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# CASSIOPEIA

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### - ANNOUNCEMENTS -

#### LE PRIX BEALS/THE BEALS AWARD

The CASCA BOARD OF DIRECTORS is pleased to announce that the 1993 winner of this award is Dr. Peter G. Martin of C.I.T.A. Peter will be talking about the research which resulted in this award at this year's CASCA meeting at U.W.O.

#### MEMBERSHIP DUES

Invoices for the annual dues for the membership year, October 1993 to September 1994, were mailed on August 30. If you have not yet received yours, please contact the Treasurer, Dr. Christine Clement (cclement@astro.utoronto.ca). The dues are \$35 for ordinary members and \$14 for student members.

The CASCA Board has decided not to mail reminders in January 1994. Therefore please check your records to see if you have paid your 1993-1994 dues. If you have not, please send a cheque payable to CASCA to the following address

Canadian Astronomical Society  
 Dept. of Astronomy  
 University of Toronto  
 Toronto, Ontario M5S 1A7  
 Att.: Dr. Christine Clement.

#### COTISATIONS DES MEMBRES

Les factures pour les cotisations des membres, couvrant la période d'octobre 1993 à septembre 1994, ont été postées le 30 août dernier. Si vous n'avez pas reçu la votre, veuillez contacter la trésorière Dr.Christine Clement (cclement@astro.utoronto.ca). La cotisation est de 35\$ pour les membres réguliers et de 14\$ pour les membres étudiants.

Le conseil d'administration de la CASCA a décidé de ne pas poster de rappel en janvier 1994. Il est donc important de vérifier dans vos dossiers si vous avez payer votre cotisation 1993-94. Si vous ne l'avez pas fait, veuillez envoyer un chèque payable à la CASCA à l'adresse suivante:

Société canadienne d'astronomie  
 Departement d'astronomie  
 University of Toronto  
 Toronto, Ontario M5S 1A7  
 att.: Dr Christine Clement

Thank you/merci,  
 Christine Clement  
 CASCA Treasurer

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Editor's note: As of the winter solstice, 130 (~29% of) members had not yet renewed.

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**MEETINGS/CONFERENCES/WORKSHOPS****Lake Louise Winter Institute**

20- 26 February, 1994, Chateau Lake Louise

Particle Physics and Cosmology

*LLWI@phys.ualberta.ca* (The Secretary)**Workshop on Adaptive Optics**

17 - 18 May, 1994, Quebec City

*joncas@phy.ulaval.ca* (Gilles Joncas)**CASCA 1994**

25 - 28 May, 1994, University of Western Ontario

Radiating matter around and at the surfaces of stars

*jlandstr@phobos.astro.uwo.ca* (John Landstreet)**184th AAS Meeting**

29 May - 2 June, 1994, Minneapolis, MN

*twj@ast1.spa.umn.bitnet* (T.W. Jones)**Radio Astronomy Workshop**

3 - 6 August, 1994, Penticton

Radio Astronomy: Visions for the 21st Century

*director@drao.nrc.ca* (Lloyd Higgs)**IAU General Assembly**

15 - 17 August, 1994, The Hague, Netherlands

**NRC/HIA Spectroscopy Conference**

25 - 28 September, 1994, Chantecler Hotel, Ste-Adèle

The Future of Spectroscopy: From Astronomy to Biology

Mrs. Doris Ruest, Conference Manager, NRC, Ottawa

(613)-993-9228 FAX:(613)-957-9828

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**"Radio Astronomy: Visions for the 21st Century"****1st Announcement, A Workshop, Penticton, B.C. 3-6 August, 1994**

Next summer, the National Research Council will host a workshop to discuss the future directions for Canadian radio astronomy. Internationally, there is a great deal of activity in radio astronomy. New ground or space-based facilities have either been recently completed, are under construction or are planned in virtually every country in the world that engages in radio astronomy. Several countries are undergoing planning exercises to define new instrumental priorities for the turn of the century. The next generation of powerful instruments will open up new, unexplored areas of scientific investigation and shed new light on old problems.

Canada has a strong tradition of excellence in radio astronomy and is well positioned to play a leadership role in the next generation of science and instrumentation. Over the past few years there has been much informal debate about the directions toward which the science of radio astronomy is evolving and what instrumental concept we, as a country, should pursue. The direction of radio astronomy as a science will be the subject of the workshop. The scientific organizing committee consists of:

Ray Carlberg	University of Toronto	Judith Irwin	Queen's University
Peter Dewdney	Herzberg Institute of Astrophysics	Gilles Joncas	Université Laval
Neb Duric	University of New Mexico	Bill McCutcheon	University of British Columbia
Paul Feldman	Herzberg Institute of Astrophysics	George Mitchell	St. Mary's University
Mike Fich	University of Waterloo	Jean-Rene Roy	Université Laval
		Ernie Seaquist	University of Toronto
		Russ Taylor	University of Calgary
		Christine Wilson	McMaster University

At the workshop, astronomers will be challenged to look into the near future to attempt to identify the "big questions" and unexplored areas towards which present research is leading us. Canadian and international experts in astrophysical research will discuss the anticipated directions of their disciplines and the role that radio astronomy will play. The workshop will feature several panel debates and open discussions where views can be exchanged. On the last day of the workshop there will be an open forum on instrumental concepts and priorities.

