the
australian
physicist

A PUBLICATION OF THE AUSTRALIAN INSTITUTE OF PHYSICS

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Vol. 11, number 4
APRIL 1974

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Registered for posting as a periodical—Category B
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Non-members: $8.00 per annum (Australia),
$8.50 per annum (Overseas).
Single issues: $0.80 (Australia), $0.85 (Overseas).

All enquires and correspondence concerning subscriptions to: Australian Institute of Physics, PO Box 52, Parkville, VIC. 3052.

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SCIENCE AND ENERGY

Excerpts from keynote address by the Hon. W.L. Morrison, Minister for Science, to U.S./Australia meeting on Utilization of Solar Energy, University of Sydney 19 February 1974

This meeting is taking place in an atmosphere of what is fashionably described as the energy crisis.

It is an unequivocal atmosphere for scientific discussion and evaluation. There are grave dangers in approaching any question that has assumed crisis proportions, either real or imagined. The pressure is for instant solutions and crash programmes. The difficulty with crash programmes is that they have a tendency to do just that. They rarely achieve their objectives or if they do it is at an unacceptably high cost in terms of the allocation of available resources – the space race is an object lesson.

I believe that what we are faced with today is not an energy crisis but an energy challenge.

Over the last two or three decades, the advanced countries of the world have indulged themselves in a monumental energy binge. We seem hell-bent on squandering in a matter of decades what it has taken millions of years to produce.

I am not by nature a Malthusian. I believe that in the long run man’s ingenuity and commonsense will prevail. There are periods of aberration but these are followed by times of review and evaluation. I am optimistic enough to believe that is where we are now.

The relatively low cost of oil distorted our utilization of energy resources. The economic parameters thus set excluded many alternative sources. But the action by the Arab oil-producing States in increasing substantially the price of crude will broaden our perspective and open up our options.

The new ground rules for evaluating energy sources were recently laid down by the Shah of Iran when he said: "Oil producing countries will base oil prices on the cost of producing alternative sources of energy – the cost of extracting oil from shale, the cost of liquefying coal, the cost of gas from coal, the cost of atomic energy".

We can now focus attention on the need to find permanent or renewable sources of energy which are environmentally accepted. In Australia this requires a conscious decision. Australia has been described as the lucky country and in terms of energy potential we are indeed fortunate. We are an energy-rich country with a per capita average about ten times the world average and marginally better than the United States. We produce over seventy per cent of our own petroleum requirements, but this must be measured against only eight to ten years of known resources. We have an abundance of coal which at the present rate of consumption could last us some three hundred years. We have eighteen per cent of the world’s known uranium reserves and hydro-electric potential as yet untapped. We are short on geo-thermal resources but tidal movements in north-west Australia could be harnessed.

But no country and no Government can afford to be complacent. We certainly can’t afford to wait until energy reserves are almost depleted before beginning the search for alternative sources.

One of the most attractive of these alternative sources is solar energy which in the long term is potentially capable of supplying all of Australia’s energy needs. But there are problems – if there weren’t, we would not be meeting here today. The obvious one, for instance, in exploiting solar radiation, is that at any given point on the earth’s surface, the sun is with us less than half the time. Apart from the predictable night cut off, there are variations due to cloud cover. And so we move onto research with collection, storage, conversion and transmission.

The way in which solar energy can make its most immediate impact is in the form of heat at low temperatures – providing domestic and industrial hot water, process heating in industries, heating and cooling of buildings. The technology in this area is well developed and Australia through the work of CSIRO scientists has played a leading role. With the basic technology available, it now becomes largely a matter of development and of greater economic attractiveness. It is about time that industry got cracking. A firm that can come up with a combined system to provide hot water, house heating and cooling at a reasonable price would be hardly short of orders.

Our local Electricity Authorities will also have to do some rethinking and encourage rather than penalise customers who only make occasional demands on the electricity supply.

It is frequently overlooked that plants are absorbers of solar energy. By harvesting them for conversion to electricity or fuel, in either a liquid or gaseous form, scientists have realised that they can short circuit nature which normally takes thousands of years to produce fossil fuels. The farms of today could become the mines of tomorrow. But the conversion of organic material to fuels requires an integrated programme which optimises the usage of solar energy consistent with the maintenance of soil fertility.

Nor should we in the context of fuel production from organic materials overlook the bane of all developed societies – urban waste. Urban solid wastes are a source of organic materials and although there are other richer...
sources of energy, the bonus of disposing of the waste by means other than tipping it into our rivers and seas has socially desirable compensatory features.

Solar energy conversion into electric power generation raises fundamental problems. Much can be learnt from the technology gained in the United States space programme and undoubtedly the United States solar energy programme will be concentrating on this aspect of research. As the Academy of Science report indicates, Australia should contribute her share to this research and thereby maintain an informed position on potentially useful developments.

We will not of course be able to match the large sums that the United States has announced that it will devote to solar energy research. It would be both futile and irresponsible for us to seek to compete. But we are, as this meeting indicates, willing and ready to co-operate with the United States and other countries engaged in solar research programmes.

Through the Australian Research Grants Committee, scientists are able to put forward proposals for research work. Should meritorious projects concerned with solar energy exceed available funds we will respond favourably to the application of further funds. In the field of applied research, development and design the facilities of the Industrial Research and Development Grants are available. In the upcoming budget we will be examining proposals for expenditure through government authorities on work associated with solar energy research.

It is through meetings such as this that advice and recommendations for further action will be forthcoming. I can say on behalf of the Australian Government that they will be given the most careful and sympathetic consideration.

LETTERS

School Science Research

SIR:—I must say that I cannot agree with your correspondent who wrote "Altogether 49 projects and their originators were on display on this Saturday, making an interesting and stimulating exhibition" when describing the Fourteenth School Science Exhibition (*Australian Physicist*, 10, 188, 1973). Certainly the major prize winning entries were interesting and stimulating but more than half of the remainder were neither educational nor scientific. Indeed some children were rewarded for 'work' for which their science teachers should have been ashamed and I wonder what sort of 'science' they are exposed to in their class rooms.

Were I a member of the Science Teachers' Association I would be disappointed at the poor quality of so many entries in the competition and the lack of entries from the big name schools, State and Independent, some of which have staff members on the executive of the Association. Is there a green, grey or black ban on the competition or merely lack of interest by both teachers and students? Some agonizing reappraisal of the aims, objects and form of the competition seems to be needed.

—G. Major

School of Public Health and Tropical Medicine
University of Sydney, NSW 2006

Action Wanted

SIR:—In reply to a recent letter by Judith Yeo (*Australian Physicist*, Jan. 1974) I would like to emphasise an important matter. In this letter it was brought up that the Institute should be used to promote a cause to the government and the general public. The keywords here are promotion and general public, the cause on the other hand I feel should be physics.

It would be safe to say that the general public no longer understand what a physicist is, nor do they know the capabilities of a physicist and even worse, most people cannot pronounce the word. What concerns me most on this line is that among these people are many future possible employers of the up and coming young physicist. My own personal experience has sparked off this concern since at most job interviews, I have been asked to explain what a physicist is capable of doing.

Judith Yeo has provided one outlet for the public promotion of the abilities of physicists. I cannot understand why the AIP has not as yet made press statements on the more general aspects of the energy crisis as pointed out by the letter.

