of the organizing committee find time for
physics. From the left: Dr Bob Fleming (Treasurer),
Dr John Cashion (Secretary) and Professor Fred Smith
(Chairman). All from Monash.
Cover photograph by kind permission of the Wagga
Daily Advertiser.
President's Column

In January I led a delegation to India to take part in a workshop on Solar Energy under the auspices of the India-Australia Science and Technology Agreement. The topics for the workshop, which was attended by 12 Indian and 10 Australian scientists, were concerned with the production and use of thermal energy at about 100°C. After three days of intense discussion several areas for collaboration between the two countries were identified and reports were submitted to both Governments.

It would be disastrous if the enthusiasm generated on both sides by the visit was allowed to evaporate through lack of action or lack of funds.

One of the drawbacks to implementation of the recommendations made under various agreements between Australia and other countries is the inability of the Department of Science to provide money for anything but travel and expenses incurred for meetings. Any scientific or technological work resulting from the meetings must be funded from other sources. For academic institutions this means ARGC.

The guidelines used by ARGC are well established and take into account only the scientific merit of the proposal. It would be a retrograde step to ask for any other factors to be used in the evaluation. However, there are other factors operating in the projects carried out under International Agreements such as political desirability, the needs of the two countries, the resources available to the participants and the relevance of the research programme to technological planning in each country.

The Department of Science is the agency which should consider these factors and should be able to support the projects it regards as worthwhile. This is the pattern in both India and Germany.

The organisation of the workshop and the ISES meeting was of a very high standard and should dispel any misgivings that international scientific bodies have about supporting conferences in India.

The hospitality extended to us by the Indian team made the visit very enjoyable and we left with a much deeper understanding of India. To be in a country whose increase in population per year is equal to the total population of Australia puts many of our problems into perspective.

Physicists, Festivals and Feasts - An Excellent Idea

While looking for inspiration for a fresh presentation of that well-worn old topic - introductory Maxwell Theory - I read again a lecture given by H.B.G. Casimir. It was the Ninth Clerk Maxwell Memorial Lecture given to the IERE, and in it the well known theoretical applied physicist, manager, innovator, director and Dutchman, expresses his admiration of Maxwell, reiterates his support for Gaussian units and dives into some fundamental areas of magnetism. The whole lecture is a tour-de-force of a great mind but in the middle of it there occurs a sentence with an instant appeal to more pedestrian physicists. In a reference to Maxwell’s paper on Ohm’s law and almost in an aside he writes,

“In this connection it may interest you that only yesterday afternoon I participated in a seminar at Cologne where the 150th anniversary of Ohm’s law was celebrated. An excellent idea, which, when generally emulated for all the laws of nature, might lead to a gratifying number of festive events.”

“A gratifying number of festive events” - this may be the stimulus Physics is seeking.

A festival for every law of nature! - there are a great many laws of nature. Some fundamental laws would give rise to greater and lesser festivals - a proliferation which could rival festivals of the Greek Pantheon. Physics would become fun again. Departmental budgets would naturally include appropriations for food and drink. Old men’s eyes would glinten with memories and young men of ability would fight once more for places in a subject so filled with opportunity.

In Southampton University Dave Hanna’s laser group opens a bottle of champagne for every new barrier breached - a toast to the laws of nature. Such an approach in Australia could go a long way to solving the problems of the wine industry.

There is much to be done and in words used elsewhere “If it were done twice well it were done quickly . . .” for such movements are slow to begin and some of us would like to see it in our lifetimes.

Should we succeed, it may well be that, for all the contributions Dr. Casimir has made to Physics, this “gratifying number of festive events” could be the thing for which he is best remembered.

Bill Boundy
Solid State

Wagga-Wagga Solid State Physics Meeting

The Second AIP Solid State Physics Meeting was held at the Riverina College of Advanced Education, Wagga-Wagga from 8-10 February with 103 participants. The meeting retained the same basic format as last year, being fully residential, informal and having a mix of talks and posters with no parallel sessions. The main changes involved a move to a larger and cooler hall for the talks and increases in the numbers of invited talks and posters.

Ms Marlene Read (University of NSW) explaining a point to Dr Neil Manson (ANU).

There were 78 contributions to the scientific program consisting of 6 invited talks (45 minutes), 27 talks (20 minutes) and 45 posters. The invited talks were of uniformly high quality. First off was Dr Ron Roberts (NML) bringing us up-to-date with developments in measuring Thermo-powers of Metals and discussing his new absolute scale of thermoelectricity. Dr Andrew Stewart (University of NSW) introduced us to Amorphous Metals, a comparatively new class of materials and discussed methods of preparation, atomic structures, physical properties and potential applications. Dr Martin Darby (Salford University), who is spending a year at the University of NSW, talked about the Indirect Exchange Interaction — a form of magnetic coupling between localized atomic moments which is mediated by the conduction electrons. Dr David Beaglehoke (Victoria University, Wellington), one of four New Zealanders attending the meeting, gave a wide ranging review of Optical Studies of Condensed Matter. Materials mentioned included metallic alloys, semiconductors and liquid-vapour interfaces at wavelengths from the far infrared to the ultraviolet. Dr Robert Leckey (Latrobe) reviewed Recent Advances in Photoelectron Spectroscopy with special emphasis on two areas — the usefulness of synchrotrons and storage-rings as high-flux photon sources and the introduction of angularly resolved studies of solids to obtain information about band structures. The final invited talk was given by Professor Dan Haneman (University of NSW) on the subject of the Physics of Solar Photovoltaic and Photoelectrochemical Conversion Methods. He discussed the theoretical and “achieved” efficiencies of these two methods of solar energy conversion and gave a breakdown of their manufacturing costs.

A unique feature of the Wagga meeting is the method of presenting the poster contributions. The poster boards are positioned throughout a large common-room/bar which has tea and coffee continuously available. Posters are displayed for 24 hours (10 am to 10 pm) with no specified time during which authors are obliged to be present. This system has been very successful; authors have the opportunity to inspect the other posters being displayed concurrently, it avoids the necessity of having parallel sessions of talks and provides a focal point for the meeting. One suggestion for the future is that each major centre of solid state physics research should be allocated a poster board for the duration of the meeting on which to present details of their experimental facilities and current research programs.

Bob Hadyn (NML) talking to two Monash Students.

A discussion on the future of the solid state physics meeting resulted in a decision to hold a third meeting at Wagga-Wagga in February next year. There was also support for moving the venue to New Zealand every fourth or fifth year.

The organizing committee are to be congratulated on their running of the meeting. They deserve special mention for efforts in cost control (it is exceptional value at $47 “all in” for AIP members), for ensuring that the temperature stayed below 30°C and for setting the seal on the success of the meeting by organizing a tour of the college winery before the barbecue on the Thursday evening.

— John Dunlop
The fifth New Zealand Science of Materials Conference was held at the Victoria University of Wellington from 11-14 December 1977 and attracted approximately 60 delegates from New Zealand and Australia. The Australian contingent was one of the largest ever to attend these conferences and of the 44 research papers presented, 10 stemmed from Australia. This compares with the first conference at the University of Auckland in 1969, where 5 of the 24 papers were from Australia and the 1973 conference where 17 Australian papers were presented.

