CASSIOPEIA

No. 90 - Vernal Equinox 1996
ISSN 0715-4747
Publications Mail Registration No: 0565318
http://bear.ras.ucalgary.ca/CASCA/v96/index.html

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ADDRESS CHANGES

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Do not forget to update your own e-mail address

CASCA 96

THE ANNUAL GENERAL MEETING/ L'ASSEMBLÉE GÉNÉRALE ANNUELLE

The theme for this year's annual meeting will be:

NEW WINDOWS ON THE UNIVERSE

Le thème de cette année (pour l'assemblée annuelle) sera:

NOUVELLES VUES DE L'UNIVERS

The following have agreed to give invited talks:

Les invités suivants ont accepté de faire des exposés:

Dr. Baha Balantekin, University of Wisconsin (co-sponsored by the Sudbury Neutrino Observatory)
Dr. Catherine Cesarsky, Saclay, France
Terry Dickinson, Yarker (Education Session/public lecture)
Dr. Richard Ellis, Institute of Astronomy, Cambridge, U.K.
Dr. Ken Freeman, Mount Stromlo Observatory, Australia
* Dr. Mark Halpern, University of British Columbia
Dr. Art McDonald, Director, Sudbury Neutrino Observatory
Dr. Paul Steinhardt, University of Pennsylvania (sponsored by CITA)
Dr. Howard Yee, University of Toronto

* provisional, contingent on schedule / horaire provisoire, dépendant de l'expérience

The program will also feature:
- the Beals Lecturer for 1996, Dr. Richard Bond of CITA;
- the Plaskett Medallist for 1996 (whose name is yet to be announced);
- a Presidential Address by the outgoing CASCA President, Dr. William Harris;
- an after-banquet speech by Dr. Richard Jarrell, of York University.
- Among other important events which are planned, we would draw your particular attention to the open session on "*The Future of Radio Astronomy in Canada.*"

All scientific sessions will take place in Stirling Hall, the home of the Physics Department and the Astronomy Group at Queen's University.

While all of the members of the Astronomy Group at Queen's University are actively involved, immediate questions (and especially any difficulties with the use of the Home Page) should be addressed to: *hanes@astro.queensu.ca*
Dave Hanes, OC Chair (tel 613-545-6439)
(fax 613-545-6463) or sent directly to the CASCA96 Email address:*casca96@astro.queensu.ca*

We look forward to seeing you in June!

Le programme va également mettre en vedette:
- le Conférencier Beals de 1996, Dr. Richard Bond de la CITA;
- le Médaillist Plaskett de 1996 (dont le nom est encore à être annonce);
- un discours présidentiel par le président sortant de la CASCA, Dr. William Harris;
- un discours donné par le Dr. Richard Jarrell, de l'Université York, après le banquet.
- Parmi d'autres événements importants planifiés, nous aimerons tirer votre attention à une séance ouverte "*Le futur de l'astronomie radio au Canada.*"

Toutes les séances scientifiques auront lieu à Stirling Hall ou réside le Département de Physique, ainsi que le Groupe d'Astronomie de l'Université Queen's.

Tous les membres du Groupe d'Astronomie de l'Université Queen's sont impliqués, mais les questions (surtout celles concernant des difficultés avec l'emploi de "Home Page") devraient être adressées à: *hanes@astro.queensu.ca*
Dave Hanes, OC Chair (tel 613-545-6439)
(fax 613-545-6463) ou peuvent êtres envoyées par courrier électronique à: *casca96@astro.queensu.ca*

On espère vous voir en juin!

PRELIMINARY PROGRAM

Sat 1 June

- general arrivals and registration	**14:00**
- Welcoming Reception in the University Club	**19:00**

Sun 2 June

- CASCA Board meets (morning free for other registrants; poster setup and viewing)	**08:00 - 13:00**
- McDonald "*The Sudbury Neutrino Observatory*"	**14:00**
- Balantekin "*Recent Progress in Solar and Supernova Neutrino Astrophysics*" (evening free; poster setup and viewing; possible social event T.B.D.)	**15:30**

Mon 3 June

- Plaskett Medal presentation and address	**09:00**
- Halpern invited talk (provisional)	**10:00**
- Steinhardt (title TBA)	**11:00**
- "*The Future of Canadian Radio Astronomy*"	**14:00**
- Beals Lecture (Bond; title TBA)	**16:00**
- AGM Banquet/Cruise of the Thousand Islands	**18:00**
- After-dinner address (Jarrell: "*Astronomers in spite of themselves: the origins of Canadian radio astronomy, 1946-1960*"	**19:30**

Tues 4 June

- Freeman "*Dark matter in the Galaxy; news from MACHO*"	**09:00**
- Harris Presidential address "*Islands in the Stream: How to Understand Your Subject in Five Easy Lessons*"	**11:00**
- CASCA Annual General Meeting	**14:00**
- CITA AGM (first 30 minutes open to all)	**16:00**
- Gemini, NSERC, JSSA presentations	**17:00**
- Education Session	**18:30**
- Dickinson public lecture (title TBA)	**20:00**

Wed 5 June

- Ellis "*HST Studies of Distant Galaxies*"	**09:00**
- Cesarsky "*First results from ISOCAM, the Camera of the Infrared Space Observatory*"	**11:00**
- AGM ends	**12:30**

PROGRAMME PRÉLIMINAIRE

le samedi 1er juin:

- arrivée et inscription	
- accueil dans l'Université Club	

le dimanche 2 juin:

- rencontre des directeurs de la CASCA (l'avant midi est libre pour les autres inscrits; installation et visionnement d'affiches)	
- McDonald "*L'observatoire neutrino a Sudbury*"	
- Balantekin "*Progrès récent dans l'astrophysique solaire et neutrino supernova*" (la soirée est libre; installation et visionnement d'affiches; événement social possible, à être déterminé)	

le lundi 3 juin:

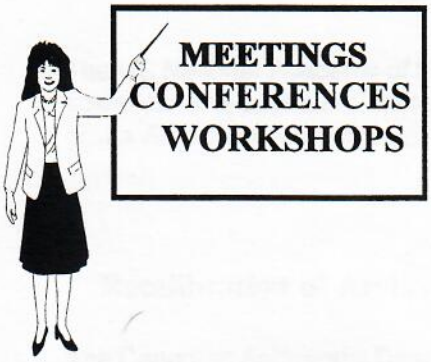
- présentation de la médaille Plaskett et discours	
- Halpern - discussion invité (provisoirement)	
- Steinhardt (titre à être annonce)	
- "*Le futur de l'astronomie radio canadienne*"	
- Conférencier Beals (Bond; titre à être annonce)	
- Banquet/ croisière AGA dans les Mille Iles	
- Après le souper, discours (Jarrell: "*Les astronomes en dépit d'eux-memes: les origines de l'astronomie radio canadienne, 1946-1960*")	

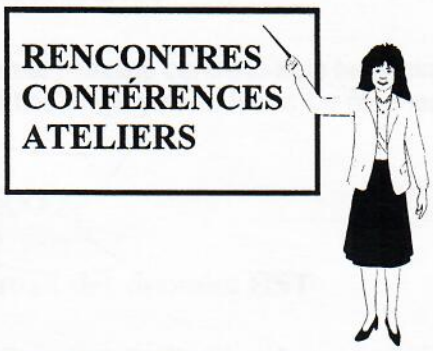
le mardi 4 juin:

- Freeman "*La matière noire dans la galaxie; nouvelles de MACHO*"	
- Discours présidentiel Harris "*Iles dans le courant: comment comprendre son sujet en cinq leçons faciles*"	
- Assemblée générale annuelle de la CASCA	
- CITA AGA (ouvert à tous pour les premières 30 minutes)	
- Présentations Gemini, NSERC, JSSA	
- Séance pédagogique	
- Conférence publique Dickinson (titre à être annonce)	

le mercredi 5 juin:

- Ellis "*Études HST de galaxies lointaines*"	
- Cesarsky "*Premiers résultats de ISOCAM, la camera de l'Observatoire Infrarouge Spatial*	
- fermeture de l'AGA	





CASCA 1996 - New Windows on the Universe
1 - 4 June 1996, Queen's University, Kingston, Ont.
Hanes@bill.phy.queensu.ca
(David Hanes)
http://astro.queensu.ca/casca96/

188th Meeting of AAS
9 - 13 June 1996, Madison, WI
bless@sal.wisc.edu
(Bob Bless)
http://www.ferberts.com/aas188/oirform.html

Cosmology: The Big Picture
7-10 August 1996, Iqaluit, NWT
baffin@theory5.phys.cwru.edu
(Glenn Starkman)

IAU 7th Asian-Pacific Regional Meeting
19 - 23 August 1996, Pusan, Korea
iauap@astrophys.es.pusan.ac.kr
(Hyung Mok Lee)

2nd Naramata Summer School
The Interstellar Medium
26 - 30 August 1996, Naramata, BC
agray@drao.nrc.ca
(Andrew Gray)

12th "Kingston Meeting" - Computational Astrophysics
17 - 19 October 1996, Halifax, NS
dclarke@ap.stmarys.ca
(David Clarke)
http://apwww.stmarys.ca/kingston/

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NEW CASCA HOMEPAGE

As promised in the last issue, the *all new* CASCA homepage is up and running. Try it at:
http://www.astro.umontreal.ca/~casca/

CASSIOPEIA remains at:
http://bear.ras.ucalgary.ca/CASCA/v96/index.html

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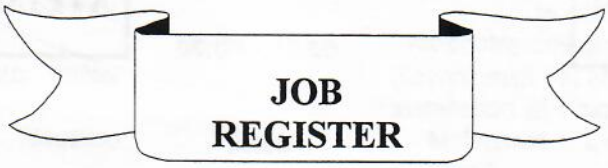

NOTICE OF OPPORTUNITY

Contract Position

A position is available immediately for work at the Military College Observatory, in Kingston, Ontario, to bring the facility to an operational standard. The main instrument is a 25" reflecting telescope, and the estimated time of completion of the contract is six months. Specific areas of attention include:

a. servicing of the drive system on the steerable axes of the telescope;
b. servicing of the drive system on the secondary mirror, to focus the telescope;
c. installation of optical instruments (CCD camera, spectrometer, photometer), including the design of a mounting system for these instruments and the provision of assistance to technicians in machining the necessary parts;
d. installation of a guiding telescope (with CCD camera), and development of a "real time" computer interface for the output images to facilitate tracking from the observing station below the observatory;
e. development of a data acquisition system (software) to control the telescope's optical devices, and store the data obtained from those devices.

Applicants MUST possess a sound knowledge of motor operated systems, and skills in drafting, computer programming, and interfacing of mechanical devices. Applicants must also be competent to work independently toward clearly defined goals. Preference will be given to applicants who have experience with optical and electronic devices.

Send Applications to:

Captain Harold Kenny
Physics, RMC
Kingston, ON
K7K 5L0
(613) 541-6000 ext 6042
fax (613) 541-6040
kenny-h@rmc.ca

NAS On-line Career Planning Information

The US National Academy of Sciences has opened a new on-line career planning centre to help beginning scientists and engineers make career and education decisions and find employment. It can be reached, or, as Americans say, accessed, at: **http://www2.nas.edu/cpc**

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Recalibration of Archival HST Data

The Canadian Astronomy Data Centre (CADC) is pleased to announce the availability of on-the-fly recalibration of archival data from the Hubble Space Telescope. This approach provides archival researchers with HST data which has been recalibrated using the latest software and the currently recommended calibration files.

Data which resides in the 'static' archive includes both raw data and data calibrated at the time of the observation. Until now, researchers requesting calibrated data from the archive received this 'static' data. This new service uses the raw data, calibration files based upon information from the Calibration Database maintained by STScI on the recommended calibration files and the latest calibration software available in STSDAS to produce freshly recalibrated data. This service automates the process that an archival researcher would follow if they wished to recalibrate the data in the archive for themselves.

Access to recalibrated HST data is via a World Wide Web interface developed jointly by the CADC and the Space Telescope Coordinating Facility. This interface lets you search for data by object, instrument, etc., allows you to have a 'preview' look at the data and to monitor the progress of your request as it is processed. Data can be retrieved by ftp or sent on DAT or Exabyte.

