

AUSTRALIAN INSTITUTE OF PHYSICS

**SEVENTH
NATIONAL CONGRESS**

UNIVERSITY OF ADELAIDE

25 - 29 AUGUST 1986

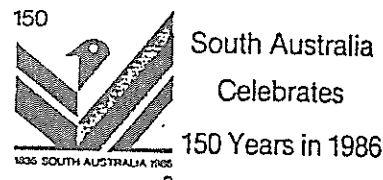
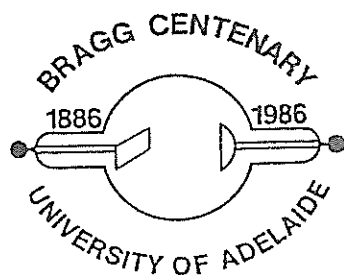
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The following Workshops each have a separate Handbook containing the full program and Abstracts of the papers:

- Workshop on Condensed Matter Physics
- Workshop on Cosmic Rays
- Workshop on Gravitation and Related Problems
- Workshop on Optics
- Workshop on Solar - Terrestrial and Space Physics



WELCOME TO THE CONGRESS

On behalf of the members of the South Australian Branch I welcome delegates to the Seventh National Congress of the Australian Institute of Physics. This meeting will be a special one for a number of reasons, and so we hope it will be as successful as the occasion demands.

First of all it marks a return to the city where the first such Congress was held in 1974. It therefore provides an opportunity to assess how well these Congresses have been received by the Australian physics community.

Secondly, 1986 is the centenary of the appointment of W.H. Bragg as Professor of Mathematics and of Physics at the University of Adelaide - surely a very important event for Australian physics. Although this event has already been celebrated by a special meeting last May, it is still appropriate for this Congress to recognise Bragg's achievement, for he worked hard for Australian as well as for Adelaide physics.

Thirdly, this year is the sesquicentennial year of the founding of the State of South Australia. The holding of the Physics Congress at this time can then be seen to emphasize both the part that science has played in the early days of the Colony and the even greater part that it must be encouraged to play in the future.

The meeting is intended to provide a survey of the latest state of physics in all the branches which are actively pursued in this country. This will be done by a series of talks given by experts both from home and abroad at a level which is general but at the same time professional. The lectures will therefore be suitable for those who are not specializing in the fields which are presented. In addition, for some more specialized interests there will be a series of workshops concentrating on areas in which research is particularly active.

I believe that for all these reasons this will be a very successful Congress, and I look forward to meeting all the participants from overseas, from interstate and from South Australia.

C.A. Hurst

(Chairman S.A. Branch, and
Chairman of the Organising Committee)

ORGANIZING COMMITTEE

Professor C.A. Hurst (Chairman)
Professor I.E. McCarthy (Deputy Chairman)
Professor H. Blevin (Deputy Chairman)
Dr. B.H. Briggs (Secretary)
Professor G.L. Goodwin ("Hands-on" Exhibition)
Dr. R. Hartley (Poster Papers)
Dr. K. Lynn (Publicity)
Dr. A. Pugatschew (Dinner, Exhibitors)
Dr. G. Robertson (Treasurer)
Professor A.W. Thomas (Fund-raising)

SPONSORS

Australian Institute of Physics
South Australian Government
TAA
University of Adelaide
Thorn EMI Electronics Australia Pty. Ltd.

GENERAL INFORMATION

VENUE:-

The Congress will be held in the Napier Building of the University of Adelaide. Enter the University from North Terrace through gate 20, 21 or 22.

PARKING:-

No parking is available on the University campus during weekdays. In the evenings, and at weekends, parking tickets may be purchased from a machine at Gate 22A on North Terrace.

REGISTRATION:-

The Registration and information desk will be located on the first floor of the Napier Building. It will be open from 4.00-5.30p.m. on Sunday 24th August and then daily from 8.30a.m.-5.30p.m. throughout the Congress.