The format of the workshop will be invited talks followed by panels and open discussions. However, contributions in the form of posters are welcome. Share your idea of the direction of your research area or your concept for the next generation of radio instrumentation. While the focus of the workshop will be toward radio astronomy, the discussion will be driven by scientific issues and we encourage all members of the astronomical community to participate. There will be a limited number of graduate-student travel grants for students at Canadian universities to attend the workshop. The registration information will include an application form for such assistance.

For more information on the content of the workshop, contact any of the members of the scientific organizing committee. To indicate interest in attending the workshop contact:

Dr. Lloyd Higgs  
 Dominion Radio Astrophysical Observatory  
 P.O. Box 248  
 Penticton, B.C.  
 Canada, V2A 6K3  
 Fax: (604)-493-7767  
 E-mail: [director@drao.nrc.ca](mailto:director@drao.nrc.ca)

The workshop will be held in the Penticton Inn, a newly renovated Howard Johnson Plaza-Hotel, in downtown Penticton. At that time of year, Penticton is typically hot (about 30-35 C during the afternoon) and dry. The beaches, motels and restaurants will be filled with tourists (the workshop immediately follows the August holiday weekend) so early arrangements will be needed. Detailed registration and accommodation information, plus the preliminary workshop program, will be provided in a second announcement early in the new year. Rooms (which can be shared) at the Penticton Inn have been block booked at a rate of \$79 plus tax. Social events will include an opening reception, and an evening tour of DRAO followed by a workshop dinner. There will be a small registration fee of about \$25, plus a charge of about \$35 for the tour/dinner.

## IAU MEMBERSHIP ADDRESS FILE

A copy of the IAU membership address file for Canada is available via anonymous ftp at stan.brandonu.ca in the directory anonymous.gulliver. The file, iau\_member.pst, is in PostScript format and can be printed on any compatible printer or viewed with any editor utility. Inspection has shown that the list contains a large number of incorrect entries. If IAU members no longer receive their Information Bulletins or are aware of errors in their addresses, they can submit corrections in writing to

Dr. J. Bergeron  
Institut d'Astrophysique  
98bis, bd Arago  
75014 Paris  
France

## CASCA MEMBERSHIP DIRECTORY FILES

The most recent versions of the Membership Directory files, directory\_pt1.pst and directory\_pt2.pst, are also available as above. These will be distributed shortly as the 1994 Membership Directory. Members who wish to submit address changes should do so as soon as possible.

Austin F. Gulliver  
CASCA Secretary

## INTERNATIONAL ASTRONOMY MEETING LISTING

For a number of years, I have been offering a listing of international astronomy meetings to any individual or organization that happened to express interest in acquiring this information. I have recorded the meetings on the basis of e-mail input from other organizations and by perusing various newsletters, bulletins, and journals. Within the past year, I have enhanced this service to the astronomical community by providing instantaneous e-mail distribution of any meeting I have been contacted about from the Internet; however, the messages I receive are not edited prior to forwarding as my primary objective is to get the information out as soon as possible.

Each organization or individual who requests the listing receives either an e-mail or hardcopy version of the list around the third week of every month. Because of the rapid growth of the distribution list, I urge organizations to rely on one individual as the caretaker of the monthly distribution to avoid duplication of effort. In exchange for this service, I request that organizations send us their preprints, bulletins, and annual reports.

In addition, the listing is updated frequently and can be accessed via ftp at the following address: \*ftp: host name is ftp.cfht.hawaii.edu. At the login prompt, enter: "anonymous"; at the password prompt, enter: your e-mail address. Issue the commands "cd pub/library", "get: meetings.doc".

In the near future, this list will also be available on NCSA Mosaic.

For further information contact: Liz Bryson, Librarian, Canada-France-Hawaii Telescope Corporation, P.O. Box 1597, Kamuela, HI. 96743. Tel: (808) 885-7944. Fax: (808) 885-7288. Bitnet: library@cfht. Internet: library@cfht.hawaii.edu.

Liz Bryson  
Librarian  
Canada-France-Hawaii Telescope Corporation

## The Quest for a Permanent CASCA Office

At the last Board meeting it was agreed that a proposal that the Society establish a permanent office in a fixed location and staffed by a part-time person on an on-going basis would be presented to the membership. Although a more detailed proposal will hopefully be presented and discussed at the AGM in London, this announcement serves not only to outline some of the reasons behind the proposal but also to solicit interest from any institution which may wish to host the proposed permanent office.

A permanent office proposal has been advanced because of the increasing workload on the Society's Secretary and Treasurer. Providing the required services to the present membership of 440 places an especially heavy burden on these Officers at least three times a year, during elections, during the collection of dues and during the distribution of the Membership Directory.

The establishment of a permanent office will also improve greatly our organization and efficiency. At present our Society has in effect no home. Our active and archival files reside in various locations across the country and are shuttled back and forth at the mercy of Canada Post upon the appointment of a new Treasurer or Secretary. Moreover, correspondence addressed to the Society sometimes takes several weeks to reach the intended recipient, owing to the lack of a permanent postal address. The geographical separation of the Secretary and Treasurer causes inevitable duplication of files and effort. In addition, each time the Secretary or Treasurer is replaced a major disruption takes place as the operating procedures are learned all over again.

The solution to these difficulties is to establish a permanent office staffed by a part-time person with the necessary skills. It is suggested that this office would meet certain requirements.

