

Current activities

Astrophysics group report

Staff

Three new Bolton fellows joined the ATNF in 2002 to carry out research programs of their choice. George Hobbs arrived from the University of Manchester (Jodrell Bank), Juergen Ott from the University of Bonn and Chris Phillips from the Joint Insititute for VLBI in Dwingeloo. Several postdoctoral fellows also departed. Erwin de Blok took up a PPARC Advanced Fellowship at the University of Wales, Cardiff. Diah Setia-Gunawan completed a one-year joint CSIRO/Indonesian postdoctoral position and returned to The Netherlands. At the end of the year, Steven Tingay left the ATNF to take up a position as the SKA manager at Swinburne University.

The ATNF astrophysics activities in Canberra were reorganised during the year. Staff members Dave Jauncey and Jim Lovell moved from their CSIRO COSSA offices to offices located with the ANU staff at the Research School of Astronomy and Astrophysics (RSAA), Mount Stromlo Observatory.

In October 2002 Jim Lovell was appointed to a new permanent position at CSIRO, the first permanent astrophysics position in a number of years. Professor Frank Briggs also joined the Canberra group with joint funding from the ATNF and the RSAA. One aim of the move to the Mount Stromlo location is to stimulate interactions between the radio and optical research communities in Australia and to increase collaborations between ATNF staff and RSAA staff and students.



Dr Lister Staveley-Smith
Head, ATNF Astrophysics Group

ATNF visitor program

The ATNF was fortunate to have several extended astrophysics-related visits, under the auspices of the ATNF visitor program, from Thijs van der Hulst (Kapteyn), Russ Taylor (Calgary) and Rogier Windhorst (Arizona State). Such visits are not only stimulating for ATNF staff, but are useful for encouraging interactions with Australian universities through seminars and scientific meetings.

CSIRO awards

A new CSIRO scheme to provide postgraduate scholarships was introduced in 2002. Under this initiative, exceptional postgraduate students receive a prestigious top-up scholarship award. Two postgraduate students from Swinburne University, Aidan Hotan and Haydon Knight, received scholarships in 2002. Both students then joined the

Photo: Kristen Clarke

ATNF studentship scheme with joint supervision between Swinburne and the ATNF. Significant interest was also shown in other new initiatives for CSIRO and ARC-CSIRO postdoctoral fellowships, and several appointments are expected in 2003.

Astrophysics events

There were several astrophysics events in 2002. A series of research talks was held during an “astrofest” on 5 June 2002 to celebrate Dick Manchester’s 60th birthday and his outstanding career in pulsar astronomy. An inaugural Bolton Symposium, showcasing the research activities of ATNF postdoctoral fellows (and some other staff and students) was held on 11 December 2002. On 18 December 2002, as part of the growing interest in the LOFAR project (page 64), a workshop was held on *Detecting the Epoch of Reionisation*. This provided an opportunity for interested astronomers to start engaging in the promising, but challenging, field of low-frequency radio astronomy research. Other meetings held during the year included a joint ATNF-AAO symposium and a student symposium.

Computing

Marsfield computer services

The ATNF provides information technology (IT) support for National Facility users, and manages ATNF-specific computing at the Marsfield site. The IT infrastructure is managed by the CTIP computer services group (CSG).

AIPS++

AIPS++ is an astronomical data processing environment being developed by an international consortium of radio observatories. The package has been developed using “object-oriented” software techniques and presents users and applications developers with a toolkit of astronomy-oriented functions. The ATNF has four staff members contributing part-time to the development of AIPS++.

During 2002 an Australian AIPS++ Users Group was formed with group members drawn from a number of Australian radio astronomy groups. The group discusses AIPS++ usage and advises the AIPS++ development team on priorities for further software development and implementation.