PROGRAM:-

Plenary lectures will be held in the mornings in Lecture Room 101 on the first floor of the Napier Building. These will be reviews intended to provide the non-expert with an appreciation of the present position in each area of physics which is covered.

Workshops will be held in the afternoon in various lecture rooms in the Napier Building. These will be parallel sessions. Some Workshops have associated Poster Displays.

Contributed Poster papers not related to any particular Workshops will be on display on the first floor of the Napier Building. Authors will be present during breaks in the program to answer questions on their papers.

CONGRESS DINNER:-

The Dinner will be held in the Adelaide Festival Centre on Thursday 28th August at 7.30p.m. for 8.00p.m. Those who have paid will find their dinner tickets in their satchels. Additional tickets may be purchased at the Registration desk.

SOCIAL ACTIVITIES:-

A Reception will be held on the evening of Monday 25th August. (To be confirmed)

Apart from one Workshop, the afternoon of Wednesday 27th August is being kept free of Congress events so that participants may engage in sightseeing tours or other social activities. These are not being formally organised, but a selection of tourist brochures will be available.

ASSISTANCE:-

If you require assistance or have enquiries please try the Registration Desk. Failing that, contact anyone wearing a badge with a green ribbon attached. These are members of the Organizing Committee, and Assistants.

Officers of the Australian Institute of Physics have badges with yellow ribbons attached.

OTHER CAMPUS ACTIVITIES:-

The following other Conferences are in progress on campus during the week 25th - 29th August:

Australian Road Research Board Conference
 Australian Linguistic Society
 Eighth Biennial Statistical Conference
 Economic History Society of Australia and
 New Zealand

The campus, therefore, will be crowded. Fortunately all the facilities of the city are within a few minutes walk.

BANKS:-

There are two banks on campus:

ANZ Bank	Hughes Plaza (Tel. 5146) and Union House (Tel. 2235257)
State Bank	Barr Smith Library Complex, Level 1 (Tel. 5400)

POST OFFICE:-

There is a Post Office in the Kenneth Wills Building Level 4 (Tel. 2233474)

BOOKSHOP:-

The Bookshop in the Adelaide University Union (Tel. 5034) will be arranging a special display of physics books during the week of the Congress.

QUIET ROOM:-

Room 207 on the Second Floor of the Napier Building is available for quiet reading or writing (except on the afternoon of Wednesday 27th August).

"AD HOC" MEETINGS:-

A small lecture room, Number 208 on the second floor of the Napier Building, is available for informal meetings or discussions.

TELEPHONE NUMBERS:-

Registration Desk: Internal 5486
From outside the University
2285486

Physics Department: Internal 5996
From outside the University
2285996

Mathematical Physics: Internal 5046
From outside the University
2285046

EMERGENCY TELEPHONE NUMBERS:-

The telephone on the Registration Desk may be used

Fire, Police, Ambulance 0 000
University Health Service 5260 (or dial 9 for
switchboard)

Royal Adelaide Hospital 0 2230269
University Emergency and
Security (on duty call
officer) 5990 (All hours)

PUBLIC TELEPHONE:-

There is a public telephone in the entrance foyer of the Napier Building, opposite the lifts.

PHARMACY (Chemist Shop):-

This is located in the Union Building, Level 4 (Tel. 5140)

UNIVERSITY OF ADELAIDE CLUB (Staff Club):-

The Club is located in the Library Complex (Hughes Plaza), Level 4 (Tel. 5240)

ADELAIDE UNIVERSITY UNION:-

Bistro Bookings Tel. 5858 (Evening meals only)
Union Cellar Tel. 5956

WHERE TO EAT:-

Because of the other activities on the campus, it is expected that the Staff Club and the University Union will be crowded. However, there are numerous restaurants of all types in the City, only a few minutes walk away, just across North Terrace.