I for one agree very strongly with the opinion of Judith Yeo and to add to this I feel that the AIP requires greater publicity and more action if it is not to be deved by apathy like many other non-activist groups. Any comments would be greatly appreciated.

—A. Hohmann

56 Bowes Ave,
Niddrie 3042.

Overtrained?

SIR:—I read with great interest, in the *Australian Physicist* of November 1973, the report of the "1972 Survey of Physicists" by G.W. Cox and T.M. Sabine. The authors draw from the data supplied by a goodly number of correlations, many of which one would expect to find sustained should they have been able to achieve a 100 percent sample of the physicist population.

However, I wish to take exception to one of the correlations adduced by the authors — namely the correlation between "Employment and Highest Degree" — and the assumptions that must go into making such a correlation. The authors divide Table II into three parts, referring to 'overtrained fields', 'adequately trained fields' and 'undertrained fields'.

The first matter to which I take exception is the set of classifications used. They read almost as if there were an
Axe or two to be ground here! Why, for example, are Atomic Physics and High Energy Physics coupled together? And why are Electronics and Instrumentation separated?

And how on earth did the authors make such a neat separation of Chemical Physics (classified 'overtrained') and Liquid and Solid State Physics (classified 'adequately trained') and Applied Physics, Materials Physics (classified 'under-trained')?

The second matter in this area is the implicit expectation of the authors that each field should ideally be 'adequately trained'. Why should it not be possible for a student, who has done postgraduate training in some particular area — say theoretical physics — to take a skill learned in that area — for example computing — and, following his PhD work, to move into that particular area? This sort of thing has happened in many cases known to me.

Further on this point, if the training institutions are to train enough, and only enough research students to meet the community needs, then it must be made possible to predict those needs four to five years in advance. I am sure that this is not possible.

Also, the University of Melbourne Appointments Board has sponsored or co-sponsored a number of seminars over the years on the training and employment of physicists. In no case in those seminars did the speakers representing 'industry' demand, or even ask, that the Universities train physicists so that they are adaptable enough to switch their attention to a new problem and bring to it critical and analytical thought. The 'industry' speakers did consistently ask for the following: "If you are going to teach physics, teach it and give students a fairly broad idea of what goes on in the various parts of it, and give them the opportunity of having a fairly thorough training in one particular aspect of it towards the end of their training. . . . . .

I think the aim of the course should be not to teach them things they are going to use outside afterwards, but to give them a general knowledge and a method of thinking." (Dr Brown — commenting in "Physicists and their place in Industry", Melbourne University Appointments Board, May 1960).

This type of plea is exactly in line with the one which I made in the paper "Is a PhD of any Value?" (Australian Physicist [1971] 8:51). There it was stated "Let us be clear that what is being called for is not less depth but rather greater breadth, and also the destruction of the notion that a PhD candidate can expect to continue working on the subject which is his thesis topic".

I make this plea again, and strongly, for it is only as Universities adopt this attitude that the graduates who form their output will be able and willing to adapt and thereby fulfil the needs of the community.

— B.M. Spicer,
School of Physics,
University of Melbourne,
Parkville, Vic 3052.

Training of Physicists

SIR:—Professor Spicer’s letter raises two points:

The first is the classification of fields. We compared the field of original training with the field of present work. To get a manageable number of areas, several fields were grouped together in, what we hoped, was a logical way. While the groupings may not be perfect all would show that, on these criteria, we are producing too many people in what could be broadly called nuclear physics.

This leads on to the second point, which is the important question, "Does the field of training matter?"

Professor Spicer remarks on the requests by industry for 'breadth' and 'adaptability', however, the advertisements put out by both private and public industry ask for fairly specific skills and experience.

It is quite certain, that, of two equally qualified applicants, the candidate who has some familiarity with the work he is required to do will be successful.

A postgraduate student has to do several things. He is required to master research skills which can be used in a wide range of activities. Thus he should become familiar with computing, instrumentation, new materials etc. He should also learn how to deal with technicians, workshop people, administrators. He should attend conferences and visit other laboratories as an introduction to the world of science.

As well as this, he is required to show intellectual rigour and the ability to carry out a sustained piece of work by exploring a new problem in depth.

Professor Spicer argues that we need a greater breadth, and not less depth. It seems that there is a lack of conservation of something in that principle.

I think the thesis topic should be chosen so that the student acquires the more general skills. In this case the detailed topic does not matter.

The danger in badly chosen problems is that all the techniques are such that the student can only continue work on his thesis topic.

—T.M. Sabine,
NSWIT
Sydney, NSW.
THE TEACHING OF PHYSICS AT STURT CAE

J. Mohyla, E.R. Sandercolk

Introduction
At Sturt College of Advanced Education (formerly Bedford Park Teachers College) the teaching of physics is an integral part of the teaching of science. The teaching of science is oriented to the pre-service education of primary and secondary school teachers. While some students undertake science as a major study, the majority of the students see the science units as liberal arts studies which will acquaint them with a mode of enquiry and give scientific literacy.

Objectives
The main objectives of the Sturt CAE science programme are to create suitable learning environments in which students can:
- develop an understanding of the interactions and inter-relationships within the sciences
- develop an understanding of the scientific approach to technological and social environmental problems
- develop their ability to think critically and creatively
- acquire some major concepts in science and understand their relevance, limitations and practical applications
- develop some ability for independent study
- develop sufficient competence in science education to teach at appropriate levels in South Australian schools.

Assumptions
The following assumptions are implicit in the presentation and content of the science courses.

Science should be presented as a unified study.
The courses should take into account that the students will become teachers. (This does not mean that the content of school science subjects forms the basis of the course).
Teachers teach as they were taught.
Some specialization is important for students who will teach senior high school science.
Science courses should take into account future trends in primary and secondary schools e.g. open classrooms, team-teaching, individualised and group activities, audio-tutorials, teacher and student choice of activities and audio-visual materials.

Previous Programmes
From 1967 to 1973, physics has been taught as a part of the physical science courses: Physical Science A, B and C; part of a unified two year sequence: Science and Man A and B; and part of the Advanced Diploma in Teaching courses: Physics D and Physical Science Education. In the physical science sequence the courses avoid the overlap which often occurs when a student undertakes separate physics and chemistry courses.

The main reference book for physics studies in Physical Science A and B is Physics by M. Alsonso and E.J. Finn. These courses cover the following areas: Mechanics, Electromagnetism (Physical Science A); Waves and Optics, Introduction to Quantum Ideas (Physical Science B).

Physical Science C includes the following physics topics: Introduction to the Solid State, Electronics.

The basic references are Solid State Physics by J.S. Blakemore and Electronics for Scientists by J.J. Brophy.

Physics D is a study of Atomic and Nuclear Science with Introduction to Atomic and Nuclear Physics by H. Semat and J.R. Albright as the basic reference work.

Physical Science Education builds upon and extends the basic methodology contained in Special Methods (physics) taken in the Diploma in Teaching. In addition to seminars exploring the philosophy and methodology of physics teaching, students have the responsibility of teaching Physical Science to an eleventh grade class at a nearby high school under the supervision of a College staff member.

New Diploma of Teaching and Bachelor of Education
In the new Diploma of Teaching to be introduced in 1974, physics will be an important component in the one-term introductory unified science units. After the completion of these one-term unified science units, students will be able to choose further one-term units to major in science. While many of these units have an interdisciplinary approach, the following suggested units will be available to a student who wishes to undertake a science programme with some specialization in physics. (Each unit consists of six student contact hours per week for 11 weeks in term 1 or ten weeks in terms 2 and 3).


