

INSTITUTION  
OF ENGINEERING

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(Physics of the)

**SECOND NATIONAL CONGRESS**

**16th Annual Conference on  
Physics & Engineering in  
Medicine & Biology.**

*Australian Institute of Physics*

*Hospital Physicists Association*

*New South Wales Society for Medical &  
Biological Engineering.*

## CONTENTS

GENERAL INFORMATION	1
Introduction	i
Social Program	ii
Scientific Program	iv
Symposia	v
Subsidiary meetings	vi
Special Course	vi
USEFUL INFORMATION	vii
MAP	viii
INDUSTRIAL EXHIBITORS	ix
UNIVERSITY & RESEARCH ORGANISATION EXHIBITS	xi
Scientific Program	xiii
Scientific Program	xxix
16th ANNUAL CONFERENCE	
ABSTRACTS	1
Monday 23rd August	34
Tuesday 24th August	69
Thursday 26th August	125
Friday 27th August	
AUTHOR INDEX	176

## GENERAL INFORMATION

### INTRODUCTION

The organising committee welcomes all delegates and their partners to the Second National Congress of the Australian Institute of Physics and the Sixteenth Annual Conference on Physics and Engineering in Medicine and Biology.

Registration at the Congress will be carried out in the foyer of the Science Theatre (Map reference P13) from 9 a.m. to 5 p.m. Monday 23rd and thereafter, to Friday 27th August in the Exhibition area. Most delegates will register during the Opening session from 9 a.m. to 11 a.m. on Monday 23rd August, and the desk will be manned for the rest of the week to register late arrivals and to assist delegates as required.

The official welcome to attendees on behalf of the University of New South Wales by the Pro-Vice-Chancellor, Professor Rex Vowels, and on behalf of the Australian Institute of Physics by the President, Dr. James Campbell, will be held in the Science Theatre at 11 a.m. on Monday 23rd August, and will be followed at 11.20 a.m. by an opening address by Professor R. Street. Professor Street is well known to Australian Physicists through his association with Monash University, the Australian Institute of Physics, the Australian Research Grants Committee and the Australian National University, and through his efforts to advance the cause of physics within Australia.

Subsequent invited and contributed sessions will be held in theatres and rooms in the Physics Main Building (Map reference J14). All invited Congress lectures will be given in the Keith Burrows Lecture Theatre, and invited lectures to the 16th Annual Conference

on Physics and Engineering in Medicine and Biology will be given in Room 27. The two parallel contributed lecture sessions in the National Congress will be held in the Keith Burrows Lecture Theatre and Room 112, Physics Main Building, and the contributed lecture sessions for the 16th Annual Conference will be held in Room 27, Physics Main Building. Detailed programs for both meetings are given later in this book.

The poster sessions which are normally held from 4 - 5 p.m. each day will be held in the two large rooms adjacent to the Exhibition. The Exhibition is in Room 01 and the poster boards in Rooms 02 and 01B, Physics Main Building. Tea will be served in the exhibition area.

#### SOCIAL PROGRAM

The social program is arranged to allow physicists to meet socially after the daily sessions, and to entertain those delegates and partners interested in seeing Sydney and the surrounding country.

#### Reception

A reception for all delegates and partners will be held from 5.15 p.m. to 7.15 p.m. at the AJC Vista Room at the Randwick Race Course near the University of New South Wales. The room is reached via the Alison Road Entrance to Randwick. Buses will leave from near the Science Theatre for delegates who do not have transport. Delegates who have cars at the Congress can help by transporting fellow members. Transport back to the University will be provided by buses after the function.

#### Harbour Cruise

Sydney is famous for its beautiful natural harbour, and this cruise will allow delegates and partners to view its many natural and

man-made attractions. A bus will depart from near the Science Theatre at 12.45 p.m. on Wednesday 25th August, and the boat will leave from Number 2 wharf at Circular Quay at 1.15 p.m. A picnic lunch will be provided on the cruise, and fruit juice and coffee will be provided. Delegates requiring other refreshments should bring their own. The cruise will terminate at Circular Quay at approximately 4.30 p.m. It has been decided not to arrange transport back to the University, since many delegates may prefer to visit the Opera House, the Rocks area or the city of Sydney. Cruise tickets must be purchased before midday Monday 23rd August.

#### Congress Dinner

The congress dinner will be held from 8 p.m. to 12 p.m. on Thursday 26th August at the Argyle Cellars, in the historic Rocks area of Sydney. This area, sometimes called the birth place of Australia, contains many fine examples of early Australian and convict buildings. The venue for the dinner is an authentic convict built building, approximately 135 years old, and a Colonial Night theme has been adopted. Music will be provided by a minstrel group and there will be a small area provided for dancing. Dinner tickets must be purchased before midday on Monday 23rd August.

#### Conference Dinner

The 16th Annual Conference on Physics and Engineering in Medicine and Biology has arranged a dinner for its members at the Randwick Rugby Union Club on Wednesday 25th August.

For those who wish to see more of Sydney, the social committee has organised a number of short tours. On Monday 23rd August there is a guided tour of the Opera House (assemble Opera House at 9.45 a.m.)

followed by lunch and a tour of the New South Wales Art Gallery (assemble Art Gallery 1.30 p.m.). On Tuesday, a trip to the Blue Mountains is available; depending on the numbers interested, this could be a regular tour or one specially provided. On Thursday there is a guided tour of the Rocks area in the morning, (assemble 10.30 a.m., Sydney Cove Redevelopment Information Office, Lower George Street) with the afternoon left free for shopping.

Bookings for the Tuesday and Thursday tours will be taken up to midday Monday 23rd August. The Monday tours must have been booked prior to Congress.

#### SCIENTIFIC PROGRAM.

##### Invited Papers

The invited speakers at the Congress have been selected by the state and territory branches of the Australian Institute of Physics and by the New Zealand Branch of the Institute of Physics. These speakers are Professor J. Whitehead (Qld.), Dr. D. Nicol (NSW), Dr. J. Israelachvili (ACT), Dr. F.F. Smith (Vic), Dr. M. Waterworth (Tas), Dr. E. Weisgold (SA), Dr. J.L. Robins (W.A.) and Dr. G. Boid (N.Z.). Invited speakers at the 16th Annual Conference on Physics and Medicine and Biology are Dr. Chaudri, Dr. J.L. Black and Dr. L. Dintenfuss.