The aim of the conference was to provide an opportunity for the exchange of information among materials scientists while giving research students every opportunity to participate. The organising committee of Professor D. Beaglehole, Dr W. H. Robinson and Ms M. Tremaine are to be congratulated for the successful manner in which they achieved their aim. The conference was officially opened by Dr Probine, Director of DSIR, who, in his short address, referred to the increasing need for reliable, corrosion-resistant materials in an energy-conscious world. He noted that a correct balance between pure and applied research work was required in order to attain this goal.

The conference comprised nine successive sessions each of which usually contained one thirty minute talk and 4 or 5 fifteen minute talks. The topics covered were: deformation (3 sessions); electronic, magnetic and mechanical properties of alloys; EPR; primary materials; with the final session including discontinuous films, optical studies and melting. The proceedings were given a fine start by the comprehensive discussion of the conditions required for superplasticity in metals by Professor T. G. Langdon. This was followed by Dr R. C. Giffkin's talk on grain-boundary sliding and its influence on creep. The audience particularly appreciated Dr Giffkin's simple but effective models with which he illustrated the motion of grain boundaries under stress.

In a further paper in the first deformation session, delegates were surprised to learn of the complexity of theories required to account for the compressive yield strength properties of soft woods *Pinus radiata* and kahitata.

The relevance of research work at DSIR in meeting the national needs of New Zealand was highlighted by the talks and film presented by the DSIR researchers on steel and lead-rubber dampers. These dampers are suitable for installation in base-isolation systems for the protection of buildings and bridges during earthquakes. Failing the ability of a local witch to conjure up an earthquake suitable for testing purposes, the research team resorted to adapting a bulldozer to provide linear dynamic testing of the dampers by means of an eccentric connected to the rear drive of the bulldozer. This enabled multiple testing of the dampers beyond the few cycles expected during an earthquake with forces of up to 500 kN being applied. This allowed effects corresponding to moderate to severe earthquakes to be simulated. The versatility and range of research work carried out at DSIR by Dr W. H. Robinson and co-workers was demonstrated by, what was for me a highlight of the conference, a series of talks describing experiments using the UMER technique. Here the conventional magnetic field modulation in an EPR experiment is replaced by ultrasonic strain modulation (UMER) in which the effect of the applied strain is to produce a shift in the value of the field at which resonance occurs for each EPR transition. Detection at the strain modulation frequency produces an absorption line of height proportional to the shift. The technique is normally used in conjunction with conventional EPR spectra and was applied by the DSIR workers to studies of: the $\mathrm{Cu}^{2+}$ radical in NaBrO$_3$; thin samples such as microscopy: determination of components of the spin-photon coupling tensor in ruby ($\mathrm{Cr}^{3+}$ in $\mathrm{Al}_2\mathrm{O}_3$) and iron binding sites in mineral and biological crystals.

The range of topics covered during the conference can be further indicated by reference to the explosive forming technique described by Mr F. W. Fahy. Here the basic explosive forming process uses the energy supplied by commercial explosives to shape the workpiece. The energy released is transmitted, through a medium such as water, as a pressure shock-wave to the blank which is usually clamped over a female die. This research showed there was no significant degradation in mechanical properties following explosive forming. In a similar vein, an investigation of the influence of electromagnetic forming (a process whereby the force results from the interaction of two electromagnetic fields) on the properties of the workpiece material was also described.

Professor D. Beaglehole introduced the session on electronic properties of alloys and during his talk explained why Au, but not Ag, has extensive solubility in Cu. The low solubility of Ag in Cu is due to a relatively large difference in electronic energy gaps between the two metals — this is just the sort of information which provides the common bond necessary to link delegates from the differing disciplines of metallurgy and physics. The rest of this session was devoted to detailed talks explaining techniques of optical studies and their application and advantages in investigating band structure effects.

Overall there were many good and successful features of the conference. Firstly, the delegates appreciated the advantage of having a bound copy of the research papers (DSIR Information Series 1977) available at the conference. This allowed delegates to gain a better understanding of the talks. Also, about a quarter of the papers were presented by research students, consistent with the aim of the organising committee. The chairmen of the various sessions should also be commended for the manner in which they kept to the strict timetable while allowing the fullest possible discussion of the papers. Instead of a more formal conference dinner, the outing consisted of a very successful theatre dinner held at a Wellington theatre. This was an up roarious evening of
comic, music-hall song and melodrama.

A disappointing aspect of the conference was a tendency for metallurgists to shy away from physics-oriented sessions and similarly, but to a lesser extent, for physicists to shun metallurgically-oriented sessions. This was most unfortunate in a conference designed to bring materials scientists together and the responsibility for this lies mainly with the delegates themselves. Indeed, some participants took this approach to extreme by attending only the two or three sessions of most interest to them. However, I also think it is important for speakers to be aware of this problem and to present their work in a more general manner. In this way they will appeal to a wider audience and can have detailed discussion with more interested people for later. Alternatively, this problem can be overcome by arranging introductory review talks followed by poster presentations of more detailed work. This approach also gives the delegate more freedom of choice and variety. By comparison, the present conference consisted of 44 successive talks all of similar presentation.

With the advent of solid state physics meetings in Australia at Wagga Wagga in both 1977 and 1978, it may be that New Zealand scientists would wish to attend the SSP meetings which are out of phase with the bi-annual Science of Materials conference. Alternatively, to avoid possible duplication of cost, effort and opportunity for reporting current research work, the AIP organisers of the SSP meetings may wish to consider holding bi-annual rather than annual meetings. This would then afford the Australasia region an annual conference in either Australia or New Zealand.*

Finally, on behalf of the delegates to the conference, and particularly those from Australia, I would like to congratulate the conference organisers at the Department of University Extension, Victoria University of Wellington, under the auspices of the Institute of Physics in New Zealand and the New Zealand Institution of Engineers, for their successful conference. Copies of the conference proceedings may be obtained by request from Dr W. H. Robinson, Physics and Engineering Laboratory, DSIR, Lower Hutt, and enquiries about the next conference (late 1979 or early 1980) should be sent to Dr G. J. Jones, Physics Department, Canterbury University, Christchurch.

S. J. CAMPBELL, MAIP
Dunrobin

*An informal meeting on 9 February 1978 of 74 delegates at the AIP Solid State Physics meeting, Wagga Wagga, approved a motion by Dr G. K. White that the annual SSP meeting be held in New Zealand once every four or five years. Fifty one delegates voted in favour of the motion.

Scientific Information Services

The Australian National Scientific and Technological Library (ANSTEL), a branch of the National Library of Australia, has been established to improve the access of the Australian community to the world’s scientific and technological literature. To this end, ANSTEL has developed a wide range of services based on computerized information retrieval systems.