1) It would be located at an institution willing to donate a small amount of office and storage space. This would become the Society's official registered address to which much of the correspondence would be routed, sorted and redirected, as necessary. Access to the necessary computer facilities including a laser printer, the Internet, etc. would be required.

2) The office would be staffed by someone capable of conducting the day-to-day business of the Society. It is estimated that such a person would be required for an average of 8 hours per week. Sharing a person already employed by the host institution would be advantageous for scheduling the variable workload.

Thus CASCA is seeking an expression of interest on behalf of an institution willing to host the permanent office of our Society.

Austin F. Gulliver  
CASCA Secretary

## - REPORTS -

## A NEW CCD FOR SPECTROSCOPY

Gordon Walker, Geophysics & Astronomy Dept., UBC  
e-mail: walker@astro.ubc.ca

In 1992 I received a NSERC equipment grant to develop long, slender Charge Coupled Devices (CCDs) for spectroscopy in a 50/50 venture with John Geary of the Smithsonian Astrophysical Observatory. John designed a mask set with 15 micron pixels and four different devices on a wafer: 4096x200 (60x3 mm) and 2560x256 for spectroscopy, 3072x1536 edge-butable for imaging in a 3072x3072 mosaic, and a 128x64 rapid frame-transfer device for wave-front sensing. All of the spectroscopic, and 75% of the frame transfer, devices belonging to UBC and the ten best 3072x1536 imaging devices to SAO.

Acquiring scientific grade CCDs is a risky business! We contracted with Loral Fairchild Imaging Sensors in mid-1992 for a best effort foundry run. In December, despite a spectacularly high yield for Kitt Peak immediately before, all of our devices proved to be shorted and, consequently, useless. Although under no obligation to do so, Loral tried again early this year, with the same unhappy result. Fortunately, a third run in the spring was successful with a moderate yield. After reviewing the test data with John, we set aside ten of the best 22 wafers for the application of Indium bumps and later thinning (when we both have more money!) for rear illumination for enhanced blue/UV response.

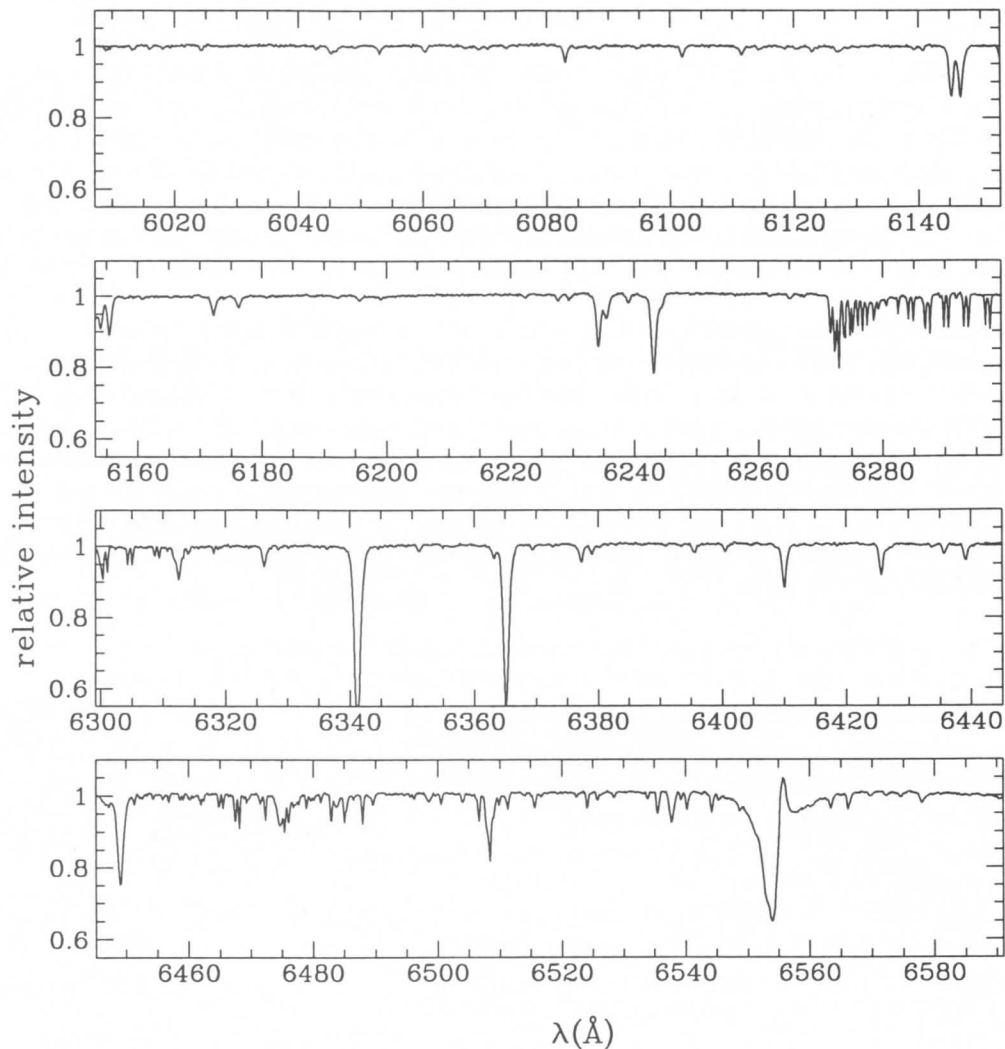
From the remaining wafers we selected the 14 best 4096x200 devices and 10 frame transfer devices which Loral diced and mounted on packages. They were delivered in mid-August together with the uncut portions of the wafers. Ron Johnson, my engineer, has characterised two of the 4096x200 devices and in mid-November we obtained our first spectra with one on the 800 mm camera of the DAO 1.2 m coude spectrograph. The device we tried is nearly flawless. The four panels in the Figure display a spectrum of Deneb in the region of H-alpha after binning 35 rows off-line from a single exposure. There was a marked pattern of low-signal (by some 5%) every 68 pixels in the raw data which disappeared in the flat-fielding. There is little evidence of charge transfer inefficiency. Technical characteristics of the device and its package are given in the Table.