At present students who have successfully completed their Diploma in Teaching may proceed to an Advanced Diploma in Teaching in their fourth year. It is likely that students entering in 1974, who are successful in gaining their Diploma of Teaching at the end of the third year will be able to proceed to a Bachelor of Education in their fourth year. This year will equip them for senior secondary school teaching or specialist science teaching in the primary school.

A typical science programme might be:

Year 1
- A question of Science (Term 1) Unified
- Concepts in Science I (Term 2) Science
- Concepts in Science II (Term 3) Units
STURG CAE SCIENCE PROGRAMME

1974

Term 1
A Question of Science; Organic Chemistry; Nuclear Science; Ecology, Pollution and Conservation; Field Studies in Biology; Plant Physiology and Development; Laboratory Techniques for the Sciences; Special Methods I (Junior Secondary Science); Special Methods II (Senior Secondary Science).

Term 2
Concepts in Science I; Quantization; Atoms and Molecules; Human and Animal Physiology; Health Science; Special Methods II (Science Education).

Term 3
Structure of Matter; Solid State Science; South Australian Flora; Animal Behaviour; Genetics and Evolution; History and Philosophy of Science; Curriculum Studies 4 (Science); Special Methods II (Science Education)

1975

Term 1
A Question of Science; Field Studies in Biology, Ecology, Pollution and Conservation; Laboratory Techniques of the Sciences; Equilibrium, kinetics and energetics; Motion and Energy; Cell Biology; Special Methods I (Junior Secondary Science); Special Methods II (Senior Secondary Science).

Term 2
Concepts in Science I; Electromagnetism; Inorganic Chemistry; Animal Adaptation; Health Science; Special Methods II (Science Education).

Term 3
Concepts in Science II; Animal Behaviour; Fauna of S.A.; Waves and Optics; Biochemistry and Molecular biology; Human Biology; Man, Technology and the Environment; Curriculum Studies 4 (Science); Special Methods II (Science Education).

The Australian Physicist, April 1974
EARTHQUAKES IN EASTERN AUSTRALIA

The Bureau of Mineral Resources (BMR) recently sponsored a one-day symposium on seismicity and earthquake risk in eastern Australia. This was held in Canberra on 5 December 1973 and was attended by about 70 participants from all states except Western Australia. The two themes for the meeting dealt with eastern Australian tectonics revealed by earthquake activity, and the economic factors which result from earthquake damage, earthquake insurance, and increased building costs caused by earthquake risk factors.

Earthquake activity in continental regions is one of the major problems facing seismologists and earthquake engineers today. The theory of late Tectonics seems adequate to explain about 95 percent of the world’s earthquakes — namely those associated with the boundaries of the major plates — but the other 5 percent that take place in supposedly stable continental regions are not fully understood; their haphazard distribution and comparative infrequency make statistical studies difficult.

Eastern Australia is typical of this situation where the earthquakes are widely diffused, but have a few localized nests, such as the Dalry–Gunning zone, where the activity rises above the regional level. In such a continental environment the occurrence of earthquakes is unpredictable: the 1961 Robertson and the 1973 Picton earthquakes illustrate this point. Consideration of the Picton earthquake took a key place at the meeting, and 4 of the 15 papers presented were devoted to this event.

Introduction

After the opening address by N.H. Fisher, the Director of BMR, J.R. Cleary (Australian National University (ANU)) discussed the crustal structure of southeastern Australia. He showed that the crust varies from about 30 km at the continental margin to about 40 km beneath the Snowy Mountains. The upper-mantle velocity of 7.9 km/s is significantly lower than that obtained for the shield areas of Australia.

The seismicity of New South Wales was reviewed by L. Drake of Macquarie University. Since 1909 six earthquakes greater than 5.5 on the Richter Scale have occurred in New South Wales; these included the Robertson (1961) and Picton (1973) earthquakes. In this period the highest shaking experienced in the Sydney area was equivalent to a Modified Mercalli (MM) value of about 5.
Picton Earthquake

N.M. Gray (Metropolitan Water Board, NSW) discussed certain geological aspects of recent earthquakes near the Sydney Basin. He advocated that both the Robertson and Picton earthquakes could be explained by postulating a high horizontal north-south stress field, which is roughly at right angles to that which was present when the Sydney Basin was formed. He suggested that the present movements are along the old basement trends but that the stress is now acting in a different direction.

T. Fitch (ANU) presented the results of studies on the source mechanism of the Picton earthquake. He showed that movement on either a buried thrust or a strike-slip fault was responsible for this earthquake. The hypocentres of hundreds of aftershocks were computed; their locations defined a circular region of high activity close to the hypocentre of the main shock. Axes of maximum compressive stress appear to be horizontal with a northeast trend; horizontal compressive axes are also reported from solutions to earthquakes in Western Australia, in other parts of the Indian Ocean Plate, and in the interior regions of other major plates.

D. Denham (BMR) showed that, throughout the eastern states since 1900, no earthquakes having magnitude greater than 6 have been recorded. He suggested that perhaps these results indicate an upper limit to the magnitude of earthquakes in this region. On average from 1900–1973 there has been nearly one earthquake of magnitude 5 or greater per year and these have resulted in felt intensities of up to MM9. The Picton earthquake was typical of the larger events: it was felt over a large area (≈ 50 000 km²) and light damage was caused over a wide area (≈ 4000 km²). However, most of the buildings damaged were old (some more than 100 years) and the maximum intensity experienced was about MM6.

R.J. Dayeh (Australian Building Research Establishment) inspected and presented slides of some of the buildings in the Robertson area that were damaged during the Picton earthquake.

Earthquake Insurance

J.A. Botta (Crusader Insurance) presented a comprehensive paper on the impact of earthquakes on insurance. He acknowledged that earthquake insurance was an international problem because the world insurance markets are all interrelated when large risks are insured. In Australia the insurance industry did not suffer the affect of earthquake damage until the 1954 Adelaide earthquake. He described the types of cover granted by insurers, and discussed the cost of earthquake insurance in Australia; although this is higher than most people may realize it is perhaps not so surprising because the 1973 Picton earthquake caused at least $500 000 damage.

South Australia

Two papers were presented on the earthquake risk situation in South Australia. I.C.F. Stewart (University of Adelaide) questioned the use of conventional earthquake strain-release maps to delineate seismicity and calculate risk factors, because this approach does not take into account the interdependence in time and space of epicentres. He proposed using a different approach in which the events occurring along one section of a zone of fracturing can be used to obtain information on adjacent sections. This method has been used successfully along such active plate margins as California and the Aleutian Islands, and he suggested that a similar approach can be made in South Australia. J. Selby (South Australia Dept of Mines) attributed the 1954 Adelaide earthquake to a movement on the Eden Fault, and discussed the effect of the fault on the development of Adelaide.

Earthquakes and Nuclear-Power Plants

Three papers were presented on the effect of earthquakes on nuclear-power plants: I.A. Mumme (Australian Atomic Energy Commission) briefly reviewed some methods for using local geology to predict seismic intensity; D.J. Higon discussed some of the seismic considerations affecting the safety of nuclear-power plants; and A.L. Borel described the seismic effects on nuclear-power plants. It would appear that earthquake risk factors for nuclear plants are well understood, and that the problem has been thoroughly considered.