Delegates to both the Congress and the 16th Annual Conference will be able to attend most of these invited presentations. Clashes do occur, particularly on Thursday, when a special one day meeting on Biomedical Engineering will be held by the organisers of the 16th Annual Conference. Delegates to both meetings are free to attend the invited lectures and contributed lectures of either meeting.

##### Contributed Papers

The contributed papers have been classified into eight broad

groups.

- A. Geophysics, Astrophysics & Astronomy,
- B. Education,
- C. Solid State Physics,
- D. General Physics, Nuclear and Particle Physics,
- E. Applied Physics and Instrumentation,
- F. Plasma Physics, Physics of Electrons & Ions,
- G. Biophysics,
- H. Hospital and Medical Physics & Engineering.

The contributed papers in category H will all be given as oral presentations and with the category G papers, make up the program of the 16th Annual Conference on Physics and Engineering - Medicine and Biology. The contributed papers in the categories A to G make up the program of the National Congress, and approximately half of these papers will be given orally, and the others will be presented as poster papers. Two parallel sessions of oral presentations have been arranged for the Congress, giving with the Category H papers a total of three parallel sessions for much of the time.

##### SYMPOSIA

Two symposia dealing with certain aspects of science Policy and of Physics education have been organised, and the program has been arranged so that all delegates can attend these meetings and participate in the discussion.

The first symposium, on Tuesday afternoon, will deal with some aspect of science policy within Australia. The panel members who will initiate discussion will be Ann Moyall, Professor S. Encel, and Dr. T. Conlon, with Dr. James Campbell as chairman.

The second symposium on Wednesday morning, is entitled "Physics: What Future?" and concentrates on the future demand for physicists from an educational point of view. This most interesting session will be chaired by Professor Bruce Mainbridge, and the panel members will be Professor P. J. Fensham, Professor L.R.B. Elton, Dr. R. E. Budwine and Dr. R. Collins.

There will be ample opportunity in both these sessions for delegates to present their views from the floor, and to question the members of the panel.

#### SUBSIDIARY MEETINGS

On Thursday after the last session an Extraordinary General Meeting of the Australian Institute of Physics will be held. A copy of the agenda for this meeting is included in the conference folder.

At 4.45 p.m. on Thursday, the Annual General Meeting of the Hospital Physicist's Association (Australian Regional Group) and the Biophysics Group of the Australian Institute of Physics will be held in Room 112, Physics Main Building.

#### SPECIAL COURSE

From 9 a.m. to noon on Thursday, 26th October, a Keller Plan Workshop will be held by Professor L.R.B. Elton, Institute of Educational Technology, University of Surrey, U.K.

Those interested in participating in this Workshop should register at the opening session on Monday, 23rd August.

## USEFUL INFORMATION

#### FLIGHT INFORMATION:

Ansett Tel: 20631  
TAA Tel: 20157

#### CENTRAL RAILWAY:

Enquiries Tel: 20942

#### TAXI CABS:

Legion Tel: 20918  
Yellow Cabs Tel: 31 0488  
R.S.L. Tel: 69 0399

#### BUSES:

Bus stop on Anzac Parade, opposite the Round House.  
No. 394 or 396 to Circular Quay. ( $\frac{1}{2}$  hr.  $\pm$  1p)  
No. 393 or 395 to Central Railway Station. (Railway Square) (20 min.  $\pm$  1p)  
No. 302 to Circular Quay (in Day Ave.) ( $\frac{1}{2}$  hr.  $\pm$  1p)

#### EATING HOUSES:

1. University Union Stage 3 Snack Bar - Ground Floor  
University Union Stage 3 Coffee Bar - First Floor  
Map Ref. E5, Anzac Parade side of Round House Bar, 1st Floor Stage 3. Open 12-2 p.m.
2. McDonald's Eating House & Pizza Hut.  
Corner of Barker Street and Anzac Parade, Kingsford.
3. Corfu Restaurant.  
454 Anzac Parade, Kingsford
4. Many more in adjoining suburbs. (refer to Tel. Directory)

#### UNSW STAFF CLUB:

By invitation only. Located on the Fourth Floor of the Electrical Engineering Building.  
Map Ref. G17

#### BANKS:

Commonwealth & Rural Branches near the Round House (Map Ref. F7) or behind the Library (Map Ref. F22).  
Bank of N.S.W., A.N.Z., National Bank all situated in Anzac Parade, Kingsford.

#### POST OFFICES:

There is a machine Postal Station near the Round House opposite the Barber's Shop. (Map Ref. F7).  
The nearest Post Offices are:  
168 Anzac Parade, Kensington  
12 Gardeners Road, Kingsford (round the corner from the Roundabout)  
Both Post Offices are about  $\frac{1}{2}$  mile from the Campus.