## CHARACTERISTICS OF 4096X200 DEVICE

pixel size:	15x15 microns
read-out noise:	5 to 8 electrons depending on rate
amplifiers:	4
package size:	56 pin dual-inline metal, 19.5 x 73 mm
quantum efficiency:	typical for a thick CCD
dark current:	operates in MPP mode
serial CTE:	notched serial register

For the time being, we plan to implement one device in the DAO coudé spectrograph and another on the UBC 0.4 m telescope. We would retain one or two devices for testing but the rest are generally available. Since the devices were developed with NSERC money I would charge Canadian institutions (including CFHT) only for the package, packaging and shipping (\$1500). Unfortunately, with but one engineer, we cannot supply a full system at any price. We could provide an engineering grade device for set-up but would be reluctant to release a scientific grade device until you have a controller and cold-housing demonstrably ready. I should remark that preliminary tests indicate that not all of the devices are so flawless, several have 'warm' columns and not all have four amplifiers working.

We expect to characterise the 128x64 frame transfer devices by early 1994 when they would also be available, but at lower cost. For the moment we have no plans for the 2560x256 devices. They are untested and still on the wafers. Paul Hickson will use our share of the 3072x1536 devices at the prime focus of the UBC 2.7 m liquid mirror telescope.



One of the first spectra taken with the new 4096x200 CCD (15 micron pixels) which is described in the article. It is of Deneb and taken at 1 nm/mm with the coudé spectrograph of the DAO 1.2 m telescope. 35 rows were summed off-line, bias removed, and flat-fielded. Note the lack of artifacts. UBC is making some of these devices generally available.



## REPORT OF THE SCIENTIFIC ADVISORY COMMITTEE MEETING TO CFHT, NOVEMBER 4 - 6, 1993.

The CFHT SAC met in Hawaii in early November for its 44th meeting. Present were

Chantal BALKOWSKI (chair),  
Ken CHAMBERS,  
Michael DeROBERTIS,  
Klaus HODDAP,  
Yannick MELLIER,  
Christopher PRITCHET,  
Harvey RICHER (vice-chair)

Daniel ROUAN.  
Nicolas MAURON  
and Daniel NADEAU  
were unable to attend.

CFHT was represented by its Executive Directors, Pierre COUTURIER and John GLASPEY. Below I present a short summary of the highlights of the meeting.

**PERSONNEL:** During the past 6 months there have been a number of personnel changes at CFHT. The previous Executive Director Guy Monnet ended his term on July 31 and returned to France. The current Director Pierre Couturier arrived in Hawaii in early June and started his term August 1. Dr. Jerry Sovka resigned as Chief Engineer as of June 30. Besides this major change, a software and an electronic technician, a member of the summit operations group, the head of the detector group and the mechanical engineer have all left since August. These staff departures, all of whom except for the chief engineer will be replaced, have placed a very high strain on the support of summit operations at CFHT because of the understaffing.

**CCDs:** A 2048 x 2048 UV coated Loral CCD loaned to CFHT by the Institute for Astronomy at University of Hawaii has become the CCD used by most instruments. A thinned 1024 x 1024 Tektronix CCD is currently on hand at CFHT and will be installed in a dewar early in 1994. CFHT is still awaiting results from the thinning attempts by the Steward Observatory on Loral 2048 x 2048 devices made available through a cooperative agreement with G. Luppino of IfA. A thinned CCD has been ordered from Reticon with delivery promised for December 1993.

**SIS:** A major effort was undertaken by CFHT to carefully align the SIS guiding system. This was successfully accomplished and now guide stars as faint as  $V=15.5$  can be used. In 1994, it is expected that a new optical/detector system being built in collaboration with DAO will extend the limiting magnitude to  $V=18$ .

### CONSOLIDATION OF

**INSTRUMENTS:** CFHT is making a major effort to streamline operations by making as few upper end and instrument changes as possible and retiring instruments that are no longer required. Within this context the following changes will or are likely to occur. (1) The f/8.2 Coude spectrograph will likely be retired shortly when the f/4 becomes fully operational. This will probably entail acquiring an additional grating for the f/4 so that all spectral resolutions required will be covered. It is also likely that in the near future a fibre optic feed into the Coude from the Cassegrain will be implemented.

The UV train, which provides unique capabilities will be maintained for now. (2) HRCam will no longer be supported by the Corporation when the SIS fast guiding becomes fully operational. (3) The FTS will be maintained by CFHT only until such time as a major refurbishment or repair is required. If high resolution spectroscopy in the infrared is deemed to be scientifically interesting, SAC encourages the community to consider developing an echelle-type cooled-grating spectrograph for the 1-5 micron region. (4) The Herzberg Spectrograph will be decommissioned after the 1994II observing semester. There has been very little demand recently for this instrument. Should a significant time allocation for Herzberg arise in 1994II, SAC may reassess the date of decommissioning. (5) A given instrument will not be mounted for less than a four night run.