Miscellaneous Papers

R. Underwood (HEC, Tasmania) gave a progress report on the seismic zoning of Australia. The aim is to produce maps of peak acceleration, velocity, and intensity for 50-year return periods. He produced a map for Tasmania, and discussed some of the major problems in preparing such maps – particularly in areas of low seismic risk such as Australia.

C.T. Bubb (Australian Dept of Works) showed how the earthquake response of the proposed Black Mountain Tower has been calculated by using the available regional earthquake data to predict peak values of ground motion.

The final paper, on the effects of large dams on earthquake risk, was presented by K. Muirhead (ANU). In the last decade, several local earthquakes have been attributed to the filling of reservoirs; some had magnitudes as high as 6 and caused considerable damage. Why a reservoir should induce a seismic activity is still largely unknown; both increased crustal loading and pressure, triggering the release of stored tectonic stresses are possible causes. In Australia the only known man-induced earthquake activity was that caused by the filling of the Talbingo reservoir, in the Snowy Mountain, where a large number of small events occurred after filling commenced.

The assembly of people of diverse occupations discussing the many aspects of seismicity and earthquake risk proved valuable to all those attending the meeting. A list of the abstracts of the papers presented is available on request from the Director, Bureau of Mineral Resources, Box 378, Canberra, ACT 2601, and it is intended to publish selected papers given at the symposium in a BMR bulletin. – D. Denham.
VACATION SCHOOLS IN ELECTRONICS
J.A. Davies
Physics Department, Queensland Institute of Technology

Introduction

Two vacation schools in electronics have been conducted by the staff of the Physics Department at the Queensland Institute of Technology.

One vacation school was held in January 1973 and the other in August 1973. There were thirty participants in attendance at each course and the following is an outline of the course structure and the unusual requirements placed on the course by the widely differing backgrounds of the participants.

Aims

The primary aim of the vacation school was to provide a means whereby teachers in science could update their basic knowledge of electronics and its application. The rapid advances in semiconductor electronics and in integrated circuits made in the last few years has tended to leave past graduates out of touch with modern applications. The majority of teachers who attended the courses were graduates who had not encountered solid state electronic devices in their university courses.

A further aim was to enable technical staff or graduates employed in laboratories, such as the CSIRO, who are constantly exposed to new and more complex electronic instrumentation, to understand the basic operation of the apparatus and learn to identify any limitations imposed by the electronic circuitry on experiments they might be performing.

The course was also aimed at technical sales representatives who while often having only a slight background in electronics are dealing with increasingly complex electronic equipment and devices.

Finally it was hoped that members of the community at large whose hobby might be an interest in electronics would be inclined to attend the course.

Course Structure

The course had to be structured so that it was basic, yet interesting enough to attract participants who already had an understanding of electronics.

For this reason the course was run over a period of five consecutive days with three hours of lectures in the morning followed by four hours of practical work in the afternoon.

The course was intensive in that it attempted to move from elementary consideration of the diode and transistor to the applications of integrated circuits in digital instruments in just 15 lectures. The lecture headings are given in Table 1. All lectures were reproduced in a booklet which was distributed to participants at the beginning of the course.

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Lecture Titles (Each 1 Hour) |
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<td>SCR's, TRIAC's and their applications</td>
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<tr>
<td>Second Day</td>
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<tr>
<td>Construction and basic</td>
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<tr>
<td>principles of operation of</td>
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<tr>
<td>transistors</td>
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<tr>
<td>Transistor amplifiers (CE,</td>
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<tr>
<td>CB, CC) and applications</td>
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<tr>
<td>Parameters of amplifiers,</td>
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<tr>
<td>circuits and simple design</td>
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<tr>
<td>problems</td>
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<tr>
<td>Third Day</td>
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<tr>
<td>Practical aspects of</td>
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<tr>
<td>transistor amplifiers</td>
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<tr>
<td>Transistor oscillators and</td>
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<tr>
<td>FET's</td>
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<tr>
<td>Integrated circuits</td>
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<tr>
<td>fabrication, types,</td>
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<tr>
<td>nomenclature</td>
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<tr>
<td>Fourth Day</td>
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<tr>
<td>Linear IC's as operational</td>
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<tr>
<td>amplifiers</td>
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<tr>
<td>Linear IC's in oscillators</td>
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<tr>
<td>and consumer circuits.</td>
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<tr>
<td>Linear IC's in r.f.</td>
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<tr>
<td>circuits, power supplies.</td>
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<tr>
<td>Fifth Day</td>
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<tr>
<td>Digital IC's in logic</td>
</tr>
<tr>
<td>gates and flip flops.</td>
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<tr>
<td>Application of digital IC's</td>
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<tr>
<td>in counting circuits.</td>
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<tr>
<td>Digital IC's in analog to</td>
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<tr>
<td>digital conversion and</td>
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<tr>
<td>digital instruments.</td>
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</tbody>
</table>

Each afternoon's practical work consisted of three experiments, each directly related to one of the three lectures given in the morning session. Each experiment required approximately one hour to complete, leaving one hour of time for discussion, or further experimentation.

Two laboratories were used, each with fifteen participants and two lecturers assigned to each laboratory. Each participant was able to work individually on each experiment, although some preferred to work in pairs. The laboratory schedule appears below in Table 2.

All experiments were fabricated on small pieces of matrix board with solder lugs or spring clip terminals for speed in assembly. Ten sets of each experiment were provided, five sets to each laboratory, so allowing participants to rotate experiments approximately every hour.

No formal writing up of the experiments was requested; however an instructors' manual was issued so that results could be discussed with the participants. Results were also discussed during some of the lecture periods to highlight certain theoretical versus practical differences.

Participants

Table 3 shows a percentage division of the participants
Table 2

Laboratory Schedule (Each Topic 1 Hour)

First Day
Uses of diodes, clipping and clamping circuits.
Zener diode regulation.
SCR's and phase control circuits.

Second Day
Characteristic curves of a transistor.
Measurement of transistor amplifier parameters.
The difference amplifier.

Third Day
Use of the characteristic curves.
FET amplifier.
FET chopper amplifier.

Fourth Day
Operational amplifier, adder and integrator.
IC waveform generators.
Regulation of IC power supplies.

Fifth Day
Digital IC gating.
Digital IC counting.
Digital trainer, logic functions, A.D.C.

with respect to their occupations. The percentage is calculated from the total of sixty participants.

The greater proportion of teachers was brought about by the initial direction of the preliminary course information to the State Education Department, Science Teachers Association and Private Schools. The second course was much more widely publicised (by mailed circular) and attracted a much wider cross section of participants.

In most instances the fees of attendance at the course were paid by the participant's employer. The exceptions to this were the self employed participants in the Technical Sales and other groups.

Staff Observations

The lecturing staff was drawn from the Physics and Electrical Engineering Departments. Lecturers were always scheduled for a practical session when they delivered the relevant lecture in the morning, the extra staff member required in the afternoon was drawn from the group. In this way close liaison was maintained with the participants.

Overall once the ice was broken, lectures became more punctuated with questions, and discussion took place much more freely during question time. Once the practical routine was settled into, participants tended to make their own headway with little assistance from the lecturers. Both these points were ideals hoped for by the organising staff. The level of practical skill varied far more than one would expect in a tertiary teaching situation. This led to a great deal of time being spent by the instructors on the first few afternoons teaching a number of participants the fundamentals of circuit connections and instrument connection and operation.