One such service is the SCI (Science Citation Index) database. This multidisciplinary database is produced by the Institute for Scientific Information in the USA in the form of weekly magnetic tapes. These tapes contain details of articles from nearly 4000 of the world’s most significant journals from over 100 disciplines in the following broad subject areas:

- Agricultural, biological and environmental sciences
- Engineering, technology and applied sciences
- Physical and chemical sciences
- Medical and life sciences
- Behavioural sciences

An SCI search tailored to individual requirements can retrieve:

- all works with titles containing specific key words or combinations of key words
- all papers citing a particular reference
- all papers citing works published by a particular author
- all works by scientists or technologists associated with a particular organization
- all works published by a particular scientist

Both current awareness searches in the form of 52 bibliographies per annum, and retrospective literature searches are available. Until recently the maximum number of users who could subscribe to the SCI service was severely limited. These restrictions have now been lifted and there is no longer a waiting list for SCI services.

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      This service provides searches which have been tailored to the individual requirements of the subscribers. Subscriptions cost $75 p.a.

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Sir,

The enclosed advertisement appeared in a recent copy of the Scientific American. I feel that it should be of concern to Physicists in Australia and especially to those interested in science policy as it affects manufacturing industry in Australia. It is interesting to note the policies which some countries seem to be willing to adopt to attract technologically based industries but I am more disturbed to read that Varian has been attracted by these terms to manufacture Atomic Absorption Spectrometers in Ireland. Atomic Absorption Spectrometry is often quoted as being a major Australian contribution to science but it would seem that Australia has missed out in a large measure on the benefits which should accrue from an invention of such importance. No doubt Australia receives some financial benefit still from operation of patent licences etc but this must be small compared with the possible advantages to be had from a fairly large scientific based manufacturing industry producing an instrument used so widely as the Atomic Absorption Spectrometer.

B. M. Hartley.

Sir,

The comments made recently by Mrs. Ann Moyal, Director of the Science Policy Research Centre at Griffith University in “Search” Jan./Feb. 1978, advocating the establishment of a Parliamentary and Scientific Committee, suggests that the AIP should give the matter considerable thought.

It is envisaged that the membership of a suitable committee would include interested Members of Federal Parliament, representatives from scientific professional societies and other Australian scientific organisations. The Committee would provide parliamentarians with information on major scientific and technological questions. Mrs. Moyal points out that there is favourable support for the establishment of the Committee not only from both sides of the federal houses but from the Chairman and members of ASTEC and the President of the Australian Academy of Science.

In the past, there has been an undue reliance by executive government in closed-decision making processes on advice tendered by members of the scientific elite. The establishment of the Parliamentary and Scientific Committee would represent a move away from this style of decision making.

In a world where scientists are becoming increasingly aware of the social consequences of their actions, it is essential that they be given adequate representation to inform governments of what issues are involved. This representation can be increased in part if the AIP takes the initiative and supports the establishment of the Committee.

Although membership of the Committee would probably be restricted to a few members representing their respective organisations, physicists would have the opportunity to express opinions, perhaps through the science policy branch of the AIP. As well, younger scientists, working on the forefront of research may be given a chance to express their views on specific scientific matters. It is most likely that, due to the rapid growth of scientific knowledge, young active researchers would be more aware of the potential and alternatives in a specific field than more eminent and established scientists.

By supporting the establishment of the Parliamentary and Scientific Committee the AIP would ensure that the Australian Physics community was not totally disenfranchised concerning decisions made about science and technology in Parliament.

The AIP has an excellent opportunity to consolidate its own position as a professional society and to see that the quality of decisions, concerning science made in the Australian Parliament, could be improved.

With this in mind, the AIP should be exploring all avenues open to it to ensure that the Parliamentary and Scientific Committee is brought to fruition.

Richard A. Joseph,
School of Science,
Griffith University, Queensland.
ACT Branch News

CANBERRA MAGNETIC OBSERVATORY

The Bureau of Mineral Resources, Geology and Geophysics (BMR) is installing equipment in its new geomagnetic observatory in the ACT. To be known as the Canberra Magnetic Observatory, it will be fitted out with modern instruments for recording the variations, in absolute terms, of three components of the earth's magnetic field. Time-variations will be recorded digitally at one-minute intervals by an instrument based on the proton precision magnetometer. Absolute calibrations will be made regularly with a proton vector magnetometer and a standard fibre declinometer; these instruments are being developed in the Australian Geomagnetic Standards.

The new observatory will replace one at Toolangi, Victoria after about eighteen months parallel recording. This overlap is necessary to determine the factors resulting from the change of latitude and will allow the recordings at the new observatory to extend those made at Toolangi, and before that, at Melbourne. These dates from 1858 and constitute one of the longest series of magnetic recordings in existence.

A full description of the Canberra Magnetic Observatory will appear in a future issue of the BMR Journal of Australian Geology and Geophysics. In the meantime enquiries should be made to: The Director, BMR, PO Box 378, Canberra City, ACT 2607.

ACT BRANCH VISITS ORRRAL VALLEY

For its first meeting of 1978 the ACT Branch enjoyed a conducted tour through the Orroral Valley Satellite Tracking Station on 25th February. This is the most southerly of the three stations operated by the Department of Science in the ACT on behalf of NASA. It nestles between high ridges of the Great Dividing Range, about 40 km as the crow flies southward from Canberra. Its primary function is to track, control and monitor data from unmanned earth and lunar orbiting satellites and lunar stations. It also supports other space activities, such as the Apollo/Soyz mission in 1975 and many scientific satellites of countries having agreements with NASA. It will form part of the support system for the manned 'space shuttles' which NASA proposes to operate in the 1980's. On-going projects are the Nimbus series of meteorological satellites, the Orbiting Solar Observatory series and the LANDSAT earth resources satellites.

The tracking equipment comprises two parabolic antennas, of 26m and 9m diameter, 4 multi-array, square-framed antennas, a pulsed ruby laser apparatus for optical ranging, a Baker-Nunn tracking camera which is the oldest piece of equipment on the station, retained for its back-up track recovery capability, and several plane horizontally fixed antennas also retained for back-up track recovery. There are also two, smaller 'dish' antennas provided by the Department of Science to help in control and correction of the Japanese Geostationary Meteorological satellite, 36 000 km above the Pacific Ocean just north of West Irian.

Branch members and their families, 50 in all, were conducted in 3 groups by the station Director, Mr. Dennis Wiltshire and members of his staff. Each group began in the operations building, with informal descriptions of the control equipment, amplifiers, filters, computers, tape recorders, atomic time standards, radio and teletype communications equipment and test apparatus. The main parabolic antenna, standing before this building conveniently in view from the main control panel, has been undergoing complete renovation for the past 4 months after 13 years of continuous service. It will be in service again by the end of March.

The laser apparatus, which was installed about a year ago, attracted particular interest. Its principal use is in satellite orbit control, by measuring the time taken by very short bursts from the laser to be reflected by a satellite back to the apparatus. A complementary project, over the long term, is to measure horizontal movement of the laser foundations and thus determine whether there is continental drift in the region. The precision of the 'fix' based on many satellite passes is estimated as 50 mm. Therefore some conclusion may be possible in 10 to 15 years.