Access to the Hubble archive can be found via the CADC homepage: *http://cadcwww.dao.nrc.ca/*

Recalibration des données HST

Le Centre Canadien de Données Astronomiques est heureux d'annoncer qu'il est maintenant possible de demander la recalibration des données HST à partir du système de récupération mis en place par le CCDA Ceci permet d'obtenir des données qui auront été recalibrées avec les versions les plus récentes des logiciels et des fichiers de calibration.

Jusqu'à maintenant, les chercheurs n'avaient accès qu'aux données qui avaient été calibrées par le STScI lors de leur acquisition. Ce nouveau service utilise les données brutes, les fichiers de calibration provenant de la base de donnée maintenue par le STScI et la dernière version disponible des logiciels de calibration (STSDAS) pour produire les nouveaux fichiers calibrés.

L'accès à ce nouveau service se fait via l'interface WWW du CADC qui a été développée conjointement avec le ST-ECF. La sélection des observations s'effectue en sélectionnant les critères de recherche qui correspont à vos besoins. Il est également possible de visualiser les observations avant d'en faire la demande. Les données recalibrées peuvent être distribuées via l'Internet ou via rubans magnétiques.

L'accès aux services du CCDA se fait via *http://cadcwww.dao.nrc.ca/*

Dennis Crabtree *crabtree@dao.nrc.ca*

APJ LETTERS NOW AVAILABLE ON WORLD WIDE WEB

Astronomers get a peek at what the future holds as North America's premier astrophysics journal goes on line. The American Astronomical Society and the University of Chicago Press, with funding from the National Science Foundation, have created the first on-line journal for reporting astronomical research results. The electronic version of the Letters section of the Astrophysical Journal (EapJL) is available on the World Wide Web, complete with the figures, line drawings, tables of numbers and complex mathematical symbols which appear in the paper version. The EApJL can be found on the WWW at:

http://www.aas.org/ApJ/.

Access to the journal will be free to all readers until 1997.

Bringing out an electronic version of the Astrophysical Journal Letters is the first step in the conversion to electronic form of all the research journals published by the American Astronomical Society. Meanwhile the Society has no plans to discontinue the corresponding conventional paper versions. The electronic version will be available one month before the corresponding paper copies.

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le 25 mars 1996

Dear CASCA Members / Chers Membres de CASCA:

Tel que stipulé à la section 5.9 des règlements de la constitution: "... Le comité de Nomination fera parvenir cette liste au Secrétaire de façon à ce qu'il ait suffisamment de temps pour la transmettre aux membres et cela, au moins soixante jours avant l'Assemblée Annuelle. Le Secrétaire profitera de cette occasion pour inviter les membres à proposer un ou des candidats. Il rappellera, par la même occasion, que toute candidature doit être appuyé par écrit et par au moins cinq membres titulaires ou membres étudiants. Toute mise en candidature reçue (par le Secrétaire) quarante jours avant l'Assemblée annuelle doit être rajoutée à la liste électorale..."

As stated in Section 5.9 of the Bylaws of the Constitution, "...The Nominating Committee shall give this list to the Secretary in time for him to transmit it to the membership not less than 60 days before the Annual Meeting. ...the Secretary shall invite additional nominations that must be supported in writing by at least 5 Ordinary or Student members. Any such nominations received (by the Secretary) more than 40 days before the meeting must be added to the ballot sheet,...".

The Nominating Committee has put forward the following slate of Officers of the Board:

Voici la liste de candidats proposes par le comité de Nomination:

President: John Landstreet

John Landstreet is a professor in the Department of Astronomy at the University of Western Ontario. He did his Ph. D. at Columbia University under Lo Woltjer in the mid-1960's, and after a few years of postdoctoral study and teaching, came to Canada in 1970. He has been at Western ever since except for sabbatical leaves in Heidelberg and Toulouse, and is currently chairman of the Astronomy Department. He is also Chairman of the Board of Directors of the CFHT, President of Commission 25 (Stellar Photometry and Polarimetry) of the IAU, and First Vice-President of CASCA.

His research interests at first focussed on study of magnetic fields in white dwarf stars. More recently he has worked on a variety of problems concerning the atmosphere and envelope physics of main-sequence A and B stars, particularly the magnetic ones.

First Vice-President: Michael M. De Robertis

Michael De Robertis is an associate professor in the Department of Physics and Astronomy at York University. He obtained his BSc from the University of Toronto, his MSc from Queen's University and his PhD in 1983 from the University of Victoria. He worked as a Postdoctoral Fellow at Lick Observatory and the University of California at Santa Cruz until 1985, at which time he took up a University Research Fellowship at York University. He was hired by York University as an assistant professor in 1988.

His research interests are primarily related to the origins and manifestations of activity in galactic nuclei--Seyfert Galaxies in particular--using spectroscopic and imaging techniques in the optical and near infra-red.

Second Vice-President: Russel Taylor

Russ Taylor obtained his Ph.D. from the University of British Columbia in 1982. After postdoctoral positions at the University of Toronto, the University of Groningen and Jodrell Bank, he joined the faculty of the Department of Physics and Astronomy at the University of Calgary. His research interests focus primarily on energetic phenomena associated with stars, stellar mass loss, and the interaction of stars with the interstellar medium; primarily carried out via observational studies at radio, millimeter and infrared wavelengths.

Over the last few years he has served on several advisory bodies, including the Herzberg Institute Advisory Board, the Joint Subcommittee for Space Astronomy, the National Radio Astronomy Observatory Users' Committee. He was a member of the CASCA board of directors from 1991 to 1994 and is currently completing his term as chairman of the CASCA Radio Astronomy Committee. He is very enthusiastic about establishing an exciting direction for the future of radio astronomy in Canada and is a member of the NRC Planning Committee for a next-generation National Radio Astronomy Facility.

In collaboration with a number of Canadian and international astronomers he has helped organize a multi-wavelength high-resolution Galactic interstellar medium imaging project that will make almost exclusive use of the Dominion Radio Astrophysical Observatory for the next several years.

Directors (two to be elected)

Peter Bergbusch

Peter Bergbusch has been employed as a Laboratory Instructor in the Department of Physics at the University of Regina since 1974. He obtained his PhD from the University of Victoria in 1992.

His research interests have included photometric studies of globular cluster stars and old open clusters, and the development of accurate isochrones and model luminosity functions.

John Hutchings

John Hutchings is a Principal Research Officer of the NRC of Canada. He has worked at the Dominion Astrophysical Observatory since graduating from the University of Cambridge in 1967.