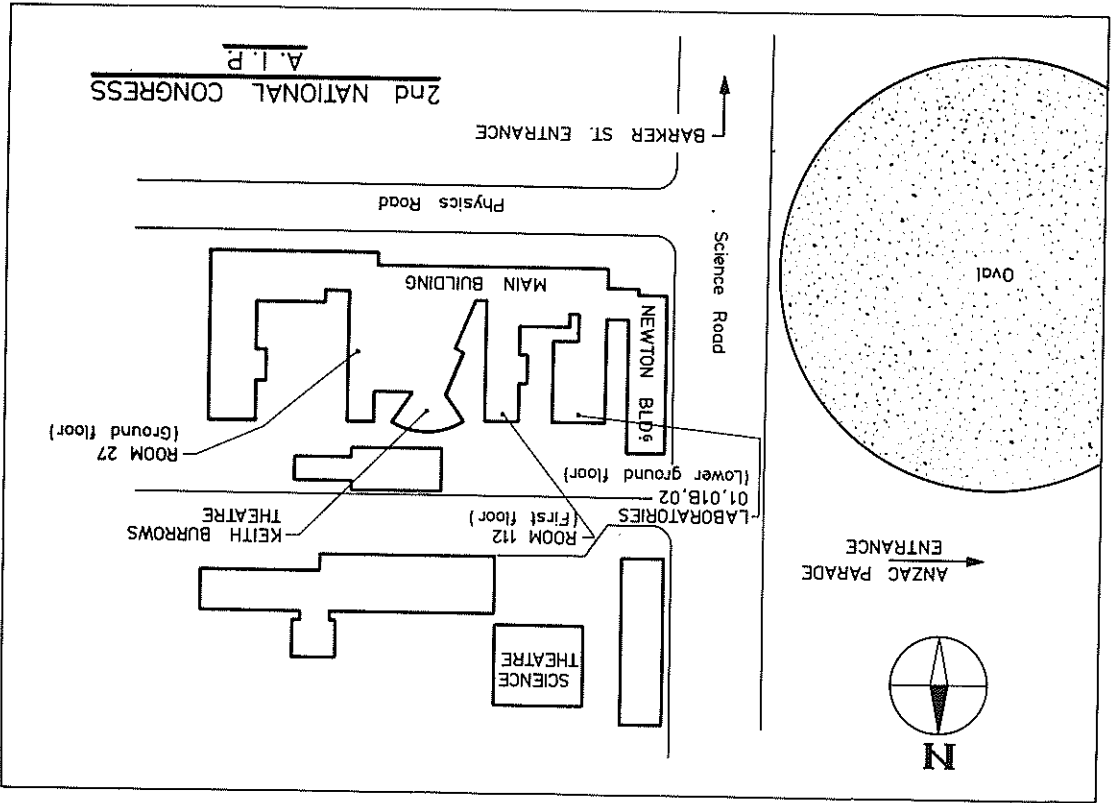
#### NEARBY HOTELS:

'The Royal' at the intersection of High Street and Belmore Road. (Recommended)  
'The Regent'. Turn left at the intersection of Barker Street with Anzac Parade. Situated on next corner - Middle Street.

#### PARKING:

On campus, highly unlikely, but try.

## MAP



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UNIVERSITY & RESEARCH ORGANISATION EXHIBITSC.S.I.R.O.

Display of current activities in the National Measurement Laboratory. Hologram demonstrations.

N.S.W. INSTITUTE OF TECHNOLOGY SOLAR ENERGY PROJECT

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*(In collaboration with the Physics Department)*  
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CAMPBERRA - Canberra Rex Hotel	* \$ 59.00 *
GOLD COAST - Broadbeach/Chevron/Travelodge	* \$114.00 *
HOBART - Four Seasons Town House	* \$179.00 *
LAWRENCETON - Innkeepers Park Lane	* \$163.00 *

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SECOND NATIONAL CONGRESS  
OF THE AUSTRALIAN INSTITUTE OF PHYSICS

SCIENTIFIC PROGRAM

Monday, 23rd August, 1976

9.00-10.30 Registration - Science Theatre Foyer

10.30-11.00 TEA

11.00-12.00 Official Opening

Place: Science Theatre

Chairman: Prof. C. Eilvyett

11.00 Official Welcome on behalf of the  
University of New South Wales

Pro-Vice-Chancellor,  
Prof. R. Vowels

11.10 Welcome on behalf of the  
Australian Institute of Physics

Dr. James Campbell,  
President

11.20 Opening Address "Physics Research in  
Australia - a personal  
view".

Prof. R. Street,  
Director, Research  
School of Physical  
Sciences, A.N.U.

12.00 LUNCH

Monday, 23rd August

1.30-2.00 Invited Lecture

Place: Keith Burrows Theatre

Chairman: Prof. C. Eilvyett

1.30 "Ionospheric Measurement and Modification" Prof. J.D. Whitehead

2.05-3.45 Contributed Papers - Parallel Sessions

A: Geophysics, Astrophysics and Astronomy

Place: Keith Burrows Theatre Chairman: Prof. J.D. Whitehead

2.05 IA1 Ground-based monitoring of solar x-rays - B.G. Ferguson

2.25 IA2 Mechanisms of ionospheric disturbances during magnetic storms  
deduced from satellite and ionosonde data - K.I. Jones

Monday, 23rd August

- 2.45 IA3 The world-wide growth of physics, and particularly geophysics, research since 1967; and the need for ionospheric research - C. Eilylett
- 3.05 IA4 IPDF geomagnetic pulsation events observed at middle latitudes - B.J. Fraser and S. Wawrzyniak
- 3.25 IA5 Rocket measurements of mesospheric oxygen from Lyman- $\alpha$  absorption spectroscopy - Mohammad Ilyas
- C: Solid State Physics
- Place: Physics Main Bldg., Rm. 112      Chairman: Dr. G. Bowden
- X 2.05 LC1 A theory of spin-glasses - F.A. de Rozario
- X 2.25 LC2 Thermodynamics of spin glasses - M.A. Simpson, T.F. Smith and D.A. Smith
- X 2.45 LC3 The magnetic specific heat of a spin glass - P. Wells
- X 3.05 LC4 Self energy terms in the RKKY interaction - A.M. Stewart
- X 3.25 LC5 Studies of Gadolinium near the Curie temperature - G.H.J. Wentenaar, D.H. Chaplin, K.R. Sydney and G.V.H. Wilson
- 3.45-4.00 TEA
- 4.00-5.00 Poster Papers
- A: Geophysics, Astrophysics and Astronomy
- Place: Physics Main Bldg., Rm. 02
- PA1 Ionospheric irregularity models derived from Fresnel diffraction patterns - M.L. Heron
- PA2 High spectral resolution studies of the atomic oxygen  $\lambda$  630 nm, dayglow - T. Cocks, D.F. Creighton, F. Jasca
- PA3 Results of investigations using the phase ionosonde - P.E. Morro
- PA4 Solar cycle effect on meteor detection rate and upper atmosphere density - C.D. Eilylett