### CRASH OF COMET 1993e ONTO

**JUPITER:** In July 1994 comet 1993e is expected to crash into Jupiter. This event will occur on the far side of the planet as seen from the Earth, but nevertheless there are interesting long-lived effects (eg tidal disruption of the incoming body, effect on the upper atmosphere of Jupiter) that warrant detailed observations of this event. The ephemeris of the event was

thought to be known well enough that the time of the impact could be predicted to +/-24 hours. With this in mind proposals were solicited by CFHT and several French proposals were granted time. However, in the meantime, possible doubts have been raised as to whether the event will occur at all or whether the object will be so disrupted that the crash will be uninteresting. This results from the observation that in its last passage near Jupiter the comet was torn into roughly 20 1 km sized objects. The Corporation then decided (with the agreement of SAC) that 11 nights at the end of July should be set aside for the comet crash observations and that interested groups should have the opportunity to **REAPPLY** for time based on new orbital information which should become available in the next few months. It is expected that the main instruments that will be available for these observations are the FTS and 10 micron camera, although other possible instruments should not be excluded if excellent proposals are obtained. A working group established by SAC will decide which proposals will eventually be given time to carry out their observations.

### **ADAPTIVE OPTICS WORKSHOP:**

When the AO Bonnette becomes operational, most probably in 1996, CFHT users are likely to be in the unique position of having access to images which, under optimal conditions, could rival those available from the Hubble Space Telescope (Full Width at Half Maximum near 0.1"). SAC is of the impression that the CFHT community should be prepared for this situation and the best manner in which to inform CFHT users of the potential science that can be done with such high spatial resolution will be to hold a "Workshop on Adaptive Optics" where the science that can be done will be stressed over the technical aspects of adaptive optics. SAC made a proposal to the Board of Directors of CFHT and they have agreed to support this workshop. The workshop is currently planned to be held on the 2 days immediately preceding the next SAC meeting. This means that it will be in Quebec City on May 17--18, 1994. Robin Arsenault at CFHT will coordinate the scientific organizing committee which consists of F. Rigaut, J. Bouvier, R. Racine, D. Crampton, and M. Northcott. The local organizing committee will be chaired by G. Joncas.

Harvey Richer  
e-mail: [richer@geop.ubc.ca](mailto:richer@geop.ubc.ca)

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## **URSI-Commission J Report: 1993**

Ken Tapping, DRAO, P.O. Box 248, Penticton, B.C., V2A 6K3  
Internet: [ktapping@drao.nrc.ca](mailto:ktapping@drao.nrc.ca)

### **General Assembly of URSI, 1993**

*The 1993 General Assembly of the International Union for Radio Science (URSI) was held in Kyoto, Japan, between 25th August and 2nd September. I was recently appointed the Canadian Chairman for URSI Commission J (Radio Astronomy), and attended the meeting. URSI is to radio science in all its forms, as the IAU is to astronomy. It holds periodic "General Assemblies", which are not as much at the scientific cutting edge as they are an opportunity to hear more broadly on the progress being made in the various disciplines*

*of the science, and to provide an envelope for various international committees to meet. However, an important difference between the IAU and URSI is that individuals are not currently members of URSI, countries are. We don't therefore hear regularly about what is happening in URSI, and many of us know little about the organization. This is a pity, because these meetings provide a valuable interface between radio astronomers and other users of the radio spectrum. One thing which was very obvious is that many of those I met who are interested in finding new wavelength bands for cellular phones and satellite communications do not understand either the sensitivities we*

are achieving in radio astronomy, or how vulnerable we are to interference from man-made transmissions.

During the General Assembly were special meetings for Commission J and for IUCAF (Inter-Union Commission for Allocation of Frequencies). This report is divided on the basis of issues rather than proceedings of the individual meetings.

## 1. Protecting the Radio Astronomy Frequency Bands

### 1.1 The 1610.6-1613.8MHz OH-Line Band

This frequency band (used for cosmic hydroxyl studies) has been designated by the International Telecommunications Union for shared use between radio astronomy, up-links for satellite mobile communications and navigation, and for aeronautical radionavigation. In 1992 a world-wide study organized by IUCAF and the GLONASS Authority into the severe interference being caused to radio telescopes by the Russian GLONASS satellite navigation system. The results of the study, and a subsequent series of international discussions have led to the proposal of a multistep plan which should minimize the interference problems in the short term, and completely eliminate this problem by 1998.

Another potential source of problems in the INMARSAT communications system. A number of ideas have been suggested for reducing its threat to radio astronomy, including moving its operating frequencies up to about 1.8GHz, completely outside the radio astronomy band. There is growing pressure by various governmental agencies and private companies around the world for implementing more satellite communications and navigation systems in this frequency band. To date there are several proposals extant from both North America and Europe. Some are for the use of spread spectrum techniques, where the bandwidth occupied by the signals can be far larger than that necessary for that rate of information transfer.

The high demand for use of frequencies in this band, together with the strong interference problems already encountered, underline the need for radio astronomers to keep their ears to the ground and to be more broadly involved in the discussions of planned uses of bands being used by, or of interest to, radio astronomers.