His research interests include QSOs and AGN, high redshift galaxies, star-formation in galaxies, interstellar extinction, massive stars, and X-ray sources. He has worked with large optical telescopes, X-ray and UV space facilities, and radio telescopes.

He is a member of the HST GHRS and STIS instrument teams, and is the Canadian FUSE project scientist. He has served on NASA, CSA, NOAO, and ESA committees, and is in a term on the CFHT SAC/CTAC.

Judith Irwin

Judith Irwin is assistant professor in the Department of Physics at Queen's University in Kingston. She obtained her Ph.D. from the University of Toronto in 1988, after which she spent three years as a research associate with the JCMT group at NRC in Ottawa. She has been at Queen's since 1991.

Her research interests include nuclear and disk-halo outflows from galaxies as well as cooling flows. This has involved observations of CO, HI, radio continuum emission, and H-alpha emission, using single dishes and interferometers. She is also involved in the DRAO Galactic Plane Survey.

Jaymie Matthews

Jaymie Matthews is an Assistant Professor in the Department of Physics and Astronomy at the University of British Columbia. He obtained his Ph.D. at the University of Western Ontario in 1987. Afterwards, Jaymie held NSERC and Killam Postdoctoral Fellowships at UBC, served as an attache de recherche at Université de Montréal, and returned to UBC to take up his current position in 1992.

His research interests centre on stellar pulsation and asteroseismology, ranging from the rapid nonradial oscillations of magnetic peculiar stars to surface brightness analyses of Cepheids. His studies also include variability of Wolf-Rayet and T Tauri stars, as well as magnetic white dwarfs. Jaymie also takes a keen interest in astronomy education and public outreach (e.g., development of a computer-based astronomy lab for a first-year course at UBC).

Serge Demers, Secretary/Secrétaire

MEMBERSHIP IN CITA, INC.

The Canadian Institute for Theoretical Astrophysics is a national institute that is hosted by-rather than a part of-the University of Toronto. To help maintain CITA's distinct national character, CITA has been incorporated as the Canadian Institute for Theoretical Astrophysics-Institut canadien d'astrophysique théorique.

An important part of the structure of CITA, Inc. is its members. In particular, the members elect four of the seven members of the CITA Council; the four elected Council members must be members of CITA, Inc.; and any changes in the by-laws of CITA, Inc. must be approved by the members. In addition, the membership list is the basis for mailing our newsletter and for announcements of CITA programs, postdoctoral fellowships, etc. We also hope that the CITA membership will be broadly representative of the community of theoretical astrophysicists in Canada, in much the same way that the CAS represents the community of astronomers.

Conditions for membership are: (1) members must hold a doctorate awarded by a recognized university for work related to astronomy or astrophysics, or else have equivalent experience, and their research should have a major component in the broad field of theoretical astrophysics; (2) members must be professionally engaged at a university or research laboratory and be eligible to hold an NSERC operating grant, or else be engaged in equivalent positions in Canadian Government Research Laboratories, or be a Canadian citizen working abroad in an equivalent position; (3) members must be members in good standing of the CAS.

There are no dues. However, we encourage donations by the members of CITA, Inc. or other persons wishing to support theoretical astrophysics in Canada. CITA, Inc. has charitable status with Revenue Canada so that all contributions are tax-deductible.
Membership is for five years. The current membership list, along with the expiry dates, is given overleaf.

COMMENT DEVENIR MEMBRE DE L'ICAT INC.

Le but de l'Institut canadien d'astrophysique théorique, c'est de servir d'institut national; pour remplir ce but l'institut est accueilli par une université "hôte", sans pour autant en faire partie. Afin de préserver son caractère national et de mieux marquer la distinction entre l'ICAT et l'université qui le recoit, l'ICAT s'est constitué en une société portant le nom d'Institut canadien d'astrophysique théorique--Canadian Institute for Theoretical Astrophysics.

La structure de l'ICAT inc. s'appuie fortement sur ses membres. En particulier, ceux-ci élisent quatre des sept membres du Conseil de l'ICAT inc; ces quatre membres élus du Conseil doivent aussi être membres de l'ICAT inc. Aucun règlement de l'ICAT inc. ne peut être modifié sans l'approbation des membres. De plus, nous utilisons notre liste de membres pour expédier notre bulletin d'information et pour annoncer les programmes, les bourses postdoctorales, etc. qu'offre l'ICAT. Nous souhaitons que les membres de l'ICAT représentent en gros l'ensemble des astrophysiciens théoriciens au Canada tout comme la SCA représente l'ensemble des astronomes.

Pour devenir membre, il faut remplir les conditions suivantes: (1) détenir un doctorat, décerné par une université reconnue, dans le domaine de l'astronomie ou de l'astrophysique, ou avoir acquis une expérience équivalente au moyen de travaux de recherche qui relèvent largement de l'astrophysique théorique; (2) être employé à titre professionnel d'une université ou d'un laboratoire de recherche et être admissible aux subventions pour dépenses courantes du CRSNG, ou occuper un poste équivalent dans un laboratoire de recherche du gouvernement canadien, ou être citoyen canadien occupant une position équivalente à l'étranger; (3) être membre en règle de la SCA.

Il n'y a pas de cotisation. Cependant, nous faisons appel à ceux d'entre les membres de l'ICAT, inc. et à d'autres qui veulent promouvoir l'astrophysique théorique au Canada et nous les

New members are elected at the Annual General Meeting, which is planned to occur during the CAS meeting in June. If you would like to join, please send a curriculum vitae plus a covering letter stating that you fulfil conditions (1), (2), and (3) above, to: Dr. Scott Tremaine, CITA, McLennan Labs, University of Toronto, 60 St. George St., Toronto M5S 3H8, Ontario.

If you would like to withdraw from membership, please send me a written notice of resignation.

We hope that all eligible CAS members with an interest in theoretical astrophysics will continue to join so that the input from our membership remains as broadly-based and representative as possible.

Scott Tremaine, Director
CITA Phone: (416)978-6477
McLennan Labs FAX: (416)978-3921
University of Toronto
E-mail: *tremaine@cita.utoronto.ca*
60 St. George St.
Toronto M5S 3H8
Canada
March 2, 1996

encourageons fortement à nous faire un don. Précisons que Revenu Canada a reconnu l'ICAT inc. comme organisme de charité, si bien que tous les dons sont déductibles d'impôt.