Participants' Observations

A questionnaire was prepared and distributed to the participants of the last course in an attempt to determine more exactly how they viewed the course. Was the course too basic, too difficult, too intense, etc? What alterations, if any, would they make to the course? Sixteen participants replied to this questionnaire so the sample was small; however the remarks made were all very similar with a few exceptions. The exceptions have led us to modify our next course to meet more closely the requirements of the participants. A summary of the major points arising from the questionnaire is presented below.

Of the replies received 75 per cent. preferred the course as presented, less than 20 per cent. wanted a more basic course and the remainder were divided between a more advanced course and the present course with more accent on digital electronics.

In reply to the question on what lecture/laboratory ratio they would prefer if the course lasted one week, 94 per cent. replied, "as presented".

When asked to comment on their overall impression of the course and whether it came up to their expectations, 100 per cent. replied in the affirmative that the school had met their expectations.

Comments received tended to reflect the technical ability of the particular participants. One such reply from a government laboratory research worker, wished for a more advanced course covering: telemetry, VHF/UHF circuits, etc. but felt that in view of the aims of the course a second course would have to be designed to cater for the more advanced work.

The small percentage who requested a more basic course were people who had had no previous formal education in electronics and were to be expected in the cross section of participants we received. To cater for some of the difficulties they encountered, the next course will have an extra day provided prior to the start of the main course, which will attempt to familiarise the participants with basic electrical circuit details and instrument operation.

In conclusion it would appear that the course was well structured in regards to the type of participants we hoped to attract. There is however scope for a more basic course and also for a more advanced course.

Table 3

Vacation School Participants.

<table>
<thead>
<tr>
<th>Teachers</th>
<th>Laboratory Personnel</th>
<th>Technical Sales</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Private</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42%</td>
<td>13%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>Industrial</td>
<td>16%</td>
<td>5%</td>
</tr>
</tbody>
</table>

The Australian Physicist, April 1974 65
INSTITUTE AFFAIRS

NOTICE OF ANNUAL GENERAL MEETING

Notice is hereby given to all members that the 11th Annual General Meeting of the Australian Institute of Physics will be held at 4.15 pm on Tuesday, 21 May 1974, at Flinders University, Bedford Park, South Australia.

Approval has been given by the Registrar of Companies Victoria, for the Institute to hold the 11th AGM 15½ months after the previous one, and to present the accounts for the year ending 30 September 1973.

At this meeting a special resolution will be proposed to amend Clauses 2, 5, 6, 7, 8, 9, 10, 19, 21, 65 and 70 of the Articles of Association, as set out below, in order that

a) the present corporate grade of Associate can be re-named Member, and the title Associate can be used for a non-corporate grade to include newly-qualified physics graduates gaining the experience necessary to qualify for Grad. A.I.P., and also professional persons qualified and engaged in disciplines other than physics and

b) the present abbreviated titles of Hon. F.A.I.P., F.A.I.P., A.A.I.P. and Grad. A.I.P. can become Hon.FAIP, FAIP, MAIP and GAIP respectively.

Council recommends these changes in the belief that they give more meaningful titles to the grades in question.

At this meeting a second special resolution will be proposed to amend Clause 18 of the Articles of Association. This clause defines the grades of non-corporate membership, and council believes that it should be changed to enable members of cognate societies to become members of AIP Groups and to participate fully in the activities of the Groups on payment of a Group Subscription. It is believed that Group activities could be broadened by including as Group members those people who are interested but who are prevented from present membership either because of a qualification barrier, or because they already pay a high subscription to a cognate society. It will therefore be proposed to amend Clause 18 as set out below.

PROPOSED AMENDMENTS TO ARTICLES OF ASSOCIATION

2. (1) In these articles of association –

“Associate” means a person who has been accepted as an Associate by the Institute;

“branch” means a branch created within the Institute in pursuance of clause 20 of these articles;

“by-laws” means by-laws of the Institute made in pursuance of these articles of association;

“branch chairman” means the chairman of a branch;

“branch committee” means a committee of a branch;

“branch meeting” means a meeting of members of a branch and others as defined in clause 24 hereof;

“Company Nominee” means a nominee of a Company Subscriber;

“Company Subscriber” means a company, organization or other body accepted as a Company Subscriber by the Institute;

“Fellow” means a person possessing the qualifications referred to in clause 7 of these articles who has been admitted or transferred to the grade of Fellow in the Institute;

“Graduate” means a person possessing the qualifications referred to in clause 9 of these articles who has been admitted to the grade of Graduate in the Institute;

“group” means a group constituted within the Institute in pursuance of clause 23 of these articles;

“Group Affiliate” means a member of a cognate society accepted as a Group Affiliate by the Institute;

“Honorary Fellow” means a person possessing the qualifications referred to in sub-clause (1) of clause 6 of these articles who has been admitted to the grade of Honorary Fellow in the Institute;

“member” means a corporate member of the Institute;

“Member” means a person possessing the qualifications referred to in clause 8 of these articles who has been admitted or transferred to the grade of Member in the Institute;

“Student” means a person who has been accepted as a Student by the Institute;

“Subscriber” means a person who has been accepted as a Subscriber by the Institute;

“the Act” means the Companies Act 1961 as amended from time to time;

“the Council” means the Council for the time being of the Institute;

“the Executive” means the Executive of the Institute as constituted under clause 40 of these articles;

“the honorary registrar” means the honorary registrar of the Institute and includes any person for the time being performing the duties of the honorary registrar;

“the honorary secretary” means the honorary secretary of the Institute and includes any person for the time being performing the duties of the honorary secretary;

“the honorary treasurer” means the honorary treasurer of the Institute and includes any person for the time being performing the duties of the honorary treasurer;

“the Institute means the Australian Institute of Physics;

“the Minister” means the Minister for the time being administering the Act;

“the president” means the president for the time being of the Institute;

Replace as follows:

5 (1) The Members shall be divided into the following grades namely, Honorary Fellows, Fellows, Members and Graduates.

Replace as follows:

6 (1) Distinguished persons intimately connected with physics or a science allied thereto whom the Institute especially desires to honour for outstanding services in connection with that science shall be eligible to become Honorary Fellows.
(2) The total number of Honorary Fellows shall not exceed the number specified in the by-laws.

Replace as follows:

7. Every candidate for admission or transfer to the grade of Fellow shall either —
   (a) have obtained a degree of Doctor of Philosophy in physics recognised for the purpose of this clause by the Council or shall have in the opinion of the Council attained an equivalent standard in his knowledge of physics and his general education; and
   (b) have had such experience, for at least five years after obtaining that degree or attaining that standard, in the practice of physics or its applications or the teaching of physics at such a level of responsibility as shall satisfy the Council,
   or alternatively —
   (a) be a Member or meet the requirements for admission or transfer to that grade; and
   (b) have had such experience, for at least six years additional to that specified in the next succeeding clause as a requirement for the grade of Member, in the practice of physics or its applications or the teaching of physics at such a level of responsibility as shall satisfy the Council.