Monday, 23rd August

- PA5 <sup>2.05</sup> Developments in the theory of wave propagation in absorbing media - J.A. Bennett
- PA6 <sup>3.05</sup> Full wave solutions of radio wave scattering from meteor trails - E.M. Poulter
- PA7 <sup>3.25</sup> Preliminary results from the analysis of ionospheric data recorded at conjugate stations - P.J. Wilkinson
- B: Education
- Place: Physics Main Bldg., Rm. 01B
- PB1 Tertiary level physical sciences ab initio - Bruce Mainsbridge and John N. Carras
- PB2 Some thoughts on a 'creativity' experiment - Paul E. Clark
- PB3 Some observations on the difficulties encountered in running a P.S.I. (Keller) course - A.R. Moon
- PB4 The unfamiliar in familiar or a new way to the old relativity - John R. Shepanski
- C: Solid State
- Place: Physics Main Bldg., Rm. 01B
- PC1 Structures observed in electro-chemically deposited black-chrome selective solar absorbing surfaces - R.J. Simpson, C.L. Riddiford, G. Smith
- PC2 Emissivity of the chrome-based solar absorbing surface - S.W. Hogg and G.B. Smith
- PC3 Chrome Black as a solar selective surface absorber - P.M. Driver, R.W. Jones and C.L. Riddiford
- PC4 Hydrogen in diamond - P.R.W. Hudson and I.S.T. Tsong

Tuesday, 24th August

9.00-9.30 Invited Lecture

Place: Keith Burrows TheatreChairman: Dr. W.I.B. Smith

X 9.00 "Optical Fibres" Dr. D. Nicol

9.35-10.35 Contributed Papers - Parallel Sessions

E: Applied Physics and Instrumentation

Place: Keith Burrows TheatreChairman: Dr. W.I.B. Smith

9.35 IE1 Use of volatile metal compounds for operation of CW rare gas-metal vapour lasers - J.A. Piper

9.55 IE2 Experimental development of powerful CW 337  $\mu\text{m}$  HCN waveguide lasers - J. Whitbourn, D. Veron and P. Belland

10.15 IE3 A photo-thermal solar energy converter for plants requiring high grade heat inputs - P.J. Shepherd and R.B. Gammon

A: Geophysics, Astrophysics and Astronomy

Place: Physics Main Bldg., Rm. 112Chairman: Prof. C. Eilijett

9.35 LA6 The Molonglo radio telescope - past, present and future - A.G. Little

9.55 LA7 Atomic oxygen density infrared from rocket measurement of the night airglow atmospheric band of  $\text{O}_2$  - R.C. Schaeffer

10.15 LA8 Phenomenological outline of the proposed physical mechanism linking changes in solar activity with the weather - V. Kastaals

10.35 TEA

11.00-11.30 Invited Lecture

Place: Keith Burrows TheatreChairman: Dr. T.F. Smith

11.00 "Optical Astronomy and Associated Activities at the University of Tasmania" Dr. M. Waterworth

Tuesday, 24th August

11.30-12.30 Poster Papers

A: Geophysics, Astrophysics and Astronomy

Place: Physics Main Bldg., Rm. 02

PA8 Evidence for the effect of sporadic E ionization upon refraction at 80 MHz - C.S. Wright

PA9 The effect of transient x-ray sources on VLF communication - D.G. Cole

C: Solid State Physics

Place: Physics Main Bldg., Rm. 01B

X PC5 The spin wave specific heat of anisotropic ferromagnets - P. Wells

X PC6 Magnetic moments in itinerant electron systems - G.B. Smith, D.A. Smith

X PC7 Specific heat capacities of the Heusler compound  $\text{Fe}_{3-x}\text{MnSi}$  - C.V. Boughton and P.R.W. Hudson

X PC8 Elastic properties of V-Si Al5 structure compounds - E.F. Gibbs, T.R. Finlayson, T.F. Smith

X PC9 Hall coefficient measurements in Niobium and Tantalum dichalcogenides - G.K. Bristow, T.F. Smith and T.R. Finlayson

X PC10 Hall effect measurements on short specimens - H.J. Goldsmid

X PC11 Dislocation damping mechanisms in ionic crystals - A.R. Anderson and H.F. Pollard

D: General Physics, Nuclear and Particle Physics

Place: Physics Main Bldg., Rm. 01B

PD1 Electromagnetic field theory of tachyons - M.M. Novak

PD2 Goos Haenchen shift at total reflection from negatively absorbing media - H.A. Ward and H. Hora

Tuesday, 24th August

E: Applied Physics and Instrumentation

Place: Physics Main Bldg., Rm. 02PE1 A triple grating polychromator for Thomson scattering -  
W.I.B. Smith and M. Greenwald

PE2 Gratings and their anomalies - Ross McPhedran

PE3 Optically pumped far-infrared lasers - B.W. James

PE4 Rotational line jumping in a CO<sub>2</sub> laser interferometer -  
I.S. Falconer and J. HowardPE5 An improved optical control system for thin film production -  
P. Sommerkamp, B. Heinz, H. Schmiecker, W. ZwelltkeX PE6 An instrument for measuring optical properties of selective  
surfaces - H. Willrath

12.30-2.00 LUNCHEON

X 2.00-5.00 Symposium "Science Policy"

Place: Keith Burrows TheatreChairman: Dr. James Campbell      President A.I.P. and Managing Director  
Engelhard Industries Pty. Ltd.Speakers:

Ann Moyal, Department of Social History, N.S.W. Institute of Technology.  
Professor S. Encel, Professor of Sociology, University of N.S.W.  
Dr. Telford Conlon, School of Life Sciences, N.S.W. Institute of Technology

3.30-4.00 TEA

Wednesday, 25th August

9.00-12.30 Symposium "Physics: What Future?"

Place: Keith Burrows TheatreChairman: Professor B. Mainsbridge, Dept. of Physics, Murdoch University.Speakers:

Prof. P.J. Fensham, Faculty of Education, Monash University

Prof. I.R.B. Epton, Institute for Educational Technology,  
University of Surrey

Dr. R.E. Budwine, Head, Department of Applied Physics, R.M.I.T.

Dr. R. Collins, A.W.A. Research Laboratories.