On devient membre pour cinq ans. La liste des membres actuels, aussi bien que la date à laquelle leur engagement se termine, se trouve ci-dessous.

Les nouveaux membres sont élus à l'Assemblée générale annuelle de la SCA en juin. Si vous désirez adhérer à l'ICAT, veuillez envoyer votre curriculum vitae accompagné d'une lettre affirmant que vous remplissez les conditions (1), (2) et (3) ci-dessus, au Dr. Scott Tremaine, CITA, McLennan Labs, University of Toronto, 60 St. George St., Toronto, Ont. M5S 3H8.

Si vous désirez démissionner comme membre, veuillez m'en aviser par écrit.

Nous souhaitons que tous les membres de la SCA qui sont admissibles et qui s'intéressent à l'astrophysique théorique se joignent à l'ICAT, pour que la contribution de nos membres reste aussi diversifiée et représentative que possible.

Scott Tremaine, directeur
le 2 mars 1996

MEMBERSHIP OF CITA, INC.

Dates given by each name are year of expiry of membership

M. Alexander (NRC) 2000
J. Auman (UBC) 1996
A. Babul (New York University) 2000
P. Bastien (Montréal) 1999
R. Bond (CITA) 1996
E. Borra (Laval) 1996
R. Carlberg (Toronto) 1996
W. Chau (Queen's) 1996
D. Clarke (St. Mary's) 1999
M. Clement (Toronto) 1996
M. Clutton-Brock (Manitoba) 1996
A. Coley (Dalhousie) 2000
F. Cooperstock (Victoria) 1999
H. Couchman (Western Ontario) 2000
M. Duncan (Queen's) 2000
C. Dyer (Toronto) 1996
G. Fahlman (UBC) 2000
P. Feldman (HIA) 1996
M. Fich (Waterloo) 1998
G. Fontaine (Montréal) 1997
T. Gaetz (CfA, Cambridge) 2000
E. Glass (Windsor) 2000
J. Griffith (Lakehead) 2000
D. Hartwick (Victoria) 2000
R. Henriksen (Queen's) 2000
K. Innanen (York) 1996
W. Israel (Alberta) 2000
N. Kaiser (CITA) 1998
S. Kwok (Calgary) 2000
K. Lake (Queen's) 1996
D. Leahy (Calgary) 1996
M. Mandy (U of Northern BC) 2000
M. Marlborough (Western) 2000
P. Martin (CITA) 2000
R. McLenaghan (Waterloo) 1996
R. Mitalas (Western Ontario) 1996
G. Mitchell (St. Mary's) 2000
J. Moffat (Toronto) 1996
N. Murray (CITA) 1999
L. Nelson (Bishop's) 1996

S. Pineault (Laval) 1996
J. Poll (Victoria) 1996
R. Pudritz (McMaster) 1998
C. Rogers (DRAO) 1996
S. Sreenivasan (Calgary) 1998
G. Starkman (Case Western) 2000
J. Stone (Maryland) 1998
P. Sutherland (McMaster) 1996
S. Tremaine (CITA) 2000
D. VandenBerg (Victoria) 2000
S. van den Bergh (DAO) 1998
F. Wesemael (Montréal) 1997
M. West (St. Mary's) 2000
P. Wesson (Waterloo) 1999
L. Widrow (Queen's) 2000

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CITA ANNUAL REPORT 1995 ICAT

Canadian Institute for Theoretical Astrophysics / Institut canadien d'astrophysique théorique

The following is an abbreviated version of the 1995 CITA Annual Report. Due to space constraints, we have not included more than a very brief summary of the scientific activities at CITA in 1995. The full report is available on request from *citadmin@cita.utoronto.ca* or on the web at *http://www.cita.utoronto.ca*.

Foreword

The Canadian Institute for Theoretical Astrophysics is a nationally supported research centre for studies in theoretical astronomy and related subjects, hosted by the University of Toronto and receiving research support from an NSERC collaborative special project grant as well as the Canadian Institute for Advanced Research. CITA's primary missions are to foster interaction within the Canadian theoretical astrophysics community and to serve as an international centre of excellence for theoretical studies in astrophysics. In this report, we review the main activities at CITA during 1995. This report has been prepared by Robert Malaney and Doug Johnstone.

Personnel Changes In 1995

Five new staff joined CITA in 1995: Stephane Colombi (Fermi National Accelerator Lab), Tarun Souradeep (IUCAA, India), Lloyd Knox (Univ. of Chicago), John Magorrian (Oxford University), and Douglas Johnstone (University of California, Berkeley). They joined research associate Robert Malaney, and research fellows Brian Chaboyer, Matthew Holman, Jim Chiang, Andrew Jaffe, James Murray, Dmitri Pogosyan, Kevin Rauch, Derek Richardson, Jihad Touma, and John Tsai.

A number of our research fellows left during the past year. Arnold Boothroyd took up a Postdoctoral Fellowship at Monash University, Janna Levin took up a Postdoctoral Fellowship at U.C. Berkeley, Izumi Murakami took up a Postdoctoral Fellowship at the National Institute for Fusion Science, Japan, Robert Nelson took up a GRO Fellowship at Caltech, Christophe Pichon took up a Postdoctoral Fellowship at University of Basel, Seshadri Sridhar took up an Assistant Professor position at IUCAA, Pune, David Syer took up a Postdoctoral Fellowship at the Max Planck Institut in Munich, and Christopher Thompson took up an Assistant Professor position at the University of North Carolina.

Faculty and research fellows have been involved in the supervision of several students from the University of Toronto: S.-H. Kim, J. Wadsley and P. Wiegert from Astronomy, and Y. Lithwick and G. Squires from Physics. Two undergraduates, D. Charbonneau from Toronto, and G. Young from Harvard also conducted research at CITA during 1995. Jerry Sellwood from Rutgers University spent a 6-month sabbatical at CITA from January to June 1995.

The research staff of CITA for the year 1995, along with their primary research interests, is listed below.
(Notes: ☞ left CITA in 1995; ☜ joined CITA in 1995.)