The afternoon was completed in the pleasant, social atmosphere of a barbecue supper at a picnic site a few kilometres from the station, on the banks of the Gudgenby River amongst picturesque peaks of the Great Dividing Range.

ACT BRANCH - Committee for 1978

The Committee elected at the branch annual general meeting held on 7 December, 1977 at the Federal Golf Club, Canberra is as follows:

Chairman: Mr G. E. Barlow
Vice-Chairman: Prof. G. V. H. Wilson
Hon Secretary: Dr M. J. Barton
Hon Treasurer: Mrs E. M. Richardson
Ordinary members: Mr F. W. Brown
Dr D. Chaplin
Mr J. P. Lonergan
Dr V. R. McKenna
Dr C. S. Newton
Dr A. F. Nicholson
Dr O. J. Raymond
Dr R. J. Sandeman

At its first meeting on 13 February, 1978 the new committee co-opted an additional ordinary member, Dr Peter C. Tandy.
The popular caricature of the physicist as a tousled academic doodling relativistic formulae in his ivory tower, aloof from the problems of everyday life, is sometimes too near the truth for comfort. Until recent times it has been taken for granted that expanding scientific research is essential for progress in a modern community, and the scientist has been honoured and generally given an open licence in his pursuit of the 'truth' with little responsibility for the consequences. Since the turn of the century, physicists in particular have lived through a golden age in which their revolutionary discoveries have captured the public imagination and nations have allocated enormous resources to the furtherance of their cause. It is scarcely any wonder that physicists should have grown complacent or have seen little need to question their traditional ways.

Of all the areas in science, perhaps one of the most traditional has been the reporting and recording of research results in journal papers. For well over a century, physicists have communicated by this means and much of the spectacular progress is a tribute to the efficiency of the system. The basic publishing circuit that has stood the test of time, with apologies to the radio technicians, rather like the circuit of a standard FM receiver (Fig. 1). Briefly it works as follows.

![Publishing House Diagram]

After the data in raw form (RF) have been processed and amplified in a draft of the paper they are passed to a secretary for conversion to a typed or intermediate form (IF), in the required journal style. It is to be hoped that the 'mixing' characteristics of the converter do not unduly distort the signal at this stage, but in any case there is usually ample opportunity for feedback at each step in the circuit. The formulated message (FM) is then transmitted to the publishing house where the Editor and his deputies, being attuned to the basic journal requirements of the IF band, reject all very low signals before selecting a suitable referee. Although he can act as a rectifier or choke, the referee usually performs as a discerning limiter, i.e. an IF amplifier operating at low bias (naturally) and efficiently rejecting all imposed noise. On acceptance, the refined FM then ideally passes to a 'discriminating' copy editor and printer who, with some subtle amplifying and condensing (and not too much transforming), convert the FM to appropriate audience-message (AM) format, demodulate the signal to audience form (AF) and then amplify in print before final distribution as a journal paper. Like any other circuit, there are characteristic impedances and time delays, as most authors are well aware, but overall it operates as a good FM receiver should — supplying the audience with high quality reception, remarkably free of noise.

As science has developed so have the complexities of publication, storage and retrieval of the literature and many further components are often present in the modern circuit, e.g. extra limiters at both the author's institution and the publisher, and alternative filters and AF amplifiers for different specialist journals and forms of reproduction. Today hundreds of different circuits exist throughout the world.

In this way, from the early origins of academic societies and old-world commercial publishers, new areas of expertise have evolved and combined to form a remarkable communication network, transcending national boundaries and dedicated solely to serving the needs of the researcher. And, by and large, it has served them well. Over the decades, printers and publishers have gone to great pains to reproduce and catalogue accurately, countless new sublanguages and a perplexing array of exotic symbols. Indeed, the scientist's traditional licence in nomenclature has often been so extreme that many a capricious choice of a mathematical symbol has become a printer's nightmare. Often the natural language has been distorted (presumably in a misplaced gesture of modesty or objective emphasis) by descriptions in the passive where the only relief is the cumbersome 'present author' or the pedantic 'we' but rarely the simple 'I' (see e.g. Fowler 1965).

Regrettably, throughout the evolution of the publishing field, physicists have remained relatively aloof from the problems. Research has been the master and publication its servant — which is as it should be. Unfortunately, history has shown repeatedly that whenever the needs of servants are consistently ignored a revolution inevitably follows, disrupting all progress in the society.

Over the last 30 years science has experienced a publication explosion. 'Publish or perish' has been the catchcry and the sheer volume of outpourings has caused
great problems to all concerned. Each component of the publishing circuit has been affected. In particular, referees have been overburdened; publishers, in a time of inflation, rising postal charges and paper shortages, have endeavoured to cope with major increases in staff; and physics researchers have had difficulty in keeping up with developments in their own field, let alone physics in general.

Science has shown that specialization is the key to success and, partly in response to demand and partly to recoup costs by capturing new markets, publishers, using their existing machinery, have produced more and more specialist journals. Libraries have been compelled to subscribe to most of them, running out of both funds and storage space. Worst of all, the spectrum of new research data has been quantized to such an extent that the correlation or transition between levels requires a very high energy input indeed. Coherent research has often been disseminated piecemeal and, in less responsible quarters, even deliberately diced and published diversely with inevitable duplication, merely to gain credits. Truly then publication has become the master and research the slave!

Perhaps the most alarming feature of the publication explosion has been the increase in noise. The pressure to publish has led to an excessive emphasis on the news-reporting aspects, often to the detriment of the archival-recording quality. In their efforts to minimize delays and cut costs, publishers have restricted or omitted many of the quality-controlling components of the publishing circuit. Thus copious errors and less worthwhile treatments have been transmitted through the system. We have seen the introduction of journals and text books where camera-ready typescripts from authors pass with little editing direct to the printers for photographic reproduction. In an even more dramatic short-circuit of the system (see Fig. 1), authors have assumed publishing responsibilities themselves and have loaded the airways with waves of preprints. It has now reached the point where a reader must note the author, abstract and origin of a paper before assessing its possible value. Unfortunately the noise not only affects the immediate reception but also jams the storage and retrieval circuits; for the good and the bad, the obsolete and the trivial are all faithfully catalogued and stored in the literature banks. What a waste of resources! Only strict filtering by experts at the origins can alleviate the problem. Regrettably, physicists have been only too willing to accept the noise as an inevitable price of modern research in this 'golden age'.

But now it seems the golden age is ending. There is a growing concern for social issues. In a climate of worldwide inflation, governments are cutting back on research allocations and the competition for their support is more intense. Many of the smaller institutes and societies have had to suddenly reduce or relinquish their publishing operations and even national publishers have felt the strain. The former free service to authors is now disappearing, with more and higher page charges, correction charges and fewer reprints being the norm.