The following are some suggestions:

Lunches and Snacks - Renaissance Arcade: A variety of restaurants and cafes including -

Off the Terrace, Aunt Nellie's Pantry (good but a bit expensive).
Grumpy's, Street Cafe (Cheaper with sustaining food, recommended by students)
The Mansion Tavern (Enter from Pulteney Street)
Richmond Hotel Tavern Bar and Bistro
Wintergarden Cafe Upstairs, for more substantial meals served with wine.

Renaissance Tower (Cross the Mall - several small coffee shops, or take the lift to the top floor for cafeteria style eating)

The Gallerie Shopping Centre, North Terrace (Adjacent John Martins) Downstairs -
The Food Affair - many small booths with Take-away and Eat-in facilities (cosmopolitan and busy)
Upstairs - coffee shops

* Terrace Plaza, North Terrace (Myer's Store) (A variety of lunch and snack facilities)

WHERE TO EAT (CONTD.)

DINNERS:-

Mansions Tavern - Renaissance Arcade,
Pulteney Street entrance
Richmond Hotel 128 Rundle Mall, Rundles
Restaurant and Tavern Bar
Bistro

There are many restaurants along Rundle Mall (east end of the Mall) and Rundle Street (east of Pulteney Street) including Chinese, Italian, Thai etc.

For more distant locations, consult the Tourist Guides.

LOCAL HOTELS:-

Richmond Hotel (see above)
Austral Hotel 205 Rundle Street - Dinner available
Exeter Hotel 246 Rundle Street
Botanic Hotel Corner of North Terrace and East
Terraces - Dining facilities

AUGUST	Morning: PLENARY SESSIONS (Lecture Theatre 101) 9.00 a.m. 12.45 p.m.	Afternoon: WORKSHOPS (In the rooms indicated) 2.00 p.m. 5.30 p.m.	EVENING
MONDAY 25th	OPTICS, and ATOMIC AND MOLECULAR PHYSICS (Combined session)	Condensed Matter Physics (101) Cosmic Rays (G01) Optics (G02) Solar-Terrestrial and Space Physics (205)	RECEPTION (To be confirmed)
TUESDAY 26th	PLASMA PHYSICS	Condensed Matter Physics (101) Cosmic Rays (G01) Gravitation and Related problems (L17) Optics (G02) Solar - Terrestrial and Space Physics (205, 206)	Meeting - Vacuum Physics Group (208) (Contd.205/6)
WEDNESDAY 27th	CONDENSED MATTER PHYSICS	Solar-Terrestrial and Space Physics (205, 206)	Meeting - Solar Terrestrial and Space Physics Group (205)
THURSDAY 28th	ASTROPHYSICS	Condensed Matter Physics (101) Gravitation and Related problems (L17) Physics Education (L16) Solar-Terrestrial and Space Physics (205, 206)	CONGRESS DINNER
FRIDAY 29th	MEDICAL PHYSICS	Condensed Matter Physics (101) Particle and Nuclear Physics (G01) Solar-Terrestrial and Space Physics (205)	Meeting of Upper Atmos. Physics Working Group of ANCAR (205)
FUNDAMENTAL PARTICLES	NUCLEAR PHYSICS		

MORNING PLENARY SESSIONS
(Lecture Theatre 101)

9.

MONDAY 25TH AUGUST

9.15 - 10.20 a.m.

OPENING by the Senior Deputy Chancellor of the University
of Adelaide, Dr. E.H. Medlin

Optics and Atomic and Molecular Physics
Convenors: Prof A.G. Klein and Prof. I.E. McCarthy)

Edith Emily Dawson
1st B.Sc. (Hons) Grad
of Univ of Adelaide
(Major - Physics)
→ Sewing Machine -
MLC (Melb)

Low energy electron collisions in pure and applied science
Dr R.W. Crompton (Aust. National University)

Electron momentum spectroscopy of atoms and molecules
Prof. E. Weigold (Flinders University)

10.45 - 12.45 p.m.