12.45-5.00 HARBOUR CRUISE

Thursday, 26th August

- 9.00-9.30 Invited Lecture  
Place: Keith Burrows Theatre Chairman: Dr. R. Crompton
- 9.00 "(e-2e) Spectroscopy of Atoms and Molecules" Dr. E. Weigold
- 9.35-10.35 Contributed Papers - Parallel Sessions
- F: Plasma Physics and Physics of Electrons and Ions  
Place: Keith Burrows Theatre Chairman: Dr. R. Crompton
- 9.35 LP1 Electron diffusion under the influence of an electric field near an absorbing boundary - J.J. Lowke, J.H. Parker, Jr., and C.A. Hall
- 9.55 LP2 Equilibrium transport parameters of an electron swarm in hydrogen at elevated swarm energies - J. Fletcher
- 10.15 LP3 Validity of electron transport theory - H.B. Milloy
- E: Applied Physics and Instrumentation  
Place: Physics Main Bldg., Rm. 112 Chairman: Dr. D. Morton
- 9.35 LE4 How to measure the roughness of surfaces - E.G. Tivaltte
- 9.55 LE5 Temperature measurement simplified - Allan Paine
- 10.15 LE6 A computer data logger for interferometric airglow measurements  
 G. Brimble
- 10.35-11.00 TEA
- 11.00-12.40 Contributed Papers - Parallel Sessions
- D: General Physics, Nuclear and Particle Physics  
Place: Keith Burrows Theatre Chairman: Prof. H. Bolotin
- 11.00 LD1 Fission yield studies of the Oklo natural reactor - J.R. de Laeter and K.J.R. Rosman
- 11.20 LD2 The Bohr compound nucleus hypothesis falls again - J.R. Bird

Thursday, 26th August

- 11.40 LD3 Nuclear structure studies of the excited states of  $^{48}\text{Ti}$  - B.J. Linard, J.C.P. Heggie and H.H. Bolotin
- 12.00 LD4 Observation of  $2\pi$  rotations by Fresnel diffraction of neutrons - A.G. Klein and G.I. Opat
- 12.20 LD5 Track sensitive targets in high energy physics - Stuart N. Tovey
- F: Plasma Physics, Physics of Electrons and Ions  
Place: Physics Main Bldg., Rm. 112 Chairman: Prof. H. Hora
- 11.00 LP4 Measurements of  $\text{Ln-3}$  Tokamak plasma perturbations - A.H. Morton
- 11.20 LP5 Momentum transfer of light in a plasma - M.B. Nicholson-Florence
- 11.40 LP6 Two-dimensional electrical current distribution in a plasma in the presence of anisotropic inhomogeneous conductivity - Yeong-Hyun Dyo
- 12.00 LP7 Short range laser beam self-focusing in a plasma due to relativistic influences on the refractive index - E.L. Kane and H. Hora
- 12.20 LP8 Calculation of pair production in laser plasmas at relativistic self focusing - A. Tsivinsky and H. Hora
- 12.40-2.00 LUNCH
- 2.00-2.30 Invited Lecture  
Place: Keith Burrows Theatre Chairman: Dr. J. Goldberg
- 2.00 "Underwater Acoustics" Dr. G. Bold
- 2.35-3.35 Contributed Papers - Parallel sessions
- E: Applied Physics and Instrumentation  
Place: Keith Burrows Theatre Chairman: Dr. J. Goldberg
- 2.35 LE7 Motor vehicle legislation in Australia - Robert Law
- 2.55 LE8 The physics of tyre sound generation - Peter R. Willett

Thursday, 26th August

- 3.15 IEB9 Introduction of radioisotope techniques into the Australian mineral industry - J.S. Watt and B.D. Sowerby

C: Solid State Physics

Place: Physics Main Bldg., Rm. 112 Chairman: Prof. H.C. Bolton

- 2.35 LC6 Phonon scattering by platelets in Ia diamond - P.R.W. Hudson  
 X 2.55 LC7 The electron density of states and the energy of interstitial hydrogen in transition metals - C.A. Sholl and P.V. Smith  
 X 3.15 LC8 Eigenfields and simulation of complex EPR spectra - P.W. Kenned and J.R. Pilbrow

3.35-4.00 TEA

4.00-4.00 Poster Papers

C: Solid State Physics

Place: Physics Main Bldg., Rm. 01B

- X PC12 The implications of background scattering for high resolution channeling - R.L. Dalglish and J.C. Kelly  
 X PC13 Farinfrared spectra of long chain ketones - C.H. Burton, T.H.K. Barron, D.W. Posener.  
 PC14 Collision-induced absorption in rare gas liquids - B.W.N. Lo  
 X PC15 EPR and MCD studies of a colour centre in beryl - E.R. Vance and A. Edgar  
 X PC16 Grain boundary transport in the Alkali Halides - L.B. Harris

D: General Physics, Particle and Nuclear Physics

Place: Physics Main Bldg., Rm. 01B

- PD3 Weak and electromagnetic interactions of the leptons, free from primitive divergences - A.F. Nicholson  
 PD4 A study of the level structure of  $^{47}\text{Ti}(\alpha, \text{p}\gamma)$  reaction - D. Kennedy, J.C.P. Heggie and H.H. Bolotin  
 PD5 An application of the inverse reaction problem to  $\text{H-N}$  scattering - J.L. Cook and E. Clayton

Thursday, 26th August

- PD6 N-port theory for energy conversion - H.K. Messerle  
 PD7 Black body radiation at high densities - M.M. Novak

F: Plasma Physics, Physics of Electrons and Ions

Place: Physics Main Bldg., Rm. 02

- PF1 Monte Carlo simulation of electron swarms in  $\text{H}_2$  - S.R. Hunter  
 PF2 ( $e, 2e$ ) spectroscopy of He and  $\text{H}_2$  - ground state correlation effects - A.J. Dixon, S. Dey, T.E. McCarthy and E. Weigold  
 PF3 Collisions of atomic rare gas ions with their parent gases - H. Helm and M.T. Elford  
 PF4 Monte Carlo simulation of electron drift with inelastic collisions - I.D. Reid  
 PF5 Numerical instability when calculating the propagation of laser radiation in inhomogeneous plasma - V.F. Lawrence  
 PF6 Penetration depth of alphas in plasma of high density and temperature - P.S. Ray and H. Hora  
 PF7 Non linear forces in laser produced plasma for relativistic refractive index - R. Castillo and H. Hora

Thursday, 26th August

Place: Keith Burrows Theatre

- X 5.00-7.00 Extraordinary General Meeting, Australian Institute of Physics  
 4.45 Place: Physics Main Bldg., Rm. 112  
 Annual General Meeting, Hospital Physicists Association (AHG)  
 8.00-12.00 Colonial Night (Argyle Cellars, The Rocks), Wine and Dine at leisure with small dance floor available.