Replace as follows:

8. Every candidate for admission or transfer to the grade of Member shall either —
   (a) have obtained a degree of Master of Science in physics recognised for the purpose of this clause by the Council or shall have in the opinion of the Council attained an equivalent standard in his knowledge of physics and his general education; and
   (b) have had experience, for at least two years after obtaining that degree or attaining that standard, in the practice of physics or its applications or the teaching of physics at such a level of responsibility as shall satisfy the Council,
   or alternatively —
   (a) be a Graduate or shall meet the requirements for admission or transfer to the grade of Graduate; and
   (b) have had experience, for at least four years additional to that specified in the next succeeding clause as a requirement for the grade of Graduate, in the practice of physics or its applications or in the teaching of physics at such a level of responsibility as shall satisfy the Council.

Replace as follows:

9. Every candidate for admission to the grade of Graduate shall —
   (a) have obtained a degree of Bachelor or a diploma with physics as a major subject recognised for the purpose of this clause by the Council or shall have in the opinion of the Council attained an equivalent standard in his knowledge of physics and his general education; and
   (b) have had experience, for at least one year after obtaining that degree or attaining that standard, in the practice of physics or its applications or in the teaching of physics at such a level of responsibility as shall satisfy the Council.

Replace as follows:

10. Notwithstanding the provisions of these articles the Council may, in exceptional circumstances, admit candidates who do not meet the requirements of the three last preceding articles to the grades of Fellow, Member or Graduate.

Replace heading above Article 18 as follows:

ASSOCIATES, STUDENTS, SUBSCRIBERS AND COMPANY SUBSCRIBERS OF THE INSTITUTE AND GROUP AFFILIATES

Replace as follows:

18. (1) The Institute may admit
   (a) persons as Associates, Students and Subscribers but such persons shall not be members;
   (b) companies, organisations or other bodies as Company Subscribers but such bodies shall not be members; and
   (c) persons who are members of cognate societies, recognised for this purpose by the Council as Group Affiliates but such persons shall not be members.

(2) Provisions in relation to Associates, Students, Subscribers and Company Subscribers of the Institute and Group Affiliates shall be as herein provided be prescribed by the by-laws from time to time in force.

Replace as follows:

19. The application fees and entrance fees for membership, the transfer fees and annual subscriptions of members, Associates, Students, Subscribers, Company Subscribers and Group Affiliates and the conditions relating to their payment and collection and to the payment and collection of levies shall be as prescribed by the by-laws from time to time in force.

Replace as follows:

21 (3) The by-laws may provide for Associates, Students Subscribers and Company Nominees to be attached to a branch and to participate in its activities.

Replace as follows:

65 (3) A copy of all such by-laws and of any alteration or addition made to them shall be sent to every member (and if they affect Associates, Students or Subscribers to each Associate, Student or Subscriber) at his registered address at least seven days before they shall come into effect and in default thereof no person shall be liable to expulsion or suspension through any act or omission which but for such by-laws alteration or addition would not have rendered him so liable.

Replace as follows:

70 (1) A notice may be given to any member, Associate, Student or Subscriber either personally or by sending it by post to him at his registered address.

1974 COMMITTEES

Australian Capital Territory Branch

Chairman: Dr R.W. Crompton, Vice-Chairman: Dr P.B. Treacy, Secretary: Mr C.S. Newton, Treasurer: Mrs E.M. Richardson; Mr G.E. Barlow, Mr I.J.W. Bisset, Mr D.C. Creagh, Mr J.C. Dooley, Mr M.J. Goodspeed, Mr J.T. Lonergan, Mr J.P. Rayner, Dr D.M. Rosalky.

New South Wales Branch

Chairman: Dr T.M. Sabine, Vice-Chairman: Prof. H.J. Goldsmid, Secretary: Mr D. Paix, Treasurer: Mr G.C. Fletcher; Dr I. Bassett, Dr N. Bignell, Dr J.R. Bird, Dr C.H. Burton, Mr R.J. Cordia, Prof. C.D. Ellyett, Prof. D.H. Morton, Dr G. Paul.

Queensland Branch

Chairman: Dr D. Whitehead, Vice-Chairman: Prof. R.L. Segall, Secretary: Mr R.E. Dunlop, Treasurer: Dr B.W. Lucas; Dr R.B. Gardiner.
South Australian Branch

Chairman: Mr W.S. Boundy, Vice-Chairman: Dr E. Hirsch, Secretary: Mr K.H. Lloyd, Treasurer: Mr J. Mohyla; Dr B.H. Briggs, Dr E.L. Murray, Dr J. Cahill, Dr E.R. Sandercock, Dr D.R. Martin.

Tasmanian Branch

Chairman: Dr I.A. Newman, Vice-Chairman: Dr R.D. Watson, Secretary/Treasurer: Dr J.R. Fox.

Victorian Branch

Chairman: Prof. H.C. Bolton, Vice-Chairman: Prof. K.D. Cole, Secretary: Mr J.V. Sullivan, Treasurer: Mr D.L. Swingler; Prof. H.H. Bolotin, Mr J.D. Bunting, Dr J.G. Greer, Mr R.J. de Groot, Dr J. Liesegang.

Western Australian Branch

Chairman: Dr B. Thomas, Vice-Chairman: Dr R. Green, Secretary: Dr M. Lynch, Treasurer: Dr B. O'Connor; Dr J. Black, Dr J. Chute, Mr R. Fleay, Mr S. Gunson, Dr B. Hartley, Mr R. Price, Dr J. Robbins, Dr J. Swan, Mr K. Tobin, Mr T. Edwards.

Biophysics Group

Chairman: Dr H.G.L. Coster, Vice-Chairman: Prof. A.B. Hope, Secretary/Treasurer: Mr L.D. Oliver; Dr B.I.H. Scott, Dr J.L. Black, Dr C.D. Field, Dr J. Maloney.

Education Group

Chairman: Mr P.E. Ciddor, Vice-Chairman: Dr G. Paul, Secretary/Treasurer: Dr C. Gauld; Dr P.E. Clark, Mr L.G. Little, Dr B. McIntosh, A/Prof. R.E.B. Makinson, Mr W.A. Miller, Mr W.A. Durrant.

Nuclear and Particle Physics Group

Chairman: Prof. B.M. Spicer, Vice-Chairman: Prof. I.E. McCarthy, Secretary/Treasurer: Dr M.J. Kenny; Dr J.R. Bird, Dr I.F. Bubb, Prof. H.H. Bolotin, Prof. C.A. Hurst, Dr B.G. Kenny, Prof. G.I. Opat, A/Prof. R.B. Taylor, Dr P.B. Treacy.

Vacuum Physics Group

Chairman: Dr M. Elford, Vice-Chairman: Dr E. Dennis, Secretary: Dr R.J. MacDonald, Treasurer: Mr J. Gascoigne; Dr R.W. Crompton, Mr L. Cotterell.

WHITHER BIOPHYSICS?

“What is the best organisation for the promotion of Biophysics in Australia?” This question has been exercising many minds for many years, and probably the difficulties in finding the right solution (if indeed there be a single solution) lie in the great diversity of what people call biophysics. The problem of finding common links is probably accentuated because biophysics embraces some physiologists, biochemists, biomathematicians and bioengineers as well as people with a formal background in physics.

In an endeavour to involve all such scientists in the Biophysics Group of the AIP the Constitution of the Group has drawn up to make it possible for non-physicists to have full group membership rights and the opportunity to hold office. In 1973, too, the AIP Council has approved the necessary amendments to its Articles and By-Laws to enable scientists who are members of cognate societies to join the Biophysics Group. AIP by payment of the Group fee only (currently $2) thus sparing these persons a second large subscription.

However, it seems that many biophysicists may not want to belong to a society which, by its name, indicates a basic allegiance to physics.