Linux operating system

The open-source operating system Linux is becoming increasingly important in ATNF computing. Linux is available for a wide variety of computers from personal laptop machines to multiprocessor cluster systems. In 2002 ATNF efforts concentrated on providing a uniform set up for Linux users and dealing with the conflicting requirements of rapid support for new hardware and stable operation.

World coordinate systems

A highlight of the year was the publication of a paper describing the world coordinate systems for representing celestial coordinates in the commonly-used astronomical data format known as FITS (Flexible Image Transport System). A key aspect of FITS-format files is the use of “header” information that describes the kind of data that exists in the files and how software should interpret the data. It is of great importance to have a standard format for representing celestial coordinates. This publication, the result of years of work by ATNF staff member Mark Calabretta, is the result of international collaboration, much excellent mathematical and software development, and extensive international negotiations to get a general acceptance of the new standard.

Summer vacation program

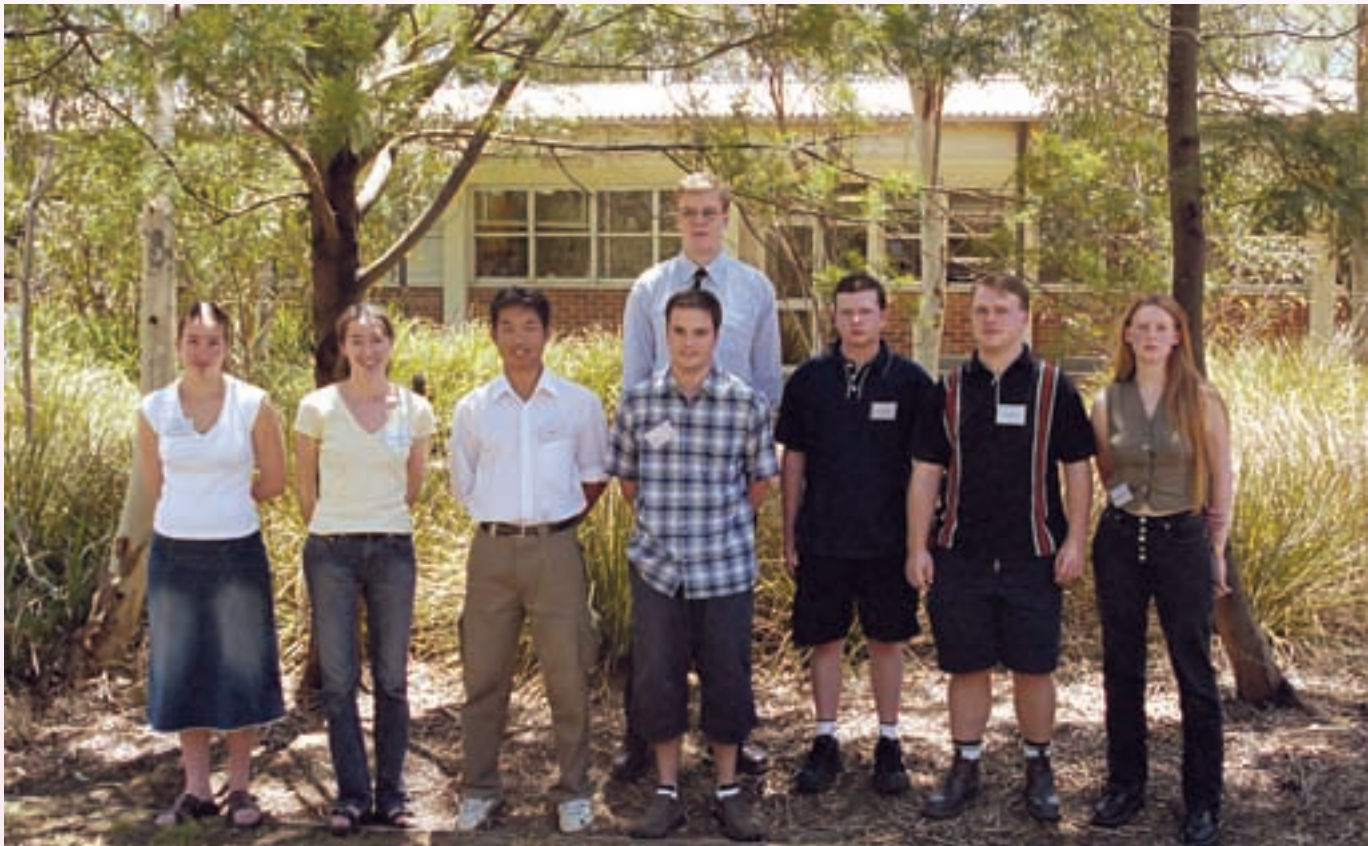
Each summer the ATNF coordinates a summer vacation program for undergraduate students who have completed at least three years of their degrees.