Friday, 27th August

9.00-9.30 Invited Lecture

Place: Keith Burrows TheatreChairman: Prof. K. Taylor

X 9.00 "Superconductivity, Soft Modes and Anharmonicity" T.F. Smith

9.35-10.35 Contributed Papers - Parallel Sessions  
D: Solid State PhysicsPlace: Keith Burrows TheatreChairman: Prof. K. TaylorX 9.35 LG9 Superconductivity of  $\text{Nb}_3\text{Sn}$  - H.J. Clark, T.F. Smith and T.R. FinlaysonX 9.55 LC10 Imperfections in type I diamond - P.R.W. Hudson and P. Pakey  
X 10.15 IC11 A unifying approach for effective field model in magnetism - Graham Bowden

F: Plasma Physics, Physics of Electrons and Ions

Place: Physics Main Bldg., Rm. 112Chairman: Dr. E. Weigold

9.35 LF9 Differential cross sections for the elastic scattering of electrons from xenon - P.J.O. Teubner, S.J. Buckman and H. Arriola

9.55 LF10 Metastable ionization in neon-argon mixtures - T.O. Rhymes  
10.15 LF11 (*e,2e*) spectroscopy of neon and xenon - S. Dey, A. Dixon, I.E. McCarthy, C.J. Noble and E. Weigold

10.35-11.00 TEA

11.00-11.30 Invited Lecture

Place: Keith Burrows TheatreChairman: Prof. H.J. Goldsmid

X 11.00 "Probing Surface Phenomena by Metal Vapour Deposition" J.I. Robins

Friday, 27th August

11.35-12.55 Contributed Papers - Parallel Sessions

C: Solid State Physics

Place: Keith Burrows TheatreChairman: Prof. H.J. Goldsmid

11.35 IC12 Detection of paramagnetic centres by spin dependent conductivity - J. Menendez-Cortinas and D. Haneman

11.55 IC13 The historical development of x-ray photoelectron spectroscopy - J.G. Jenkin

12.15 IC14 Sputtered metal carbide solar selective absorbing surfaces - G.L. Harding

12.35 LC15 Production of Ni Cr resistive layers - P. Sommerkamp, B. Heinz, U. Patz

G: Biophysics

Place: Physics Main Bldg., Rm. 112Chairman: Professor E.P. George

11.35 LG1 The molecular basis of the anaesthetic effect of benzyl alcohol: low impedance studies with bimolecular lipid membranes - R.J. Ashcroft, H.G.L. Coster and J.R. Smith

11.55 LG2 High field electro-mechanical effects in cell membranes - H.G.L. Coster and J.R. Smith

12.15 EG3 Transmembrane calcium ion flux in free swimming *Paramecium caudatum* - R.J. Offeen12.35 LG4 Diffraction studies of Proprioception - Kavari Chakrabarty  
12.55-2.00 LUNCH

2.00-2.30 Invited Lecture

Place: Keith Burrows TheatreChairman: Prof. J. Kelly

X 2.00 "Why I Find Intermolecular Forces Repulsive" J. Israelachvili

Friday, 27th August

## 2.35-3.35 Contributed Papers - Parallel Sessions

C: Solid State Physics

Place: Keith Burrows Theatre

X 2.35 IC16 Sputter clusters from Lithium fluoride - Z. Kerestes, J.C. Kelly, A.R. Bailey and R.L. McDonald

2.55 IC17 The analysis of solid state surfaces and thin films by the statistical method of secondary ion mass spectroscopy (SIMS) - C. Berney

3.15 IC18 Outline of a quantum theory of channelling - P.B. Treacy

E: Applied Physics and Instrumentation

Place: Physics Main Bldg., Rm. 112

Chairman: Dr. J.R. Bird

2.35 IE10 Neutron detection efficiency calculations for organic scintillators - E. Clayton

2.55 IE11 A simple and rapid method for gamma-ray detection efficiency determinations of Ge(Li) detectors - D. Kennedy, J.C.P. Heggie and H.H. Bolotin

3.15 IE12 A high transmission mass energy filter - B.N. Bellby and R.L. Dalglish

3.35-400 TEA

4.00-5.00 Poster Papers

C: Solid State Physics

Place: Physics Main Bldg., Rm. 02

X PC17 Opening of ESR bottleneck in GaAl<sub>3</sub> by Dy substitution - N. Than-Tromg, L.B. Chiu, P.R. Elliston, A.M. Stewart and K.N.R. Taylor

X PC18 Transition metal moment induction by Gd in rare earth Cobalt-Nickel pseudo binary compounds - E. Enkagul, W. Kalceff, A.M. Stewart and K.N.R. Taylor

Friday, 27th August

PC19 Nuclear orientation-pulsed magnetic resonance studies of <sup>60</sup>Co nuclei in iron - H.R. Foster, D.H. Chaplin, P. Lyman, D.E. Swan and G.V.H. Wilson

PC20 Effect of biquadratic exchange interactions upon the Heisenberg ferromagnet - Joan Adler, J. Oitama and A.M. Stewart

X PC21 Spin reorientation in GaAl<sub>2</sub> - G.J. Bowden, P. Miles, J. Pope and K.N.R. Taylor

E: Applied Physics and Instrumentation

Place: Physics Main Bldg., Rm. 02

PE7 Sputter coating of solar selective surfaces onto tubes - G.T. Harding, D.R. McKenzie and B. Window

X PE8 A method of investigating the structure of certain selective solar absorbing surfaces - A. Hons and A.R. Moon

PE9 Scattering properties of globular solar selective films - C.M. Horvitz

X PE10 Development of a stepping motor control unit - M.G. Bunce and R.H. Farrow

PE11 A simple pure nuclear quadrupole resonance spectrometer - E.P.A. Sullivan

PE12 An electrostatic ion microprobe - P. Krejciak and R.L. Dalglish

F: Plasma Physics, Physics of Electrons and Ions

Place: Physics Main Bldg., Rm. 02

PF8 Excitation and dissociation of H<sub>3</sub><sup>+</sup> - Seng - Chow Goh

PF9 Angular distributions for elastic scattering of electron from sodium - S.J. Buckman and P.J.O. Teubner