Australian biophysicists are dissatisfied basically because many of them feel no close identity with any of the existing Societies or Institutes. The range of existing bodies follows closely the traditional departmental pattern used for undergraduate studies and most students have no difficulty in attaching themselves to the appropriate one once they graduate. This is not always true for borderline fields such as biophysics. Many biophysicists now work in biological laboratories and have little contact with physics or physicists. To them the professional society that they are qualified to join is irrelevant — almost an accident of their undergraduate background.

A motion passed at the last AGM held during the 13th Conference on Physics in Medicine and Biology sought to explore the possibility of forming an independent society.

NOTES AND NEWS

Professor K.E. Bullen – Gold Medal

The Royal Astronomical Society of London has awarded its Gold Medal for 1973 to Professor Bullen, formerly of the University of Sydney. The award is for his great contributions to our knowledge of the internal constitution of the Earth and of other planets.

CSIRO Applied Chemistry Laboratories

A new grouping of Divisions has been established under the Chairmanship of Dr S.D. Hammond. The Division of Chemical Technology (Chief: Dr D.E. Weiss) will apply chemical and polymer technology to utilization, recycling and conservation of renewable resources, and
in the production of cellulose-based materials. The Division of Applied Organic Chemistry (Chief: Dr D.H. Solomon) will be concerned with pest control, useful plant products, and basic aspects of organic polymer and physical chemistry.

**New Award for Radioastronomer**

The first Herschel Medal of the Royal Astronomical Society has been awarded to Dr J.P. Wild, Chief of the CSIRO Division of Radio-physics, for his outstanding contribution to solar radioastronomy. Dr Wild is to visit China as part of a delegation from the Australian Academy of Science and the ANU.

**Conferences**

**International Laser Radar Conference**

The 6th Conference on Laser Atmospheric Studies, which will be devoted to Laser Radar, will be held in Sendai, Japan on 3-6 September 1974. Enquiries may be sent to Professor Hidemichi Inaba, Research Institute of Electrical Communication, Tohoku University, Katahiro 2-1-1, Sendai 980, Japan.

**International Conference on Application of Statistics and Probability to Soil and Structural Engineering**

The 2nd Conference in this series will be held in Aachen, West Germany, on 14-18 September 1975. Titles and summaries of proposed papers should be sent to Professor O.G. Ingles, Department of Civil Engineering Materials, UNSW, Box 1, Kensington, NSW 2033, before 1 July 1974.

**Radioisotope Course of Non-Graduates**

The 16th course presented by the Australian School of Nuclear Technology will be held from 16 September to 4 October at the AAECRE. Enquiries should be sent to The Principal, Australian School of Nuclear Technology, Private Mail Bag, Sutherland, NSW 2232 before 12 August.

**Agencies, Products, Reports**

**Optimum Parameters for Spectrophotometry**

A 25-page booklet is available on request from Varian Pty Ltd Springvale Road, North Springvale, Vic. 3171. The booklet covers Absorption Spectroscopy, Optimization, UV-Vis Spectrophotometers, Useful Procedures for Calibrations and Measurements.

**Sources for Spectral Lamps**

The design of constant-current sources for spectral lamps is discussed in a paper by G.F. Box (CSIRO Division of Chemical Physics) in the Australian Journal of Instrumentation and Control 29 (6) (December 1973). Both vacuum-tube and transistor circuits are described, with particular reference to hollow-cathode lamps and mercury vapour lamps.

**Ling Dynamics – New Agent**

All sales and servicing of Ling vibration equipment will in future be handled by Ronald J.T. Payne Pty Ltd, 385 Bridge Road, Richmond, Vic. 3121.

**Commercial Laser Doppler Velocimeter**

A Laser Doppler system developed at the Brown Boveri Research Centre in Switzerland is now available for routine industrial use through DC Industries Pty Ltd, 32 Smith Street, Collingwood, Vic. 3066.

**The Magellanic Stream**

An enormous mass of hydrogen gas is flowing towards our galaxy from the Magellanic Clouds. Dr D. Mathewson of Mt. Stromlo Observatory identified the stream last year during observations at the CSIRO installation at Parkes. Since then he has been studying the problem of the origin of the gas stream. He and Professor Oort of Leiden have related the stream to the postulated “inter-galactic wind”. A full report will appear in a later issue.

**Government Study of Electronic Components Industry**

The Department of Science has appointed three consultants to advise on the future of the Australian electronic component manufacturing industry. The consultants are: Professor R.M. Huey (UNSW) Mr M.M. Insby (private consultant), and a group at RMIT under Mr R.G. Cearns. In an associated study for the Department of Secondary Industry, Arthur D. Little International Inc., will report on international aspects of component technology.

**Oxford Instruments (Australia) Pty Ltd**

Oxford Instruments opened an office in Sydney at the C.I.G. Technical Centre, Alexandria, NSW, in October last year. The company originally produced high power water cooled magnets and collaborated over the design of the ANU 30 tesla facility. They then moved into superconducting magnets and now provide the widest range of cryogenic research instrumentation available from any company and have also moved into the application of cryogenic techniques in chemistry – with high field NMR systems, susceptibility systems and low temperature sample attachments for optical, infra-red and X-ray spectroscopy. An advertisement appears in this issue.

**International Union of Pure and Applied Physics – Conferences Approved for 1974**

The Conferences have been classified as A, B or C type depending on the size and scope.

(A) **General conferences** designed to provide an overview of the entire field of interest to a Commission. Normally occurring at three-year intervals and with an attendance in the range 750 – 1500.
(B) Topical conferences concentrating on broad subfields in the area of a commission's interest. Normally scheduled in the years between type A conferences. Expected attendance in the range of 300 – 600.

(C) Special conferences on more specialized topics than in the case of type B conferences. Normally held in the years between type A conferences. Anticipated attendance in the range 50 – 200.


Semiconductor Commission 12th International Conference on the Physics of Semiconductors (A) Stuttgart, BRD July 15–19. Dr. O.G. Folbert, IBM Deutschland GmbH, Entwicklungs- und Forschung, PO Box 211, D-7030 Stuttgart, BRD.


4th International Conference on Crystal Growth – Tokyo, 24-29 March. Prof. R.R. Hasiguti, Faculty of Engineering, University of Tokyo, Bunkyo-ku, Tokyo, Japan.

X-Ray Processes in Matter (C) Helsinki, Finland July 29 – Aug 1. Dr. T. Aberg, Laboratory of Physics, Helsinki University of Technology, SF-02150 Otaniemi, Finland.

Colour Centers in Ionic Crystals (B) Sendai, Japan Aug 19–23. Dr. M. Ueta, Department of Physics, Tohoku University, Katahira 2-Chome, Sendai, Japan.

Commission on Particles and Fields IXth International Conference on High Energy Accelerators (B) Stanford, California, USA, May 2-7. Professor W.K. H. Panofsky, SLAC, PO Box 4349, Stanford, California 94305, USA.


Nuclear Physics Commission The Few Body Problem in Nuclear Physics (B) Quebec, Canada, Aug 26–30. Professor R.J. Slobodian, Université Laval, Département de Physique, Québec, 1e, Canada.

Reactions between Complex Nuclei (B) Nashville, Tennessee, USA June Dr. P.H. Stelson, Physics Division, Oak Ridge National Laboratory, PO Box X, Oak Ridge, Tennessee 37830, USA.