CITA Faculty

★ J.R. Bond, Professor (Ph.D. Caltech 1979) - *Cosmology: Very Early Universe, Evolution of Cosmic Structure, Dark Matter, Cosmic Background Radiation, Particle Theory*

★ N. Kaiser, Professor (Ph.D. Cambridge, 1982) - *Cosmology, Early Universe, Large Scale Structure, Galaxy Formation, Galaxy Clusters, Gravitational Lensing*

★ P.G. Martin, Professor (Ph.D. Cambridge 1972) - *Interstellar Matter, Dust, Interstellar Polarization, H_2, HII Regions, Chemical Abundances, Infrared Cirrus, Galactic Plane Survey*

★N.W.Murray, Assistant Professor (Ph.D. UC Berkeley 1986) - *Active Galactic Nuclei, Cataclysmic Variables, Solar System Dynamics, Helioseismology*

★S. Tremaine, Professor and Director (Ph.D. Princeton 1975) - *Stellar Dynamics, Galactic Structure, Solar System Formation and Dynamics, Comets*

Research Associates 1995

★A.I. Boothroyd ☞ (Ph.D. Caltech 1987) - *Collisional Dissociation of H_2; Stellar Evolution: Lithium, Carbon Stars, Surface Abundances, Mass Loss, Solar Models and Neutrinos*

★ R.A. Malaney (Ph.D. St. Andrews 1986) - *Nuclear-Neutrino Astrophysics and Cosmology*

★ C. Thompson ☞ (Ph.D. Princeton 1988) - *Pulsars, Plasma Physics, Supernovae, Astrophysical Dynamos, Gamma Ray Bursts, Large Scale Structure, Microwave Background Radiation*

Postdoctoral Fellows 1995

★B.C. Chaboyer (Ph.D. Yale 1993) - *Stellar Evolution: Globular Cluster Ages, Solar Neutrinos, Primordial Li Abundance; Galaxy Formation*

★ J. Chiang (Ph.D. Stanford 1993) - *High Energy Emission from Compact Objects: Pulsars, Active Galactic Nuclei; Broad Absorption Line QSOs*

★S. Colombi ☜ (Ph.D. I.A.P., Paris 1993) - *Cosmology, Large-scale Structure, Statistics, N-body Simulations, Perturbation Theory*

★A. Jaffe (Ph.D. Chicago 1994) - *Cosmology, Large-scale Structure, Statistics, Particle Astrophysics*

★ M.J. Holman, (Ph.D. MIT 1994) - *Nonlinear Hamiltonian Dynamics, Solar System Dynamics, Asteroids, Comets*

★ J. Levin ☞ (Ph.D. M.I.T. 1993) - *Early Universe, Cosmology, Gravitation*

★L. Knox ☜ (Ph.D. Chicago 1995) - *Cosmology, Early Universe, Microwave Background Radiation*

★S.J. Magorrian ☜ (D.Phil. Oxford 1995) - *Galactic and Stellar Dynamics*

★I. Murakami ☞ (Ph.D. Tokyo 1992) - *QSO Absorption Systems, Intergalactic Medium, Cluster of Galaxies*

★J.R. Murray (Ph.D. Monash 1994) - *Particle Methods for Astrophysical Hydrodynamics, Accretion Disks, Cataclysmic Variables*

★ R.W. Nelson ☞ (Ph.D. Cornell 1991) - *Compact Objects, X-ray Binaries, Plasma and Radiative Processes in Strong Magnetic Fields, Galactic Dynamics*

★ C. Pichon ☞ (Ph.D. Cambridge 1994) - *Galactic Dynamics, Disk Stability, Relativity, Gravitation*

★ D.Yu.Pogosyan (Ph.D. Tartu 1990) - *Cosmology, Large-scale Structure, Microwave Background Radiation*

★ K.P. Rauch (Ph.D. Caltech 1995) - *Gravitational Lensing, Active Galactic Nuclei, Relativistic Astrophysics*

★ D.C. Richardson (Ph.D. Cambridge 1993) - *Solar System Formation and Dynamics, Planetary Rings, Fractal Aggregates, Tree Codes*

★T. Souradeep ☜ (Ph.D. IUCAA 1995) - *Cosmology, Large-scale Structure, Microwave Background Radiation, Early Universe*

★S. Sridhar ☞ (Ph.D. Indian Institute of Science 1990) - *Galactic Dynamics, Interstellar Turbulence*

★ D. Syer ☞ (Ph.D. Cambridge 1993) - *Stellar Dynamics, Dynamics of Accretion*

★ J.R. Touma (Ph.D. MIT 1993) - *Solar System Dynamics, Galactic Dynamics*

★ J.C. Tsai (Ph.D. MIT 1992) - *Clusters of Galaxies, Dust in Elliptical Galaxies, Star Formation*

Although the bulk of the support for CITA's research staff comes from our NSERC Collaborative Special Program grant and from research grants to individual faculty members, support also came from NSERC Postdoctoral Fellowships (Chaboyer, Richardson), an NSERC International Fellowship (Murakami), and a NATO SERC Fellowship (Syer).

National Fellows 1995

A program started in 1988 solicits nominations from universities across Canada for "CITA National Fellows". These are research fellows who are jointly supported by CITA and the nominating university; although they work primarily at the nominating university, visits to CITA and collaboration with CITA staff are encouraged. CITA Council awards these fellowships using the same selection criteria as those for CITA research fellowships. The National Fellows in 1995 were:

★ M-H. Lee (Ph.D. Princeton 1991), held at Queen's University (1995-1997).
★ D. McManus (Ph.D. University of Alberta 1991), held at Dalhousie University (1994-1995)
★ D. Salopek (Ph.D. University of Toronto 1989), held at University of Alberta (1993-1995)
★ X. Shi (Ph.D. University of Chicago 1994), held at Queen's University (1994-1996)

CIAR and CITA

The Canadian Institute for Advanced Research (CIAR) supports a number of Programs chosen for their high intellectual promise and interdisciplinary character. The CIAR Cosmology Program has nodes at UBC (Director and Fellow Bill Unruh, Fellow Ian Affleck), at the University of Alberta (Fellows Valery Frolov, Werner Israel and Don Page) and at CITA, where Dick Bond and Nick Kaiser are CIAR Fellows. The intellectual interaction between CIAR Fellows and other CITA visitors and researchers, and the administrative cooperation between CITA and CIAR in attracting excellent cosmologists, continues to make Toronto and Canada a lively place for research in theoretical cosmology.