The 2002/2003 program was held jointly with CTIP. Over 300 applications were received for 19 positions, eight with the ATNF and 11 with CTIP. Six of the ATNF students were located at the Marsfield headquarters with the other two at the Narrabri Observatory.

The vacation program provides the students with an opportunity to experience working in a research team. Each of the students worked for about 12

weeks on a research project with supervision from a research scientist or engineer. As in previous years, a highlight of the program was an observatory trip where the students spent four days at either the Parkes or Narrabri Observatory and worked in small teams on observing projects. Each group was allocated approximately 10 hours for observations with the telescopes, with observing support provided by ATNF postdoctoral fellows. The students also received safety and telescope training provided by staff at the observatories.

The program concluded with a student symposium, with a presentation given on each of the diverse research topics. At the end of their work experience, many of the students commented that they had greatly enjoyed the CSIRO work environment and that the program had attracted them to consider further study or research careers.



2002/2003 ATNF summer vacation students

Photo: Barnaby Norris

ATNF photoarchive

The ATNF historic photographic archive dates from 1939 to the mid-1990s and comprises over 100,000 individual negatives or slides, and associated prints. The collection includes images of many of the key figures in Australian radio astronomy, photographic records of key events in the history of Australian radio astronomy and images of the radio telescopes and field stations

used by the Division of Radiophysics and the ATNF.

In 2001 – 2002, a thorough assessment was made of the contents of the entire collection to determine which parts are worth retaining, and the collection was relocated to a purpose-built room where the temperature and relative humidity are maintained at accepted levels for long-term conservation of photographic material. Following the assessment, in 2002 approximately 2,500 images, covering the years 1939 to 1964, were scanned to create digital files, using a high-quality film scanner purchased for the project.



***Sheep in the paddock** This photograph, taken in 1964, is one of thousands available in the ATNF photoarchive. The Parkes 64-m and Kennedy 18-m radio telescopes can be seen. The Kennedy antenna was transferred from Fleurs to the Parkes site in 1963.*

The photographic negatives are scanned at a resolution of approximately 10 million pixels per image. The high resolution digital files are catalogued and organised using an asset-management database program, *Cumulus*, with detailed information on the images entered into the database.

The digital archive is being developed as a resource for research on the history of Australian astronomy and for exhibitions, education and public relations. The archive is being systematically extended and will provide at least 6,000 digital images representing six decades of radio astronomy in Australia. In 2002, work also began on a separate image archive of more recent images.

ATNF website

The ATNF website is used as a primary communications tool, in particular to provide information and resources for the national and international community of astronomers who use the ATNF's facilities. The web is also used to promote public outreach activities and to document research and future development work. The ATNF website is extremely large and complex, with many technical documents and online applications, some of which are critical to the operations of the observatories.

After consultation with users, a major effort was put into improving the structure and design of the ATNF website, with the replacement of the central site in March 2002.

The new design incorporates significant structural and technological changes. These include the dynamic listing of current news and events as well as greater compliance to current web standards, for example in the use of metadata “tags” in web files. New online tools include facilities for staff to create their own web pages, a travel form to facilitate arrangements for staff going overseas, and online survey forms to collect feedback from observers at the Narrabri Observatory.