Experimental tests of Bell's inequalities
Prof. A. Aspect (Ecole Normale Superieure, Paris)

Holography in industry and metrology
Dr. P. Hariharan (CSIRO Div. of Applied Physics)

Optical fibres: in transit between physics and engineering
Dr. H. Sabine (Telecom Aust. Res. Labs.)

TUESDAY 26TH AUGUST

9.00 - 10.30 a.m.

Plasma Physics (Convenor: Prof I. Jones)

The Tokamak approach to fusion
Prof. F.S. Troyon (Centre de Rech. en Phys. des Plasmas, Lausanne, Switzerland)

Recent advances in laser fusion
Prof. C. Yamanaka (Osaka University, Japan)

Fusion research in Australia
Prof. M.H. Brennan (University of Sydney)

11.00 - 12.45 p.m.

Condensed Matter Physics
Convenors: D.H. Chaplin and Prof. G.J. Bowden)

Nuclear magnetic resonance microscopy
Prof. P.T. Callaghan (Massey University, N.Z.)

From Dewar to space shuttle - the rise of cryogenics
Dr. G.K. White (CSIRO Div. of Applied Physics)

Nuclei - cooled, relaxed, resonant and ordered
Dr. N.J. Stone (Oxford University, U.K.)

WEDNESDAY 27TH AUGUST

9.00 - 10.30 a.m.

Solar-Terrestrial and Space Physics (Convenor: Prof. K.D. Cole)

The sun's magic lamp

Dr. C.J. Durrant (University of Sydney)

Very low frequency e.m. waves from the magnetosphere observed at the ground

Prof. R.L. Dowden (University of Otago, N.Z.)

The Earth's middle atmosphere

Dr. R.A. Vincent (University of Adelaide)

11.00 - 12.45 p.m.

Astrophysics (Convenor: Prof. D.B. Melrose)

Dark Matter and observational cosmology

Prof. E.E. Salpeter (Cornell University, U.S.A.)

The search for solar neutrinos

Prof. L.S. Peak (University of Sydney)

Decaying neutrinos in cosmology and astrophysics

Prof. B.H.J. McKellar (University of Melbourne)

THURSDAY 28TH AUGUST

9.00 - 10.30 a.m.

Physics Education

(Convenors: Prof. John Prescott and Dr. Gillian Robertson)

Women in physics: the American experience

Dr. Barbara Wilson (Physics Res. Lab., A.T. and T. Bell Labs.)

W.H. Bragg and the public image of physics

Dr. J.G. Jenkin (La Trobe University)

CSIRO VIDEO "WOMEN IN PHYSICS"

11.00 - 12.45 p.m.

Medical Physics (Convenor: Dr. M. Repacholi)

Hospital physics

Dr. M. Repacholi (Royal Adelaide Hospital)

*Physical interactions and biological effects
of the fields used in magnetic resonance imaging*

Dr. T. Tenforde (Lawrence Berkeley Lab., Univ of California)

Review of medical laser technology

V. Previn (Laserex Operations)

An update of environmental ionizing radiation and its effects

David Paix (S.A. Inst. of Technology)

FRIDAY 29TH AUGUST

9.00 - 10.30 a.m.

Fundamental Particles (Convenor: Prof. A.W. Thomas)

Unification of fundamental forces

Prof. J. Ellis (CERN, Geneva)

Strings and superstrings: a tangled tale

Dr. R.C. Warner (University of Melbourne)

11.00 -12.45 p.m.