### 1.2. The 1420-1427MHz Passive Radiometry

## Band

This band is designated "passive only"; no transmissions are permitted in it. This is ideal for radio astronomy since with long integration and image-building times, it is very difficult to specify a tolerable interference level. However, there are suggestions that this status be changed. The European "Commisses Europeens de Postes et Telecommunications" are proposing that the status of this band be changed to "shared", relieving some of the demand pressure for more spectral space for mobile communications. Since such a change might well destroy studies of cosmic HI, particularly the weak, widely-distributed emission, radio astronomers are fighting this proposal.

### 1.3 Comment

These interference problems, real and potential, underline the need for radio astronomers to stay in contact with the rest of the community of users of the radio spectrum. Leaving it to the international committee structures is perhaps risky, as the current GLONASS difficulties demonstrate. It behooves all technically-oriented members of the radio astronomy community to stay in touch with what others are doing, and to use every opportunity to educate other users of the radio spectrum as to the requirements of radio astronomy, the sensitivities we are now attaining, and our vulnerability to interference. The URSI Meetings provide an effective means of finding out what other scientific users of the spectrum are up to, and to learn what new communications technologies and techniques are likely to turn up in governmental, military and commercial activities.

## 2 Working Groups

As an aid to fulfilling its role, Commission J is currently operating Working Groups on Very Long Baseline Interferometry and Millimeter and Submillimeter Astronomy. The roles of these working groups are to monitor the current states of those lines of astronomy, to assess the effectiveness of current facilities in satisfying present and future research needs, and to provide a forum for discussing future instrumentation requirements. In discussions at this General Assembly, the proposals under consideration in several countries for construction of very large radio telescopes, and the realization that, as in the case of many other observing facilities, such instruments are beyond the means of any one country, led to

the authorization by URSI of a "Very Large Radio Telescope Working Group". It is currently Chaired by Robert Braun of The Netherlands, and has members from Canada, France, Germany Russia, the United Kingdom and the United States. Until someone else would particularly like to assume this prestigious position, I am the member for Canada. As a "straw man" concept, the group is discussing an instrument having a collecting area of about one square kilometer, operating in the centimeter-wavelength range. It has been suggested that besides having very high sensitivity, it should be able to map a field at least a couple of degrees square. The Working Group is soliciting suggestions and comments from the user community, and plans to meet again in the first half of 1993. For the time being, anyone wishing to add their 5 cents worth can send their contributions to me.

**3.Election of New Vice-Chairman for Commission J**

Roy Booth (Sweden) has been elected the new Vice-Chairman for Commission J. An important consideration in this election is to ensure that the position rotates fairly between nations. Roy's term runs from 1993-1996. The current Chairman is Ron Ekers (Australia).

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**HIGHLIGHTS FROM DAO ANNUAL REPORT 1992/93**

The Multi-Object Spectrograph/Subarcsecond Imaging Spectrograph (MOS/SIS) was successfully delivered and commissioned at CFHT. Over a hundred objects can be observed simultaneously with slitlets, which facilitate the careful sky subtraction necessary for very faint object work.

The Canadian Network of Observational Cosmology, involving some two dozen Canadian and foreign researchers was inaugurated. The initial project, focussing on gravity and dynamics and led by Ray Carlberg (U. Toronto) is using MOS for observations of galaxy clusters at moderate redshift.

The CADC received the 100th optical disk of HST data from STScI on 1993 March 25. The HST archives may be previewed using the STARCAT software. Archiving of CFHT data is now also routinely done at CADC.

A 256 x 256 platinum-silicide near-infrared detector has been commissioned at the imaging (f/5 Newtonian) focus of the 1.8-m telescope and was scheduled for use on 13% of the nights during the year.

**CANADIAN ASTRONOMY PUBLICATIONS**  
**September 3 to December 9, 1993**

If you have a preprint or other Canadian publication, we would like to include it in this list. Please send a copy (or a photocopy of the title page) to:

Canadian Astronomy Publications List  
 Astronomy Library  
 University of Toronto  
 Room 1306  
 60 St. George Street  
 Toronto, Ontario  
 M5S 1A7

**A. PREPRINTS OF RESEARCH PAPERS**

The following is a list of preprints written by Canadian astronomers and received at the Astronomy library within the dates given above. The preprints are arranged in alphabetical order according to the surname of the first listed author. Originating institution and date of receipt at the library are given.