In the rush to specialization, smaller general physics journals around the world have suffered. Near to home we have recently seen questions being asked about the future of the Australian Journal of Physics (Crompton 1976; Ilyas 1977). The general trend is disturbing, since national journals such as the AJP have an important role to play in communication today. Freed from the constraints of profit margins and enormous volumes of material, they can provide an efficient open service with emphasis on high standards of control and archival quality rather than rapid news (although dispatch of page proofs before publication ensures prompt listing of contents and abstracts in current awareness bulletins). Along with the few good review journals they can help maintain a balanced approach to physics publication by presenting specialist papers on related areas side by side and by the occasional inclusion of theoretical studies which impinge on a number of different areas (see e.g. Dewar 1977). I would be the last to suggest any interference with a physicist’s vital freedom to publish where he chooses. However, I believe it is very much in his interests today to support such national journals; if only to help uphold national pride in research and provide a tangible justification to the taxpayer; or even just to keep publication options open.

There can be no doubt that physics publication is at the cross roads. In the light of the problems outlined here I pose the following questions. How much longer will the community allow precious resources to be wasted on the proliferation of noise? How much longer can publishers play their dizzy game of creating specialist journals to help recover the costs of failing ones? How much longer will governments be prepared to subsidize foreign scientists by liberal publication of their work? How much longer will taxpayers be prepared to pay for both overseas publication charges and the costs of maintaining a local publishing house?

Clearly, if the proven traditional methods of physics communication are to survive, if progress in physics research is not to be retarded, and indeed if the very identity of physics as a unified discipline is not to disappear, physicists cannot afford to remain aloof from these problems. After all, even in printer’s terminology, aloof is just a fool transposed.

References

40 The Australian Physicist, April 1978
Physics in Photosynthesis
—at Flinders University

Dr. M. Groves, Flinders University, South Australia.

The application of advanced technology and fundamental research to the field of Biology is a challenge to the Physicist. As more technical advances are being made, the study of energy transfer in Biology has and is still undergoing a revolution in the realm of time resolution. The revolution is similar to that made by Norish and Porter in the 1950's with the advent of μs flash photolysis, which has since then been extended into the ps time range.

It can reasonably be said that the most fundamental of the energy transfer reactions in Biology is that of the absorption of light quanta and the subsequent production of redox pairs, for this is the primary step in photosynthesis. A review of the basic physics involved is given by Clayton [1965 and 1971] and what follows is a brief resume of our understanding of these reactions.

Light is absorbed by a variety of pigments. Pigment system I (PSI) absorbs in the far red part of the system and Pigment System II involves pigments which absorb at shorter wavelengths than PSI. Each pigment transfers the energy with surprising efficiency (>95%) to 'trap' centres (possibly chlorophyll a-water dimers) each situated among some 340 chlorophyll a molecules — at least for one of the two types of traps known to exist. This one associated with photosystem II, pigment system II, (PS II) and acts as an antenna system. Here we are talking of a time range of 100 ps to 1 ns. A charge transfer reaction then takes place in less than 20 ns, inducing an electrochromic response (i.e. a field sensitive absorption change) in the antenna pigment molecules in PS II, and this can then be monitored. Subsequent charge transfer events occur on the microsecond time scale and have been followed by means of absorption and ESR measurements. [Witt, 1971], [Bearden and Malkin, 1974].

An extension into the μs time range (and even the 20 ns time scale for absorption measurements) is very recent work. The ultimate result of the two distinct trap acting in tandem is the formation of two redox products — Adenosine triphosphate (ATP) and the protein NADPH2, which form the basic energy currency of the cell. Molecular oxygen is also released as a result of these light reactions.

Apart from the measurement of absorption changes and ESR signals, prompt fluorescence (PF) has also been used to study the quality of the traps and deduce something of the chemical reactions taking place in the electron transport chain. It was not until 1951 that the discovery of delayed fluorescence (DF) from plants was made by Strehler and Arnold. This amounts to a very dim fluorescence which lasts for minutes after the termination of an actinic light source (i.e. one that activates photosynthesis) and is presumed to result from a charge-recombination reaction at the trap. It therefore represents a reversal of electron transport. By following the kinetics of the DF decay in short time range as is possible, one can monitor the electron transport reactions of PS II the other photosystem displaying negligible DF emission. [Lavorel 1975]. It is the extension of the measurement of DF from plants into the 1 μs time range that has been the subject of research in the Biophysics group at Flinders University, under the leadership of Professor A. B. Hope.

The technical challenge is the production of a brief flash of light of energy density from 1 to 10 J/m² and to detect, within 1 μs of the termination of the flash, the very weak DF (yield of about 10^-6 in the μs time range) making sure to avoid the very much stronger, and spectrally identical prompt fluorescence, which has a yield of at least 10^-2 J/m². Although flash lamps are capable of producing such an energy density, the slow decay of the flash may still leave 10^-4 of the peak intensity 100 μs after the peak of the flash is reached. A light source with non-linear gain characteristics is therefore required in which the gain can be reduced at a specified time in order to achieve rapid and high contrast switching. A gas discharge laser is eminently suitable for such an application.

Fig. 1. Schematic Diagram of Equipment — The timing box provides the control logical to run the system. At the same time as the pulse to trigger the Argon Ion Laser is sent (i.e. to the 13 KV trigger unit), the PM is gated off. After a time interval, determined by an adjustable delay circuit, the pulse to 'crowbar' the transmission line is sent to the gate of the SCR, thereby terminating the laser output. The PM gate is then removed after a further 2 to 3 μs, the sampling trigger pulse to the Biomation 610 unit appearing at the same time. To monitor the data before signal averaging within the PDP 11/10 minicomputer, the digitized data is displayed on an oscilloscope.

The design depicted in Fig. 1 consists of an Argon Ion Laser fed by a lumped transmission line. An SCR is placed across the discharge tube to 'crowbar' the transmission line and thus terminate the lasing action by drastically reducing the cavity gain. Such a design produced a 10 W pulse of 488 nm light with an on-to-off contrast ratio of 10^6 : 1 within 1.5 μs, adequate to meet the requirements for microsecond delayed fluores-
cence measurement. The design allows for the variation of the pulse deviation from 10 μs to 1 ms by the adjustment of a single potentiometer which determines the time at which the crowbar action occurs. This pulse duration parameter is also useful for checking the linearity of a system as a function of the actinic pulse length.

The DF is detected by a red sensitive photomultiplier which is gated-off for the duration of the laser pulse, returning to stable gain of better than 1% within 0.7 μs. A more detailed description of the system can be found in Groves [1977].

![Graph](image)

Fig. 2. DF Decay Curve in the μs Time Range - The DF from isolated pea chloroplasts is plotted on a log base 10 scale as a function of time after termination of the actinic laser pulse 2 μs advance per word was used on the Biomation Unit. The curve represents the summation of 200 individual decay curves.