Public outreach

Astronomy is a subject that generates a high level of public interest. As such it is ideally suited to promoting science and to encouraging the next generation of students towards a science-based career. The ATNF has, and will continue to maintain, a strong public profile. The primary public outreach goals for the ATNF are to attract young people into science, to raise the profile of science in Australia, and to maintain and foster good relations with our local communities. Public outreach is promoted through a range of activities which include the operation of Visitors Centres located at the Parkes and Narrabri Observatories, educational programs, publications and promotional materials, public talks and media interviews, and special events such as Open Days.

The following sections describe some of the public relations activities held during the year.

SEARFE and the SKA

A significant educational initiative in 2002 was the launch in June 2002 of SEARFE—Students Exploring Australia's Radio Frequency Environment. This project provides spectrum monitoring and logging equipment to high schools and their students. The students monitor and



Catriona Rafael (left) and Eileen Lee (right) from Abbotsleigh School using the SEARFE equipment

analyse the radio spectrum in their local areas and compare their results with other groups of students elsewhere in the country. Over time, the SEARFE project will build up a database of radio frequency usage and interference levels around Australia, and this information will make a valuable contribution to the SKA project (page 60).

The SEARFE results acquired by the schools are posted on the website, www.atnf.searfe.au. This site provides information to the schools and also hosts an active discussion forum for students, teachers and project organisers. The project is growing with a number of schools expected to join in 2003.

The SEARFE project receives support and sponsorship from the University of Sydney, University of Technology Sydney, University of NSW, IBM Australia, BAE Systems Australia, Perth Observatory and Australian Geographic. In 2002 several schools joined the project including Abbotsleigh (NSW), Dickson College (ACT), Narrabri High School (NSW) and Kimba Area High School (SA).

Parkes outreach

In 2002, the number of public visitors to the Visitors Centre continued to rise. The centre hosted 135,000 visitors over the 2002 calendar year, up from a long-term average of around 55,000 prior to the year 2000 (page 13). The rate of increase slowed over the very dry Christmas 2002 period but has since recovered its momentum. With the increasing public profile of the observatory comes a steady flow of requests to host special events. Highlights in 2002 included a concert for around 500 attendees at a national meeting of car enthusiasts held in Parkes over Easter 2002 and a dinner for more than a hundred Women in Local Government representatives in May.

Revenue taken through the Visitors Centre has increased in line with the number of visitors. A new three-dimensional show, *Elyseum 7* (detailing a spaceflight to Mars), and another audiovisual *The Invisible Universe*, have proved popular with visitors. A dramatic new cafe and associated barbecue area now graces the site of the old hexagonal barbecue shelter adjacent to the Visitors Centre. Construction work started in earnest just prior to Christmas 2002. The motivation for the building of the cafe is to broaden the range of attractions that bring visitors to the observatory, provide more activities for them when they are there, and to extend the average length of their stay.

Narrabri and Mopra outreach

The Narrabri Visitors Centre hosted approximately 10,300 visitors in 2002, somewhat more than in previous years. The Visitors Centre also ran several star-gazing evenings for community groups and official delegations. The observatory featured in two television programs during the year—the ABC's science program *Catalyst* and the Nine Network's travel program *Getaway!*

As part of the annual Coonabarabran *Festival of the Stars* weekend, the Mopra radio telescope was open to the public on 27 October 2002. Approximately 110 visitors toured the telescope vertex room and control room. During the year a number of tours of the Mopra telescope were conducted for student groups.