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- DAO annual report for the period 1 April 1992 - 31 March 1993. DAO, 22-Oct-1993
- Anderson, G.; et al. *A systematic SO(10) operator analysis for fermion masses.* CITA, 27-Sep-1993
- Ashman, K.M.; Bird, C.M. *Globular cluster clustering in M31.* CITA, 9-Sep-1993
- Avery, L.W.; et al. *Submillimeter molecular line observations of IRC +10216: searches for MgH and SiH<sub>2</sub>, and detection of HCO<sup>+</sup> and hot HCN.* JCMT/HIA, 29-Oct-1993
- Babul, A.; Miralda-Escude, J. *Gravitational lensing in clusters of galaxies: new clues regarding the dynamics of intracluster gas.* CITA, 27-Sep-1993
- Babul, A.; Weinberg, D.H. *Do the cosmological density-velocity correlations test the gravitational instability hypothesis?* CITA, 2-Nov-1993
- Babul, A.; van de Weygaert, R. *Shear and the large-scale structure in the universe: collapsing voids.* CITA, 12-Nov-1993
- Bell, M.B.; Avery, L.W.; Feldman, P.A. *C3S and C5S in IRC+10216.* HIA, 7-Sep-1993
- Bell, M.B. *The location of warm HC<sub>3</sub>N and warm HC<sub>5</sub>N gas in the circumstellar envelope of IRC+10216.* HIA, 27-Sep-1993
- Bernardeau, F. *What can we learn from the large-scale velocity field?* CITA, 2-Nov-1993
- Bernardeau, F. *Skewness and kurtosis in large-scale cosmic fields.* CITA, 2-Nov-1993
- Carlberg, R.G. *Cosmological velocity bias.* DDO/U of T, 22-Sep-1993
- Chaboyer, B. *Colour gradients in early type dwarf galaxies.* CITA, 12-Nov-1993
- Clarke, T.E.; Blaes, O.; Tremaine, S. *Do gamma-ray bursts come from the Oort cloud?* CITA, 2-Nov-1993
- Davidge, T.J.; Simons, D.A. *Deep infrared array photometry of globular clusters: I. M4.* DAO, 22-Oct-1993
- Davidge, T.J.; Simons, D.A. *Near-infrared array photometry of evolved stars in the metal-rich globular cluster NGC6553.* DAO, 22-Oct-1993
- Demers, S.; Irwin, M.J.; Gambu, I. *Deep CCD photometry of the dwarf spheroidal galaxy Leo I.* U Montreal, 14-Oct-1993
- Doyon, R.; Joseph, R.D.; Wright, G.S. *A near-infrared spectroscopic study of the luminous merger NGC 3256. I. Constraints on the mass function of the starburst.* U Montreal, 14-Oct-1993
- Doyon, R.; Wright, G.S.; Joseph, R.D. *A near infrared spectroscopic study of the luminous merger*

- NGC 3256. II. Evidence for molecular hydrogen emission. U Montreal, 14-Oct-1993
- Doyon, R.; et al. Stellar velocity dispersion in NGC6240 and Arp220. Obs. Mont Megantic, 14-Oct-1993
- Evans, N.R. Classical cepheids with evolved blue companions: constraints on evolution. ISTS York U, 23-Sep-1993
- Garnavich, P.M.; et al. The red giant branch of the old, metal-rich open cluster NGC 6791. DAO, 24-Nov-1993
- Garrison, R.F. Complementarity between photometry and spectroscopy. DDO/U of T, 26-Oct-1993
- Grossman, S.A. GSPH and the physics of convective overshooting. CITA, 27-Sep-1993
- Grossman, S.A. Arc statistics and the evidence for steep lens profiles. CITA, 27-Sep-1993
- Hardy, E.; et al. A study of the stellar populations of M32 based on its spatially resolved spectrum. U Montreal, 14-Oct-1993
- Harris, W.E.; Pudritz, R.E. Supergiant molecular clouds and the formation of globular cluster systems. McMaster U, 28-Sep-1993
- Hill, R.J.; Madore, B.F.; Freedman, W.L. The initial mass function for massive stars in the Magellanic Clouds. III. Luminosity and mass functions for 14 OB associations. IPAC, 8-Nov-1993
- Hogg, D.W.; et al. A photographic search for satellites of Neptune. CITA, 27-Sep-1993
- Hughes, V.A.; MacLeod, G.C. An analysis of IRAS identified HII regions and their radio properties. Queen's, 7-Dec-1993
- Hughes, V.A. A book review for *Minerva: Astronomer by chance / Bernard Lovell*. Queen's, 7-Dec-1993
- Hutchings, J.B.; et al. Evolution of radio galaxies to  $z=1$ . DAO, 24-Nov-1993
- Irwin, J.A. From WYSIWYG to halos and fountains: the discovery of galactic structure. Queen's, 27-Sep-1993
- Kaiser, N. Testing models for structure formation. CITA, 2-Nov-1993
- Kim, K.-T.; Kronberg, P.P.; Dewdney, P.E.; Landecker, T.L. Radio observations of the coma cluster of galaxies and its immediate vicinity: I. Radio data and optical identifications. Chungnam Nat. U. Korea, 13-Oct-1993
- Kim, K.-T. Radio observations of the coma cluster of galaxies and its immediate vicinity: II. A master list of radio sources. Chungnam Nat. U. Korea/DDO/U of T, 13-Oct-1993
- Kim, K.-T.; Kronberg, P.P.; Dewdney, P.E.; Landecker, T.L. Radio observations of the coma cluster of galaxies and its immediate vicinity: III. Statistical analyses and source counts. Chungnam Nat. U. Korea, 13-Oct-1993
- Kim, S.-H.; Martin, P.G.; Hendry, P.D. The size distribution of interstellar dust particles as determined from extinction. DDO/U of T, 16-Nov-1993
- Kronberg, P.P. Extragalactic magnetic fields. DDO/U of T, 29-Oct-1993
- Kronberg, P.P.; Dyer, C.C. Measurement of a galaxy's total mass using the technique of polarization alignment-breaking of background quasar jets. DDO/U of T, 3-Nov-1993
- Kwok, S.; Hrivnak, B.J.; Geballe, T.R. Circumstellar dust in planetary nebulae and proto-planetary nebulae. U Calgary, 5-Nov-1993
- Kwok, S. Test of planetary nebula evolution models by distance-independent parameters. U Calgary, 5-Nov-1993
- Kwok, S.; Aaquist, O.B. VLA 8.4 GHz continuum observations of compact planetary nebulae. U Calgary, 5-Nov-1993
- Li, Jonathan G.; Seaquist, E.R. Aperture synthesis observations of HI and CO in the early-type starburst galaxy NGC 3928. DDO/U of T, 13-Oct-1993
- Lister, M.L.; Hutchings, J.B.; Gower, A.C. Orientation modeling of radio galaxy and quasar properties: evidence for a unified model. DAO, 24-Nov-1993
- Madore, B.F.; Freedman, W.L.; Lee, M.G. Resolved stars in nearby galaxies: ground-based photometry of M81. NED, 27-Sep-1993
- Martin, P.; Roy, J.-R. The influence of bars on the chemical composition of spiral galaxies. U Laval, 23-Nov-1993
- Miralda-Escude, J.; Babul, A. Using gravitational lensing to test the pressure-supported hot intracluster gas hypothesis in A2218. CITA, 27-Sep-1993
- Moffat, A.F.J.; Robert, C. Clumping and mass loss in hot star winds. U Montreal, 14-Oct-1993