Figure 2 shows a DF decay curve from isolated pea chloroplasts, displaying the characteristic polyphasic decay already noted by other workers in the field who have variously analysed their curves by breaking them up into several "phases" by visual inspection, allowing a computer to produce the best fit to these 'individual' phases. However, the degree of correlation between the pre- and exponential factors in the so formed sum of exponentials function is too large for a unique fit to these curves. This was found to be true even for the relatively 'noiseless' data presented in this article when a non-linear multi-exponential fit was attempted. In order to overcome the above difficulty, a model of a three stage consecutive reversible reaction scheme was formulated. This considerably reduced the degree of correlation and the number of fitted parameters without in any way reducing the goodness of fit.

The advantage of choosing a specific model to describe the decay curves are several. By varying the temperature of the chloroplast suspension it was possible to measure the activation energy for the forward and reverse reactions, typically amounting to 0.1 to 0.2 eV. These are the first measurements of their kind in the μs time range. When the model was patched onto an analouge computer in our laboratory it was demonstrated that the effect upon the overall decay shape of changing the initial concentration of the reactants was relatively small, but changes in any of the reaction rates by only a small amount produced a considerable effect. In the light of this somewhat elementary finding, it is interesting to consider the mechanism behind the phenomenon of DF induction - that is the dependence of the decay shape upon the number of previous light flashes received by the plant. This phenomenon has, in some of the literature, been attributed to changes in concentration of some waste component competing for the energy in the electron transport chain. The above finding suggests, rather than changes in the reaction rates are far more important. Flash dependent changes in the reaction rates may come about by both the known accumulation of charge at the oxygen evolving site and charge-activated conformational changes in the membrane. The latter mechanism has been considered in other contexts to be very important for energy storage and release in biological membranes. This field of study is full of challenges for the physicist and physical chemist.

It is the aim of this article to stimulate fellow Physicists yet to think about those interdisciplinary fields in which basic physics is always at the forefront. I have indeed found it to be a considerable challenge to attempt to relate the field of Physics to the domain of the Biologist.

References:
Clayton, R. K. (1965) "Molecular Physics in Photosynthesis" (Blaisdell, NY: Publisher).
Science in Australia

Minister Commissions Receiving Equipment for Japanese Satellite

On the 24th of February, the Minister for Science, Senator Webster, officially commissioned the Bureau of Meteorology’s receiving equipment for the Japanese Geostationary Meteorological Satellite (GMS) at the Bureau’s head office in Melbourne.

The receiving equipment, called a Medium Data Utilisation Station (MDUS), would enable the Bureau to receive pictures of weather patterns over the Australian region every three hours, and every four hours for severe weather disturbances such as tropical cyclones. In the past, the Bureau had access only to information from American polar-orbiting satellites which provided pictures of the Australian region once every 12 hours.

The $350,000 receiving station, comprising a five-metre antenna on the roof of the Bureau’s head office and photographic processing and computer equipment, enabled signals to be received from the satellite and translated into pictures which could then be broken into enlarged sections for dissemination to the Bureau’s regional offices in each capital city. The Japanese satellite provided the Australian meteorologist with a better facility for observing, studying and understanding Australia’s weather patterns and should lead to an eventual improvement in short and medium-term weather forecasting. Data from the satellite should improve the meteorologist’s understanding of weather processes, particularly the way fronts and depressions evolve and intensify. It would give a much greater insight into why some systems develop more rapidly and move faster than others.

The Bureau would be able to continuously monitor weather patterns over the Australian region so that any cyclone approaching Australia should be detected no matter what part of the coastline it threatened.

Australia has also spent $210,000 on a ground control station at Orpheral Valley near Canberra which, with a similar station at Okinawa and the main station in Tokyo, helped to keep the satellite in its correct orbit. In return, Japan has given Australia special access to information from the satellite, particularly when tracking cyclones.

Japan has spent $90 million on the project. This included the cost of the satellite, its launching by rocket and ground stations for control and data acquisition.

Meeting to discuss Science Cooperation among Asian Countries

An Australian delegation attended a meeting in Wellington, New Zealand, from 27 February to 1 March to discuss scientific and technical cooperation among countries in the Asian region. The meeting, the sixth to be held by the Association for Science Cooperation in Asia since its formation in 1970, included representatives from Bangladesh, Burma, India, Indonesia, Japan, Republic of Korea, Malaysia, Nepal, New Zealand, Pakistan, the Philippines, Singapore, Sri Lanka and Thailand. The Australian delegation was led by Mr Ken Fuller, head of the Policy Studies and International Activities Branch of the Department of Science, which is the Australian cooperating agency for ASCA, and other delegates were Dr David Ride, Director of the Australian Biological Resources Study, and Dr James Cull of the Bureau of Mineral Resources, Geology and Geophysics.

The cooperative projects which were discussed included the possibility of establishing an inventory of the marine fauna and flora of Asian countries. Such an inventory would serve as a basis for conservation measures and the rational use of the living marine resources of the region.

Two seminars preceded the ASCA meeting.

Australia was represented at a seminar on food technology for developing countries by Mr Jack Kefferd of the CSIRO Division of Food Research, and at a seminar on geothermal and other non-conventional energy sources by Mr Roger Morse of CSIRO’s Solar Energy Studies Unit and by Dr Cull.

Director of Australia’s Landsat Station Appointed

Mr Don Gray, formerly Director of the Honeysuckle Creek Tracking Station near Canberra has been appointed Director of the Australian Landsat station being established by the Department of Science to receive and process data from the NASA series of earth resources satellites. The station is scheduled to begin operation by the end of 1979. The Landsat station will comprise receiving facilities at Alice Springs, a data processing centre in Canberra and offices initially in all State capitals where customers can inspect catalogues and order pictures and computer compatible tapes covering the entire continent. The data contained in the pictures and tapes will have important applications in fields such as mapping and minerals exploration, estimating crop yields, assessing and managing water resources, managing land resources and the environment generally, and monitoring floods and bushfires.

Mr Gray, who has a Fellowship Diploma in Communications Engineering from the Royal Melbourne Institute of Technology, has been Director of the Honeysuckle Creek Tracking Station since 1969. He was previously Director of the Tidbinbilla Deep Space Station near Canberra (1967-69), Deputy Director in charge of manned spaceflight activities (1966-67), a Senior Engineer at the former Island Lagoon Deep Space Station near Woomera (1963-66) and a communications engineer with the Technical Branch of the RAAF (1954-63).
IOP Awards

The Glazebrook Medal and Prize has been awarded to Sir George Macfarlane, lately of the Ministry of Defence, "for his outstanding administration of governmental science and technology". During the 1939-1945 war Sir George was engaged on radar work at the then TRE in Malvern where he remained until 1960 becoming the Head of the Theoretical Physics Group. In that year he became Deputy Director of the National Physical Laboratory being particularly concerned with laser research. He then, upon returning to Malvern as Director in 1962, embarked on a primarily administrative career which ended, before his retirement, as official head of the Scientific Civil Service.