Gamma-Ray Transition Probabilities. Delhi, Nov. Dr. Suresh C. Pancholi, Department of Physics and Astrophysics, University of Delhi, Delhi 7, India.


18th Congress Ampere on Magnetic Resonance and Related Phenomena, Nottingham, England, 9-14 Sept. Prof. E.R. Andrew, Department of Physics, University of Nottingham, University Park, Nottingham NG7, 2RD, England.

IVth International Conference on Vacuum Ultraviolet Radiation Physics, Hamburg, BRD, 22-26 July. Prof. R. Haensel, II. Institut fur Exp. Physik 2 Hamburg 50, Luruper Chaussee 149. Hamburg, Germany.


Committee on General Relativity and Gravitation International Conference on General Relativity and Gravitation (A) Haifa, Israel, Sept. Professor N. Rosen, Department of Physics, Technion, Haifa, Israel.

International Commission for Optics SPIE Conference on Image Assessment and Specification, Rochester, NY, USA. 20 22 May. SPIE National Offices, 338 Tejon Place, P.O. Box 1146, Palos Verdes Estates, Cal. 90274, USA.


THE REGISTER
CHANGES IN MEMBERSHIP FROM 6 DECEMBER 1973 TO 19 FEBRUARY 1974

Fellowship
New Elections
Hebbard, D.F. Australian National University
Robertson, D.S. Weapons Research Establishment, SA.

Deceased
Swinbank, W.C. O/S

Associateship
New Elections
Hind, A.D. Weapons Research Establishment, SA.
Peard, K.A. Footscray Institute of Technology, Vic.
Thomson, B.J. Footscray Institute of Technology, Vic.
Woolcott, R.L.S. NSW Institute of Technology.

Transfers
Boydell, S.G. University of Melbourne, Vic.
Dilley, A.C. CSIRO, Division of Atmospheric Physics, Vic.
Joynt, R.C. Herman Central Scientific Laboratory, Vic.
Liddell, P.R. Varian Techtron Pty Ltd, Vic.
Liddiard, K.C. Weapons Research Establishment, SA.

Resignations
Bielig, G.A. (Qld) Birkeland, J.R. (WA)
Coombs, J.S. (ACT) Grant, J.T. (O/S)
Harvey, P.J. (Vic) McDonald, A.D. (O/S)
Walls, G.W. (Vic) Waugh, J.B.S. (O/S)

Graduateship
New Elections
Davison, A. University of Melbourne, Vic.
Dempster, A.J. Monash University, Vic.
Harnwell, P.J. Department of Education, NSW.

Pender, L.F. Monash University, Vic.
Robinson, R.N. Preston Institute of Technology, Vic.
Wright, P.H. Monash University, Vic.
Yung, F.H. University of Western Australia.

Transfers
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Company Nominees
Resignation
O’Neill, J.J. (NSW)

21-25 First National Congress of AIP, Adelaide

THE CALENDAR

MAY
19-20 11th Annual General Meeting and 24th Council Meeting, Adelaide (AIP)
20-24 14th Conference on Physics in Medicine and Biology, Sydney (AIP Biophysics)
20-24 Fourth National Symposium of Solid State Division, Canberra (RACI)

AUGUST
19-21 Optical Information Processing, Sydney (ICO-AAS)
19-23 International Union of Crystallographers, Melbourne
25-31 8th Electron Microscopy Conference, Canberra
26-30 N.Z. Electronics and Geophysics Conference, Auckland

The Australian Physicist, April 1974
BOOK REVIEWS


Reviewed by E.P. George, University of New South Wales, Kensington, N.S.W.

This is a report of the 1968 Coral Gables Conference held at the University of Miami. The organisers had been able to assemble many of the leading workers in the field such as K.S. Cole, G. Eisenmann, O. Kedem, L.J. Mullins, L. Onsager, I. Tashiki and these proceedings, contrary to most conference reports, comprise a collection of papers of more than passing interest to the research worker in this field.

The editors correctly point out that the precise nature of the functional role of living membranes continues to elude the probing enquirer and that a complete description of biological membranes remains outside the range of recent advances in sophisticated experimental techniques. In spite of the non-emergence of definitive answers to these questions, in many cases the answers seem just around the corner and many of the papers in these proceedings may well help to unearth them.

An interesting and novel idea concerning the mechanism of nerve excitation is contributed by G. Adam. This idea, based on the Davson-Danielli structure, considers the co-operative reconfiguration of the charge sites at the membrane surfaces resulting from the substitution of one divalent cation by two monovalent ones. The theory is consistent with experiment for small depolarisations only, but with further work on the mathematical approximations used the range of validity of the theory could well be extended.

Eisenmann and collaborators give a review (54 pages) of ion distribution equilibria in bulk phases and present many results on the ionic transport properties of bilayer membranes produced by neutral macrocyclic antibiotics. Blank & Britten consider the effect of statistical fluctuations in molecular density on membrane permeation leading to a possible explanation of the ATP dependent Na+ exchange diffusion seen in red blood cells.

D.E. Green summarises the position concerning the structure of mitochondrial membranes which is followed by several pages of informative discussion and then goes on to review the evidence for the conformational basis of energy transductions in biological membranes.

Of significant interest is the paper presented by S. Fox on behalf of a large group from Miami and from Texas in which the properties of protein-like polymers obtained by heating mixtures of amino acids are described, molecular weights in the range 4,000 – 10,000 are achieved, and these polymers, named protenoids are shown to share most of the properties associated with proteins. In aqueous solution these polymers separate into small spheres, approximately 2μm diameter. Electron micrographs of these spheres show characteristic double layers at the surface and this technique promises to provide a useful approach to the study of membrane properties, since the composition of the protenoids is known and may be controlled.

The book provides a useful presentation of current ideas and techniques in membrane physics which will be of value to research workers in this interdisciplinary field.


Reviewed by C.E. Cudmore, CSIRO Division of Cloud Physics, Epping, NSW.

This monograph deals mainly with the results of observational investigations into atmospheric turbulence but also gives an adequate, clear discussion of relevant theory necessary for interpreting the data to which the book refers. Detailed theoretical derivations are avoided but the bibliography of some 300 references should aid readers who wish to pursue the origins of the treatments used.

Textbooks on turbulence have hitherto been predominantly concerned with this phenomenon in boundary layers; these authors have collected together work on the free atmosphere which was previously scattered throughout scientific literature in the English and Russian languages. Much is, of course, from their own research. The book will not only be useful to research workers in atmospheric physics and meteorology but also to those teaching these subjects, where it will act as a source of material rather than as a student's course-book.

The energetics of turbulent flow and the spectral structure of free-air turbulence are given much attention. There are useful chapters on the principles of the experimental methods used and the statistical methods of computation, particularly filtering and spectral analysis. Only the treatment of turbulence in clouds seems too brief by comparison with the widespread research results which exist in this field. An introductory chapter by the editor, with 78 more references, is aimed at updating the 1968 original text to 1972, the date of translation.

Unfortunately, the quality of the paper-back binding of the USA-produced translation is no better than that of the average single copy of a monthly journal. Any library or frequent user of the book will have to pay for hard-cover binding in addition to the high purchase price of $U.S. 37.50.
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Wholly set up and printed for the Australian Institute of Physics, Charles Ross House, 191 Royal Parade, Parkville, Victoria by Simmons Limited, 32 Farramatta Road, Glebe—1974