- Moffat, A.F.J. *First wavelet analysis of emission line variations in Wolf-Rayet stars.* U Montreal, 14-Oct-1993
- Nowak, M.A. *A cautionary note on gamma ray burst nearest neighbor statistics.* CITA, 27-Sep-1993
- Ouyed, R.; Pudritz, R.E. *Forbidden line formation in hydromagnetic disk winds. I. Oblique shocks.* McMaster U, 15-Oct-1993
- Ouyed, R.; Pudritz, R.E. *Forbidden line formation in hydromagnetic disk winds. II. Line profiles.* McMaster U, 15-Oct-1993
- Patel, K.; Pudritz, R.E. *The formation of stellar groups and clusters in molecular cloud cores.* McMaster U, 15-Oct-1993
- Percy, J.R. *Education in astronomy: an international perspective.* U of T, 25-Nov-1993
- Pudritz, R.E.; Ouyed, R. *Forbidden line diagnostics of disk winds in YSOs [young stellar objects]* McMaster U, 15-Oct-1993
- Reuter, H-P.; Lesch, H.; Kronberg, P.P.; et al. *The magnetic field in the halo of M82 - polarized radio emission at  $\lambda\lambda$  6.2 and 3.6 cm.* DDO/U of T, 3-Nov-1993
- Rowlands, N.; Houck, J.R.; Herter, T. *The highly ionized regions of NGC 6302 and NGC 6537.* U Montreal, 14-Oct-1993
- Saha, P.; Williams, T.B. *Unfolding kinematics from galaxy spectra: a Bayesian method.* CITA, 27-Sep-1993
- Scarfe, C.D.; Lyons, R.W.; Bolton, C.T.; et al. *The spectroscopic-speckle triple system HR 6469.* U Victoria/DDO/U of T, 26-Oct-1993
- Seaquist, E.R. *Radio emission from stars.* DDO/U of T, 22-Sep-1993
- Shapiro, P.R.; Giroux, M.L.; Babul, A. *Reionization in a cold dark matter universe: feedback of galaxy formation on the intergalactic medium.* CITA, 27-Sep-1993
- Simon, N.R.; Clement, C.M. *Are the cepheids in IC 4182 different from population I cepheids in the galaxy?* DDO/U of T, 20-Oct-1993
- Tapping, K.F.; Charrois, D.P. *Limits to the accuracy of the 10.7 cm flux.* DRAO, 10-Nov-1993
- Tatum, J.B.; Balam, D.D.; Aikman, G.C.L. *Astrometric recovery & follow-up of near-earth asteroids.* DAO, 22-Oct-1993
- Vallee, J.P. *NGC 7027 at millimeter wavelengths: radial gradient of the ionised shell density.* HIA, 27-Sep-1993
- van den Bergh, S. *The nature of SO galaxies.* DAO, 22-Oct-1993
- van den Bergh, S. *The enigmatic supernova S Andromedae.* DAO, 22-Oct-1993
- van den Bergh, S. *A nearby protogalaxy?* DAO, 22-Oct-1993
- van den Bergh, S.; Morris, S. *Third parameter effects in globular clusters.* DAO, 22-Oct-1993
- van den Bergh, S. *The Local Group.* DAO, 24-Nov-1993
- van den Bergh, S.; McClure, R.D. *Rediscussion of extragalactic supernova rates derived from Evans' 1980-1988 observations.* DAO, 24-Nov-1993
- van de Weygaert, R.; van Kampen, E. *Voids and their velocity fields in gravitational instability scenarios.* CITA, 2-Nov-1993
- van de Weygaert, R.; Babul, A. *Shear fields and the evolution of galactic-scale density peaks.* CITA, 12-Nov-1993
- Yee, H.K.C.; Ellingson, E. *High-resolution optical imaging of the gravitational lens system B1422+231.* DDO/U of T, 9-Sep-1993

## B. PUBLICATIONS

- The astronomy thesaurus* / compiled by Robyn M. Shobbrook and Robert R. Shobbrook.  
Anglo-Australian Observatory for the IAU, 1993 Collaborators include Marlene Cummins,  
University of Toronto Astronomy Library
- Looking up: a history of the Royal Astronomical Society of Canada* / Peter Broughton. Dundurn Press, 1993

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