The Rutherford Medal and Prize has been awarded to Professor P. T. Matthews, Vice-Chancellor of the University of Bath "for his outstanding contributions to elementary particle physics". Professor Matthews has contributed to many different aspects of elementary particle physics, being the first person to demonstrate the need for direct four-meson interactions in scalar electrodynamics and meson-nucleon interaction theories. At Birmingham in the 1950's and from 1957 at Imperial College he worked on further developments of quantum field theory. He had been active in the popularization of elementary particle physics through numerous talks and especially through his book "The Nuclear Apple".

Professor P. W. Anderson, Consulting Director in the Physical Research Division at Bell Laboratories, NJ, USA has been awarded the Guthrie Medal and Prize "for his outstanding contributions to theoretical solid state physics". Professor Anderson was Visiting Professor of Theoretical Physics at the University of Cambridge for eight years from 1967 and is a Fellow of Jesus College, Cambridge.

He has tackled many problems but perhaps special mention should be made of his pioneer work on localized electron states in doped semiconductors and on magnetic impurities in metal which topics were cited in his recent award of the 1977 Nobel Prize for Physics. Professor Anderson now divides his time between Bell Laboratories and Princeton University where he has been Professor of Physics since 1975.

The Maxwell Medal and Prize has been awarded to Dr M. V. Berry, Reader in Physics at the University of Bristol "for his outstanding contributions to theoretical physics in several fields". At present Dr Berry is researching in various areas of wave physics making extensive use of topology to study singularities that dominate wave fields.

The Duddell Medal and Prize has been awarded to Professor E. G. L. Paige of the Department of Engineering Science at the University of Oxford "for his contributions to the physical understanding, invention and design of devices based on surface acoustic waves". Recently Professor Paige has pioneered various forms of electronically variable filters and matched filters based on surface waves.


1977 Nobel Prize in Physics

The Royal Swedish Academy of Sciences has awarded the 1977 prize equally to Dr Philip W. Anderson, Bell Telephone Laboratories, Professor Sir Nevill F. Mott, Cambridge University and Professor John H. van Vleck, Harvard University for “their fundamental theoretical contributions concerning the electronic structure of magnetic and disordered systems”.

Although the 1977 prizewinners have worked in a wide variety of areas within solid state theory, a common element in their research has been their concern with the electron-electron and electron-lattice interactions in solids and the influence of these interactions on localized electron states in magnetic and disordered systems. It is characteristic of them all that they work closely with their experimental colleagues, helping to interpret their results and proposing new lines of research. The advances which they have made in our understanding of solids have been of fundamental significance for a number of technological applications. For example, van Vleck’s ideas have played an important part in the development of the laser, while the work of Mott and Anderson has made a vital contribution to the increasing technical exploitation of amorphous solids.

Van Vleck was born in 1899 and received his PhD from Harvard University in 1922. He is generally regarded as the founder of the modern theory of magnetism and has been responsible for many advances in the subject. He was the principal architect of the quantum theory of the magnetism of atoms and ions and although originally presented in 1932 this theory is used, essentially unchanged, today.

Perhaps van Vleck’s greatest impact on the theory of magnetism has been through his work on the crystalline electric field which, together with the exchange interaction, determines the great majority of the magnetic properties of solids. Although he remained active until the 1960s when much of his work on rare earth metals was performed, many of his most fundamental ideas were proposed decades ago. Their full significance has, however only been appreciated during the last decade.

Mott was born in 1905. He was educated at the University of Cambridge following which he became a lecturer, first at Manchester and then at Cambridge. In 1933 he went to Bristol University and remained there as professor of physics until appointed Cavendish.

Professor at Cambridge in 1954. He retired in 1971. During his long career he has had a crucial influence on the development of solid state physics.

It has always been characteristic of Mott’s mode of working that he discusses his ideas constantly with experimentalists and provides a fund of suggestions for new investigations. His way of thinking has been essentially physical rather than mathematical.

Perhaps the most remarkable of his achievements was the proposal, first made in 1949 and elaborated in 1956 and 1961, of the existence of the metal-insulation transition which now normally goes under the name “Mott transition”.

Anderson was born in 1923. He received his PhD from Harvard University in 1949 and began working at the Bell Telephone Laboratories the same year and is now the Assistant Director of Physical Research.

Anderson is an extremely versatile physicist who has made distinguished contributions to a large range of topics: for example, superexchange interactions, impure superconductors, the properties of superfluid. He disordered materials and localized magnetic movements. His impact on solid state physics has been very great, both through the major influence which he has had on the development of the outstanding research programme at Bell Laboratories and through the effect of his penetrating and original ideas.

The award of the Nobel prize to these three very distinguished scientists will give rise to great satisfaction and pleasure throughout the physics community.


The Register

In accordance with Resolution 30/14 and 30/15 of Council Meeting 30, the names of the following members were removed from the Register (under the provisions of Clause 13 of the Articles of Association) with effect from 30th November, 1977.

F. Baptiani  A. L. Hugill  R. G. Soar  B. P. Carroll
W. T. Bell  I. D. Johnston  J. Soderbaum  C. S. Catalano
C. Billington  A. S. Kaye  P. L. Stephenson  R. P. Davies
L. C. Botten  G. D. Lamb  A. C. Svenson  A. Franz
D. S. Brookes  M. K. Langoe  P. J. O. Teuber  B. V. Gilbert
J. S. Burnell  K. Lim  B. F. Usher  D. R. Hearne
D. J. Costello  G. T. McCulloch  W. I. Van Megen  L. K. Hook
A. Davison  P. A. McKay  S. Walters  S. J. Hornsey
L. M. Douglas  J. N. Mathur  B. D. Ward  J. L. McBride
S. C. Dowden  W. J. Molyneux  L. L. West  C. H. McCle
I. R. Edmonds  C. J. Pearce  T. M. Goodall  V. Melikyan
S. S. Parikh  J. J. Pirrocco  P. A. Reekie  C. Ballot
N. B. Gilbert  C. M. Reekie  P. A. Richardson  J. R. Pollard
P. D. Haig  G. H. Riley  M. W. Westcott-Lewis  N. W. Pollard
T. P. Hain  R. W. Riley  P. S. Whitlam  C. J. Rogers
E. O. Hall  L. V. Skartebol  J. W. Wilson  C. J. Ryan
D. E. Henshaw

Address Unknown

P. R. Best

E. C. Byford

The Australian Physicist, April 1978  45
Breakthrough in Cryogenic Pumping

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Conferences

Fourth Internation Conference on X-ray and XUV spectroscopy
Sponsored by the IUPAP will be held in Sendai, Japan from August 28 - September 1, 1978. Information is available from Professor T. Sagawa, Department of Physics, Tohoku University, Sendai, Japan.

Group Theory and Mathematical Physics Conference
IUPAP, Austin, Texas, USA from 14-20 September, 1978. Information from Dr J. L. Duggan, Physics Department, North Texas State University, Denton, Texas 76203, USA.

Second European Crystal Growth Conference

Eighth European Microwave Conference
Paris, 4-8 September, 1978. The emphasis at this conference will be on techniques and further information is available from Professor E. Constant, Centre Hyperfréquences et Semiconducteurs, Université des Sciences et Techniques, BP 36, 59650 Villenueve d’Ascq, France.