PF10 (e,2e) spectroscopy of Co, N<sub>2</sub> and H<sub>2</sub>O - A. Dixon, S. Day, I.E. McCarthy and E. Weigold

PF11 A versatile small plasma source - G.F. Brand

G: Biophysics

Place: Physics Main Bldg., Rm. 01B

PG1 The Donnan equilibrium with discrete fixed charge - H.G.L. Coster and J.R. Smith

Friday, 27th August

- PG2 The Hodgkin and Huxley description of the action potential in "Chadara coralina" - Mary J. Beilby
- PG3 Low frequency impedance dispersion - Toad Epithelera - R.J. Cordia
- PG4 Phase behaviour of sonicated D.P.L. vesicles by photon correlation of scattered laser light - G.C. Fletcher and B.A. Cornell

## 16TH ANNUAL CONFERENCE ON PHYSICS AND ENGINEERING IN MEDICINE AND BIOLOGY

### SCIENTIFIC PROGRAM

Monday, 23rd August, 1976

9.00 - 10.30 Registration - Science Theatre Foyer

10.30 - 11.00 TEA

11.00 - 12.00 Official Opening

Place : Science TheatreChairman : Prof. C. Elyett

11.00 Official Welcome on behalf of the University of New South Wales

Pro-Vice-Chancellor,  
Prof. R. Vowels

11.10 Welcome on behalf of the Australian Institute of Physics

Dr. James Campbell,  
President

11.20 Opening Address Physics Research in Australia - a personal view

Prof. R. Street,  
Director, Research  
School of Physical  
Sciences, A.N.U.

12.00 LUNCH

Monday, 23rd August

1.30 - 2.00 Invited Lecture

Place : Keith Burrows TheatreChairman : Prof. C. Elyett

1.30 "Ionospheric Measurement and Modification"

Prof. J. D. Whitehead

2.05 - 2.55 Invited Lecture

Place : Physics Main Bldg., Rm. 27Chairman : Dr. R. J. Stewart

2.05 Review Paper - Cyclotrons in Medicine - Proposal for a Multipurpose Cyclotron in Australia

M. A. Chaudri and J. L. Rouse

Monday, 23rd August

2.55 - 3.35 Contributed Papers

H : Nuclear Techniques in Medicine

2.55 IH1 Whole Body Monitoring for 'In-Vivo' Estimation of Electrolytes  
Place : Physics Main Bldg., Rm. 27 Chairman : Dr. R. J. Stewart

3.15 IH2 Fluorine Determination in Biological Materials by Nuclear Techniques  
R. D. Gaffney and D. J. Cook

3.35 - 4.00 TEA  
M. A. Chaudri, E. Reen, J. L. Rouse and B. M. Spicer

4.00 - 5.00 Contributed Papers

H : Special Physiology

Place : Physics Main Bldg., Rm. 27 Chairman : Dr. J. L. Black

4.00 IH3 Speech Physiology  
M. C. Hall

4.20 IH4 Linear Prediction  
Mary O'Kane

4.40 IH5 Interactive Digital Signal Processing  
A. M. Collins.

Tuesday, 24th August

9.00 - 9.30 Invited Lecture

9.00 "Optical Fibres" Dr. D. Nicol Chairman : Dr. W. I. B. Smith

9.35 - 10.35 Contributed Papers

H : Radiotherapy Physics and Technology

9.35 IH6 Physical Measurements on the Therac 6/Neptune Linear Accelerator  
Place : Physics Main Bldg., Rm. 27 Chairman : Mr. L. Oliver  
J.F. Drew

9.55 IH7 Measurement and Analysis of Megavoltage Source Data  
J. A. Cramb and R. M. Millar

10.15 IH8 Methods of Testing the X-Ray Beam Distribution from Linear Accelerators  
M. M. Procter

10.35 - 11.00 TEA

11.00 - 1.00 Contributed Papers

H : Radiotherapy Physics and Technology

11.00 IH9 An All-Solid-State Device for Rapid X-Ray Beam Flatness Determination  
Place : Physics Main Bldg., Rm. 27 Chairman : Mr. R. W. Stanford  
M.B. Kenny

11.20 IH10 Radiotherapy Treatment Planning on a Time-Share Computer  
N. T. Wilson

11.40 IH11 The Curietron - A Years Experience  
W. K. Jones

12.00 IH12 Absolute Determination of the Neutron Flux Produced by the Interaction of High Energy Bremsstrahlung with Tissue.  
M. Chaudri, P. Allen, F. G. Muirhead, J. L. Rouse, B. M. Spicer and M. Miller.

Tuesday 24th August

12.20 IM13 A Radiotherapy Water Phantom with Programmable Calculator Control

N. T. Wilson

12.40 IM14 A Computer Controlled Data Logging System for Water Tank Doserate Measurements

Z. Kilttel, L.D. Oliver and R. Lay

1.00 - 2.00 LUNCH

2.00 - 5.00 Symposium "Science Policy"

Place : Keith Burrows Theatre

Chairman : Dr. James Campbell, President A.I.P., and Managing Director Engelhard Industries Pty. Ltd.,

Speakers : Ann Koyal, Department of Social History, N.S.W. Institute of Technology.  
Professor S. Encel, Department of Sociology, University of New South Wales.  
Dr. Telford Conlon, School of Life Sciences, New South Wales Institute of Technology.

3.30 - 4.00 TEA

Wednesday, 25th August

9.00 - 12.00 Symposium "Physics: What Future?"

Place : Keith Burrows Theatre

Chairman : Professor B. Mainsbridge, Department of Physics, Murdoch University.

Speakers : Professor P. J. Fensham, Faculty of Education, Monash University.  
Professor I. R. B. Elton, Institute for Educational Technology, University of Surrey.  
Dr. R. E. Budvine, Head, Department of Applied Physics, R.M.I.T.  
Dr. R. Collins, A.W.A. Research Laboratories.