Facilities

CITA occupies the 12th floor of the McLennan Physical Laboratories at the downtown campus of the University of Toronto.

CITA's primary computer servers are Digital Alpha AXP systems. A 64 Mb 3000/400S and a 256 Mb 3000/500S were the first two acquired (1993). CITA and CITA grantholders also own a 50% share in a pair of AlphaServer 2100 4/200 systems (four CPUs each; 256 Mb in one system, 1024 Mb in the other), acquired in late 1994. One of the 4/200 servers will be upgraded to a 5/250 early in 1996, approximately doubling its computational power for most applications.

The computer servers are supplemented with a network of four AXP workstations, eleven Silicon Graphics Indigos and Personal IRISes, eight Sun SPARCstations, and approximately a dozen X terminals. The SGI systems are used for research activity demanding 3-D scientific visualization. The disk capacity available to the network currently exceeds 65Gb.

Several Sun-3/50 workstations are still in service, now used primarily by short-term visitors and by students. We are planning to phase out our remaining Sun3s over the next year or two, replacing them with X terminals and/or more powerful workstations.

Recent acquisitions include a Tektronix dye-sublimation colour printer, for producing high-quality colour prints and transparencies.

All CITA offices are being provided with fibre-optic and category-5 copper cabling, to provide a framework for higher-bandwidth network connections. A switched 10Base-T ethernet hub will be in place later this year, replacing our old thinwire network.

CITA Council

CITA is both an Institute within the School of Graduate Studies of the University of Toronto, and a non-profit corporation (CITA, Inc.). Relations between the two CITAs are governed by a Letter of Agreement between CITA Inc. and the University of Toronto that was signed in 1989. The CITA Council consists of seven members, five selected from the CITA Inc. membership of over 50 researchers in co-operation with the Canadian Astronomical Society (of which they must also be members), and two *ex officio*: the Director of CITA and the Dean of the School of Graduate Studies of the University of Toronto or his designate.
Members of CITA Council for the second half of 1995 were:
★ Pierre Bastien, Université de Montréal
★ John Britton (Vice-Dean, School of Graduate Studies, University of Toronto)
★ Hugh Couchman, University of Western Ontario
★ Dave Hartwick, University of Victoria
★ Richard Henriksen, Queen's University, Chair
★ George Mitchell, St. Mary's University
★ Scott Tremaine, CITA Director

Conferences Supported by CITA

CITA supports scientific workshops and meetings in Canada on subjects of interest to theoretical astrophysics. Meetings supported by CITA in 1995 were:
★ Sixth Canadian Conference on General and Relativistic Astrophysics, May 25-27 1995, University of New Brunswick (organizers: C. Dyer, J. Gegenberg, D. Hobill, G. Kunstatter, R. Mclenaghan)

Scientific Accomplishments 1995

Research at CITA covers a broad range of fields in astrophysical theory. Here, we give a brief overview of the research activities in 1995.

Research in cosmology included such topics as large scale structure, the early universe, and gravitational lensing. Dick **Bond** and Simon White organized a workshop at the Institute for Theoretical Physics on

"Cosmic Background Radiations and Galaxy Formation" partly as an effort to produce an accurate database of angular power spectra covering all of theoretical parameter space; a needed resource for the CMB community. Other CMB work included computations of angular anisotropies in models with light massive neutrinos, techniques for relating inflation-inspired cosmological models to observational parameters such as COBE DMR normalizations and σ_8, collaboration on a balloon-borne one-degree angular scale CMB anisotropy determination and a study of the prospects for observing CMB anisotropy with interferometric techniques. Studies of large scale structure dealt with the emergence of vorticity in cosmic flows, the morphologies of galaxy clusters, universe topologies consistent with COBE observations, the presence of filamentary structures (cosmic webs) in the galaxy distribution on large scales, simulations of Lyman alpha clouds using smooth particle hydrodynamics, cluster structure in Cold+Hot Dark Matter models with one to three massive neutrino components, and a consideration of measurement errors in cell extractions from galaxy surveys. Research on gravitational lensing included an algorithm for non-linear cluster lens reconstruction from the distortion of faint background galaxies, development of a cluster surface density estimator using weak distortions and applications of weak lensing models to the clusters A2218, A2390, and A2163. Finally, weak lensing was detected by Nick **Kaiser** and Gerry Luppion (Hawaii) in front of the cluster MS1054 at $z = 0.84$.

CITA members also worked on galaxies, the intergalactic medium, and active galactic nuclei. Examples of research include the effect of the intergalactic medium's pressure on the evolution of dwarf galaxies, the chemical enrichment of Lyman α clouds at high redshift, high energy emission from active galactic nuclei, and collaboration as part of the EGRET science team on determining the contribution to the diffuse extragalactic background by emission from gamma-ray blazars. Norm **Murray** has collaborated on a radiatively driven disk wind model for the broad absorption line signatures for QSOs, including implications for Seyfert galaxies, radio loud quasars and radio quiet quasars. Other research focused on the ionization structure of disks illuminated from a central source using CLOUDY, and utilized the redshift evolution of the neutral hydrogen density to calculate the evolution of star formation rates and elemental abundances in the universe.

Several CITA members have worked on the interstellar medium, studying the properties of grains and their observational signatures, the rate coefficients for collisions between H_2 and H and between two H_2 molecules, the potential energy surfaces of H_3 and He-H_2, the N/O abundance ratio within the Orion Nebula, and the evolution and infrared emission of dust in normal large elliptical galaxies. Peter **Martin** was part of an international consortium (PI Russ Taylor, Calgary) which was awarded an NSERC CSP grant to facilitate data reduction and science analysis of the DRAO Galactic Plane survey in HI and radio continuum at 1 arc minute resolution. The mosaiced images, combined with infrared data from IPAC, CO data from FCRAO, and radio continuum observations from MRAO will provide a large-scale yet detailed picture of the galactic disk.