Modelling of a biological control system. The regulation of breathing.
A meeting will be held from 11-13 September, 1978 in Oxford. The purpose is to promote discussion on a well-defined physiological problem amongst people whose backgrounds are in mathematics, control and systems engineering as well as physiology. Further information may be obtained from M. J. Yates, Institute of Measurement and Control, 20 Peel St, London, W8.

Metal – Nonmetal Transition
The 19th in the series of Scottish universities summer schools in physics will be held in the School of Physical Sciences, University of St Andrews from 6-26 August, 1978. Lecturers will include Professors Mott, March, Pollock, Thouless, Enderby, Cusack, Kaminura, Holcomb, Fritzche and Drs Pepper and Rice. Further details may be obtained from Dr D. P. Tunstall, SUSSP, Department of Physics, University of St Andrews, North Haugh, St Andrews, Fife KY16 9SS.

Atomic and Molecular Physics
The 11th National Atomic and Molecular Physics Conference organized by the Atomic and Molecular Physics sub-committee of the Institute of Physics will be held at the University of Liverpool from 9 - 12 April, 1979. Information: The Meetings Officer, Institute of Physics, 47 Belgrave Square, London SW1X 8QX.

3rd Australian Conference on Science Technology
May 15-17, 1978, Canberra. Fields to be covered include techniques in agricultural sciences, bio-engineering, biological and medical sciences, earth sciences, engineering, environmental monitoring and control, physical and inorganic chemistry, physical sciences, social sciences and visual and lecture aids. Summaries of papers to be submitted should be sent to the organizers by November 1, 1977. Correspondence to: Mrs Rene Ellis, Conference Organizer, ANZAAS-SA, 141 Rundle Mall, Adelaide, SA 5000.

Colour Measurement and its Applications
The Materials and Testing Group and the Optical Group of the Institute of Physics in association with the Colour Group and the UV Spectrometry Group are arranging a conference on Colour Measurement 3 - 4 October, 1978 at City University London. An associated industrial exhibition is being organized. Further information is available from The Meetings Officer, Institute of Physics, 47 Belgrave Square, London SW1X 8QX.

UN Science Conference, 1979
A major United Nations Conference is in preparation for 1979 on the subject of Science and Technology for Development. Australia’s participation of the conference will include wide consultation with government and non-government bodies. A secretariat has been established for this purpose in the Department of Foreign Affairs. A CSIRO Officer, Mr Ian Gordon has been seconded for 12 months as Executive Officer for the Australian Government Preparations [Coresearch, August 1977]

Queen Elizabeth II Fellowships

Seven young Australian scientists were recently awarded Queen Elizabeth II Fellowships. Awards were made for research in the physical sciences to:
- Dr Robert Adler, a research scientist at the CSIRO Division of Mathematics and Statistics in Sydney, who will carry out investigations into probability and stochastics processes at the University of New South Wales.
- Dr Allan Carey, a post-doctoral fellow at the University of Adelaide, who will use advanced algebra methods to investigate quantum field theory at the University of Adelaide.
- Dr Max Lohé, a post-doctoral fellow at Imperial College of Science and Technology, London, who will carry out research in the field of elementary particle physics at the University of Adelaide.
solution NMR did for organic chemists, was due to the apparently insuperable obstacle of dipolar broadening.

One way of overcoming this difficulty was demonstrated by Andrews and co-workers at Nottingham in 1958 and involved sample spinning at the so-called magic angle. Ten years later Waugh and co-workers at MIT proposed and demonstrated an NMR experiment with a carefully engineered rf pulse sequence to manipulate the motion of the spins so that the dipolar and quadrupolar parts of the interaction were selectively averaged out.

These experiments have dramatically widened the scope of solid state NMR, and if the techniques are not part of the arsenal of every NMR laboratory it is because of their considerable technical and theoretical complexity.

This book is a detailed, authoritative and up-to-date account of the theory of such experiments. Apart from the main chapter on coherent averaging, there are chapters on nuclear spin interactions in solids, on double resonance experiments (with a substantial section on the notorious Pines technique of Pines et al.), on magnetic shielding in solids and on spin lattice relaxation in line narrowing experiments.

It is however tough reading and the author does in fact advise on initial exposure to the texts by Goldman (Spin Temperature) and Abragam (Nuclear Resonance), neither of which is for the casual reader. Nevertheless, merely glancing at the magnificent spectra displayed here should persuade many practitioners that it is worth making an effort to understand what makes coherent averaging work. A book for the high-minded professional or ambitious post-graduate student.

HIGH RESOLUTION LASER SPECTROSCOPY
Edited by K. Shimoda.
Reviewed by G. H. Allen, West Australian Institute of Technology, Perth, WA.


It could alternatively have been entitled Volume 2a in the same series since it contains additional material to Volume 1, "Laser Spectroscopy of Atoms and Molecules" edited by H. Walther. Some topics covered in Volume 2 have been revisited (Lamb-dip saturation spectroscopy), yet on the whole Volume 13 includes new material.

The index includes some spelling errors and does not direct the reader to some of the techniques discussed in text. There is no index reference to optical heterodyning although this forms part of Chapter 5. One supposes that the Chapters should each be read in their entirety.

The Introduction uses imprecise language (e.g. "...efficiencies ...are fairly low") and does not reference notable work since 1970. In other Chapters diagrams are deficient of annotation which would have made the presentation of experimental results more meaningful. Otherwise the book is easily read. In most Chapters details of experimental assembly have been included.

The book should serve as a rapid introduction to this field for new researchers. It is recommended as an acquisition to a scientific institution's reference library but the price does not invite personal acquisition.
The Australian Institute of Physics

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Solar Energy—Now

A Symposium has been jointly organised by the New South Wales organising committee of the ANZ Section of the International Solar Energy Society, and the New South Wales Division of the Australian and New Zealand Association for the Advancement of Science.

May 18, 1978 from 9.30 a.m. - 4.30 p.m. at Crest Hotel, 111 Darlinghurst Road, Kings Cross

PROGRAMME
Based on papers to be published in “Search” of April 1978.

Topics and Speakers will include:
Mr J. W. Bugler, Capricornia Institute of Technology, on solar radiation data;
Mr W. W. S. Charters, University of Melbourne, and Dr B. Window, University of Sydney on recent developments in solar collectors;
Mr W. R. W. Read, CSIRO Division of Mechanical Engineering, on industrial heating applications with solar energy;
Mr D. J. Close, CSIRO Division of Mechanical Engineering, on building heating and cooling;
Mr R. N. Morse, CSIRO Solar Energy Studies, on research, development and demonstration for solar energy.

In addition, a film prepared jointly by Philips Industries and Telecom Australia, dealing with applications of photovoltaic conversion will be shown, and Mr B. Patterson of Philips Industries will lead discussion on this topic.

Further details and registration forms may be obtained from:
Professor L. W. Davies, School of Electrical Engineering,
The University of New South Wales,
PO Box 1, Kensington 2033, NSW.