10.30 - 11.00 TEA

12.45 - 5.00 HARBOUR CRUISE

Thursday, 26th August

Joint Session with N.S.W. Society for Medical and Biological Engineering

- 9.00 - 9.50 Invited Lecture  
Place : Physics Main Bldg., Rm. 27 Chairman : Dr. J. Loughman
- 9.00 Review Paper : The Role of the Physical Scientist in Electro-physiology ; Examples in Neurophysiology, Ophthalmol and Cardiology. J. L. Black
- 9.50 - 10.30 Contributed Papers  
 H : Electrophysiology  
Place : Physics Main Bldg., Rm. 27 Chairman : Dr. J. Loughman
- 9.50 IH15 Review of Current Cardiac Monitoring and Diagnostic Procedure  
 D. N. Ghista
- 10.10 IH16 Non-Invasive Microwave Apparatus for Studying Movement Associated with Respiration, Pulse, Muscle Action, Tremors, etc.  
 D. W. Griffin and D. R. Schultz
- 10.30 - 11.00 TEA
- 11.00 - 1.00 Contributed Papers  
 H : Biomedical Engineering  
Place : Physics Main Bldg., Rm. 27 Chairman : Dr. P. Kenny
- 11.00 IH17 Design Analysis, Development and Testing of the Optimum Prosthetic Aortic Leaflet Valve - Theoretical and Experimental Mechanics Aspects.  
 D. N. Ghista, J. Mazumdar, H. Reul and T. C. Hearn
- 11.20 IH18 Analysis for the Determination of the In-Vivo Elasticity of the Mitral Valve.  
 D. N. Ghista, J. Mazumdar and T. C. Hearn
- 11.40 IH19 Clinical Tissue Reaction to Co-Cr Alloy and the Role of Alloy Structure in Failure of the McKee Farrer Prosthesis.  
 E. R. Scull
- 12.00 IH20 A Stairclimbing Wheel Chair  
 N. M. Brearley
- 12.20 IH21 A Humidifier Operating on a New Basic Principle.  
 G. C. Grant

- 12.40 IH22 Biological Feedback Instrumentation  
 R. Thyer
- 1.00 - 2.00 LUNCH
- 2.00 - 2.50 Invited Lecture  
Place : Physics Main Bldg., Rm. 27 Chairman : Mr. D. Robinson
- 2.00 Introduction to the Field of Clinical Haemorrhology  
 I. Dintenfass
- 2.50 - 3.30 Contributed Papers  
 H : Haemorrhology and Doppler Blood Flow  
Place : Physics Main Bldg., Rm. 27 Chairman : Mr. D. Robinson
- 2.50 IH23 Doppler ultrasonic Blood Flow Measurement  
 R. W. Gill
- 3.10 IH24 Narrow Band Frequency Analysis of Doppler Blood Flow Signals  
 G. P. Haberkern, B. J. Rigby, L. K. Holley and J. K. Whiting
- 3.30 - 4.00 TEA
- 4.00 - 4.40 Contributed Papers  
 H : Blood Flow  
Place : Physics Main Bldg., Rm. 27 Chairman : Dr. R. Kraegen
- 4.00 IH25 Real-time Visual Display of Spectrally Resolved Doppler Blood Flow Signals  
 I. R. Edmonds, J.D. Spence and B. Wheeler.
- 4.20 IH26 Numerical Calculation of Flow in Two and Three Dimensional Models of an Arterial Bifurcation  
 M. R. Davidson
- 4.45 Annual General Meeting - Hospital Physicists' Association (Australian Regional Group), and Biophysicists Group, Australian Institute of Physics.  
Place : Physics Main Bldg., Rm. 27

## Friday, 27th August

9.00 - 10.35 Contributed Papers

H : UltrasonicsPlace : Physics Main Bldg., Rm. 27Chairman : Mr. G. Kossoff

X 9.00 IH27 Films on Diagnostic Ultrasound

D. E. Robinson

X 9.20 IH28 Advances in Diagnostic Ultrasound

D. E. Robinson and G. Kossoff

X 9.40 IH29 New Clinical Applications of Diagnostic Ultrasound

J. Jellins

X 10.00 IH30 An Experimental 2 MHz Ultrasonic Imaging System

E. Gauja, G. S. Munro and R. Vaughan

10.30 - 11.00 TEA

11.00 - 11.30 Invited Lecture

Place : Keith Burrows TheatreChairman : Prof. H. J. Golds

11.00 "Probing Surface Phenomena by Metal Vapour Deposition" J. L. Robin

11.35 - 12.55 Contributed Papers - Parallel Sessions

G : Biophysics

Place : Physics Main Bldg., Rm. 112Chairman : Professor E. P. G

11.35 IG1 The molecular basis of the anaesthetic effect of benzyl alcohol

Low impedance studies with bimolecular lipid membranes -  
R. J. Ashcroft, H.G.L. Coster and J.R. Smith.11.55 IG2 High field electro-mechanical effects in cell membranes -  
H.G.L. Coster and J.R. Smith.12.15 IG3 Transmembrane calcium ion flux in free swimming Paramecium  
Caudatum - R. J. Offen.12.35 IG4 Diffraction studies of Proprioception - Kaveri Chakrabarty.  
12.55 - 2.00 LUNCH

## Friday, 27th August

2.00 - 3.20 Contributed Papers - Parallel Sessions

H : X-Ray FluorescencePlace : Physics Main Bldg., Rm. 27Chairman : Mr. S. George2.00 IH31 High Resolution Fluorescence Scanning of the Thyroid from  
X-Ray Excitation.

W. M. Burch, J. L. Lising and J. A. Booth.

2.20 IH32 In-Vivo X-Ray Fluorescence Analysis

B. H. O'Connor and K. R. Taylor.

2.40 IH33 Spectral Emission of Fluorescent Screens

R. Fleay

3.00 IH34 Metriating Radiation

R. de Groot

3.20 - 4.00 TEA

4.00 - 5.00 Poster Papers

G : Biophysics

Place : Physics Main Bldg., Rm. 01BPG1 The Domain Equilibrium with discrete fixed charge  
H. G. L. Coster and J. R. Smith.PG2 The Hodgkin and Huxley description of the action potential  
in "Chadra corallina".  
Mary J. BellbyPG3 Low frequency impedance dispersion - Road Epithelaea -  
R. J. Cordia.PG4 Phase behaviour of sonicated D.P.L. vesicles by photon  
correlation of scattered laser light.  
G. C. Fletcher and B. A. Cornell.