Nuclear Physics (Convenor: Prof. B.H.J. Mc Kellar)

Applications of the proton microprobe

Dr. G.J.F. Legge (University of Melbourne)

Quark effects in light nuclei

Dr. A. Watt (Glasgow University)

AFTERNOON WORKSHOP SESSIONS

(In the Lecture Rooms indicated)

MONDAY 25TH AUGUST

2.00 p.m. (Parallel Sessions)

The magnet industry in Australia, and metal physics	(101)
Cosmic rays	(G01)
Optics and Optoelectronic techniques	(G02)
Solar and stellar activity	(205)

TUESDAY 26TH AUGUST

2.00 p.m. (Parallel Sessions)

Low temperature physics	(101)
Cosmic rays	(G01)
Gravitation and related problems	(L17)
Infrared and thin film technology	(G02)
Ionospheric irregularities (2.00 p.m. and 7.30 p.m.)	(206)
Geomagnetic variations, pulsations and VLF (7.30 p.m.)	(205)

WEDNESDAY 27TH AUGUST

2.00 p.m. (Parallel Sessions)

Geomagnetic variations, pulsations and VLF (cont)	(205)
The Middle Atmosphere Program	(206)

THURSDAY 28TH AUGUST

2.00 p.m. (Parallel Sessions)

Polymer physics and amorphous solids	(101)
Gravitation and related problems (continued)	(L17)
Physics education	(L16)
The Middle Atmosphere Program (continued)	(206)
High latitude ionospheric and upper atmospheric physics	(206)
Solar terrestrial environmental forecasting	(205)

FRIDAY 29TH AUGUST

2.00 p.m. (Parallel Sessions)

Low dimensional physics	(101)
Particle and nuclear physics	(G01)
High latitude ionospheric and upper atmospheric physics (continued)	(206)

WORKSHOP PROGRAMS

The programs for the Workshops on "Physics Education" and "Particle and Nuclear Physics" follow on the next two pages of this Handbook.

All the other Workshops have separate Handbooks giving the detailed programs and Abstracts of the Lectures.

WORKSHOP ON PHYSICS EDUCATION

THURSDAY 28TH AUGUST

2.00 p.m.

Topics for discussion

The Image of Physics
Physics as a Discipline for Women

Chair: Ms. Jan Powe

Contributors:

Dr. Barbara Wilson (A.T. and T. Bell Laboratories, U.S.A.),
Convenor, Committee on the Status of Women in Physics, American
Physical Society.

Dr. Carmel MacPherson, C.S.I.R.O. Equal Employment Opportunity
Officer.

Ms. Jan Powe, Education Convenor, A.I.P.

Virginia Westwood, C.S.I.R.O. Division of Manufacturing
Technology, S.A. -Women-in-Science Co-ordinator.

State Representatives:

Dr. Elizabeth Essex - Latrobe University.

Mrs. B. Harris - University of Queensland.

Dr. Rosalie Grant - Canberra C.A.E.

Dr. Doreen Crawford - University of W.A.

Mrs. Moira Welch - Nepean C.A.E.

This Workshop will be held in Lecture Room L16 on the lower
ground floor of the Napier Building. Enter the building
through the door on the "Lower Napier" level.

PARTICLE AND NUCLEAR PHYSICS
(Chairman: Professor B.H.J. McKellar)
Room G01

FRIDAY 29TH AUGUST

2.00 - 5.00 p.m.

Speakers will include:

Title to be announced

Dr. J. Rikovska - Stone (University of Oxford, U.K.)

Consistency and component-field structure of gauge-invariant free open superstrings
Dr. B. Spence (University of Southampton, U.K.)

(Other speakers will be decided at the Congress. Those interested in contributing should see Professor McKellar early in the week.)

MEETINGS

(All in the Napier Building)

VACUUM PHYSICS GROUP

A General Meeting of the AIP Group will be held at 5 p.m. on Tuesday 26th August in Room 208.

SOLAR-TERRESTRIAL AND SPACE PHYSICS GROUP

A General Meeting of the AIP Group will be held at 7.30p.m. on Wednesday 27th August in Room 205.

UPPER ATMOSPHERE PHYSICS WORKING GROUP

A meeting of the Upper Atmosphere Physics Working Group of the Australian National Committee for Antarctic Research will be held at 7.30p.m. on Friday 29th August in Room 205.