Spectrum management

CSIRO, initially through the Division of Radiophysics and later through ATNF, has been involved in activities related to spectrum management and the protection of radio astronomy for more than 30 years. The areas in which the ATNF are currently involved include:

- ◆ Participation in national spectrum planning and protection activities through the Australian Communications Authority (ACA). In 2002 the focus of the activities was the preparations for the World Radiocommunication Conference (WRC) in 2003.
- ◆ Participation in regional and international meetings under the auspices of the International Telecommunications Union (ITU). These include regular meetings of ITU Study Group 7 (Science Services) and in 2002 the Conference Preparatory Meeting, with focus on WRC 2003.
- ◆ Participation by the ATNF Director in the Working Party meetings of the OECD megascience forum where an international task force was set up to investigate radio frequency interference and protection measures. A report was produced in 2002 and will go to a future meeting of the OECD science ministers.
- ◆ Participation in IUCAF (Inter-Union Commission for the Allocation of Frequencies) a committee of the IAU, URSI and COSPAR. IUCAF has been very active in ITU meetings and has had a significant impact on Study Group and WRC deliberations.
- ◆ Participation in the Radio Astronomy Frequency Committee in the Asia Pacific region (RAFCAP), a new regional spectrum management committee for radio astronomy. RAFCAP participated actively in Asia-Pacific Telescope (APT) meetings in 2002 and has raised significantly the radio astronomy profile and awareness in this region.

A major spectrum management event in 2002 was the Australian Productivity Commission inquiry into the Radio Communications Acts. ATNF produced a submission and appeared before the Commission. This resulted in the following recommendation (Rec 10.4) in the Commission's report:

Radio astronomy facilities should be designated as "radio sensitive sites" under the Australian Radio-frequency Spectrum Plan. These facilities must be notified that another user has applied for a transmitter licence wholly or partially within the bands specified in footnote AUS87.

The Productivity Commission's report and the Government's response were submitted to the Australian Parliament. The ACA has advised that the recommendation will need to be implemented in a different manner from the suggestion put forward by the Productivity Commission and has undertaken to consult with the ATNF to develop appropriate guidelines to assist with managing interference risk at radio astronomy facilities. The ACA, in consultation with key stakeholders, is committed to achieving an outcome in 2003 that is acceptable to all parties. Meetings are continuing between the ACA and the ATNF on this issue.

In addition, discussions have been held between the ACA and ATNF regarding the possible establishment in Australia of a radio-quiet reserve, an area where existing levels of radio frequency signals are low, and where any increase in radio frequency signals could be controlled into the future.

Staff satisfaction survey

The ATNF is an employer of choice. In 2002, responses to a CSIRO *Insight Staff Satisfaction Survey* placed the ATNF as the top Division of CSIRO while staff satisfaction within the ATNF is considerably higher than across the comparative Global R&D Norm surveyed by the consultants International Survey Research. The staff responses to the survey questions were especially favourable for questions associated with “leadership and management” and “job security and organisational stability”. High staff morale is one of the ATNF’s greatest strengths.

Equal Employment Opportunity

The ATNF has an active EEO group with five EEO contact officers. Two are based in Sydney, two are at Narrabri and one is at Parkes. Staff at any of the sites can contact any of the EEO officers and are assured that all discussions will be held in confidence. The EEO officers work to promote good workplace relations, to provide information and advice to staff and management on EEO policies, and to support staff involved in complaints procedures. EEO talks are given at each of the ATNF sites and are also given to summer vacation students and to new staff. The group maintains extensive web pages at www.atnf.csiro.au/overview/management/eoo/.

Occupational health and safety

Each ATNF site has its own occupational health and safety committee, which meets at least four times a year to review issues and identify any new hazards. Each workplace is assessed annually by a member of the local committee, and a formal report made. Training programs in a number of areas such as ergonomics, correct lifting techniques, electrical safety and defensive driving are offered throughout the year.

Over a number of years the ATNF’s rate of occupational health and safety incidents has been in line with that of similar institutions, such as the Anglo-Australian Observatory and the Very Large Array. In 2002, ATNF staff and visitors recorded a total of 22 incidents with a total time lost of 2.1 weeks and six compensation claims accepted by Comcare.