Several CITA members worked in the fields of galactic and stellar dynamics. This work included the derivation of an algorithm for numerically implementing linear stability analysis on *any* round galactic disk, an inversion technique for the recovery of the underlying distribution function for observed galactic disks, and the consideration of resonance as a mechanism by which stars in the thick disk acquire their large vertical velocity dispersion and scale height. Also, linear instability in galaxy models, bending modes in galactic disks, mechanisms for galactic warps and the angular momentum relaxation rate in nearly Keplerian clusters were investigated. Scott **Tremaine**, as part of a large HST collaboration explored the implications of a high-resolution photometric survey of the centres of 60 elliptical galaxies and spiral bulges revealing two classes, "resolved-core" and "power-law" galaxies. This collaboration also obtained high-resolution spectroscopy of the centre of the galaxy NGC 3115 using CFHT and HST, confirming that a $10^9 M_\odot$ dark object exists at its centre. N-body simulations of the interaction of a galactic disk with a responsive dark matter halo have probed the conditions necessary for disk warps.

An SPH code has been used to investigate accretion disk outburst phenomena in cataclysmic variables, in particular the periodic "superhump" phenomena peculiar to SU Uma stars. Also, protostellar collapse models including the preheating effects of accretion luminosity have been examined. Other projects have investigated FU Orionis outbursts, non-linear Alfven wave turbulence in dense relativistic, magnetized plasma, emission from neutron stars with strong internal magnetic fields, and

γ-ray emission from ultraluminous relativistic MHD winds. Stellar physics and nucleosynthesis research included the study of mixing below the base of the convective envelopes in low-mass RGB and AGB stars, a demonstration that ^{7}Li can be created via cool bottom processing in low mass red giant stars, and a study of the structure of the Sun using helioseismic data. Detailed study of globular cluster ages using stellar evolution codes produced a probability distribution for the mean age of the oldest globular clusters with a best estimate of 14.6 ± 1.7 Gyrs.

CITA researchers have also been active in studies of solar system formation, evolution, and dynamics. Work in this field has included an examination of the breakup of comet Shoemaker-Levy 9, an investigation into the phenomenon of inelastic collapse in granular media, and possible evolutionary scenarios for the extra-solar planetary systems discovered around 51 Pegasus, 47 Ursa Majoris, and 70 Virginis. Other studies include an investigation into chaos at high order mean motion resonances in the outer asteroid belt, and a numerical investigation of allowed configurations of spinning, self-gravitating, viscous fluids. Scott **Tremaine** has continued to study the long-term evolution of the solar system, collaborating with Jihad **Touma** on an efficient numerical technique to solve the secular equations of motion to all orders in eccentricity and inclination and first order in the masses, and examining parallelization of N-body schemes in the case of small N.

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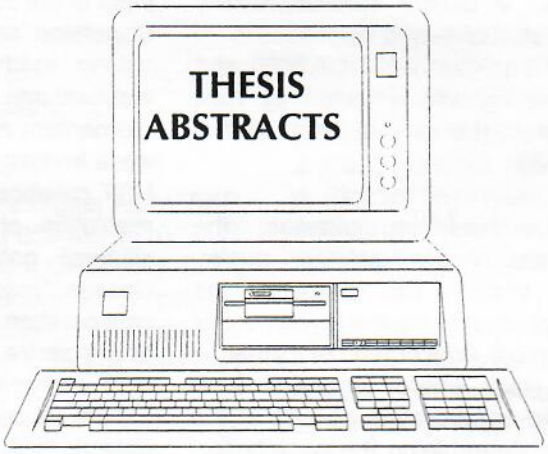

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CANADIAN ASTRONOMY PUBLICATIONS
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A. PREPRINTS OF RESEARCH PAPERS

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.

· Barrientos, L.F., Schade, D., Lopez-Cruz, O. *Luminosity evolution in cluster galaxies from Z=0.41 to Z=0.02.* DDO/U of T 5-Feb-1996

· Bond, J.R. *Implications of the background radiation for cosmic structure formation.* CITA 12-Jan-1996 · Bond, J.R., Kofman, L., Pogosyan, D. *The cosmic web: filaments as cluster-cluster bridges.* CITA 12-Jan-1996

· Boothroyd, A.I., Malaney, R.A. *Cosmological implications of 3He destruction on the red giant branch.* CITA 12-Jan-1996

· Chaboyer, B., et al *A lower limit on the age of the universe.* CITA 12-Jan-1996

· Curry, C., Pudritz, R.E. *On the global stability of magnetized accretion disks. III. Nonaxisymmetric modes.* McMaster U 6-Feb-1996

· Eales, S., Edmunds, M.G. *The implications of large dust masses at high redshifts: a first look at galactic evolution in the submillimeter waveband.* U Wales, Cardiff 13-Feb-1996

· Evans, N.R., Holberg, J.B., Polidan, R.S. *Voyager observations of the companion of the classical cepheid S Muscae.* ISTS York U 4-Jan-1996

· Irwin, J.A., Sofue, Y. *NGC 3628: the nuclear molecular disk and expanding molecular shells.* Queen's 2-Feb-1996

· Papadopoulos, P.P., Seaquist, E.R., Scoville, N.Z. *High resolution 13CO, C18O J=1-0 observations of NGC 1068, molecular gas properties and a high C18O/13CO intensity ratio.* DDO/U of T 30-Jan-1996

· Shepherd, C.W., et al *The two-point correlation function at redshift z = 1/3.* DDO/U of T 8-Jan-1996

· Sridhar, S., Touma, J. *Adiabatic evolution and capture into resonance: vertical heating of a growing stellar disc.* CITA 12-Jan-1996

· Vallee, J.P. *Magnetic field reversals in the Milky Way - "cherchez le champ magnetique".* JCMT/HIA 3-Jan-1996

· Wendker, H.J., Higgs, L.A., Landecker, T.L. *The Cygnus X region XXI: Radio emission from Cyg OB2 stars and two probable cometary HII regions.* DRAO 15-Feb-1996

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Slavek Rucinski	*http://www.astro.utoronto.ca/~rucinski/rucinski.html*
Jacques Vallée	*http://www.hia.nrc.ca/DAO/STAFF/VALLEE.html*
Michael West	*http://apwww.stmarys.ca/~west/west.html*

Educational Resources

http://scienceweb.dao.nrc.ca	A global link to science stories in Canada
http://www.skypub.com	A guide to current astronomical software; includes brief program descriptions. Nine page hard copy ($2US) from John Mosley, 7303 Enfield Ave., Reseda, CA 91335.

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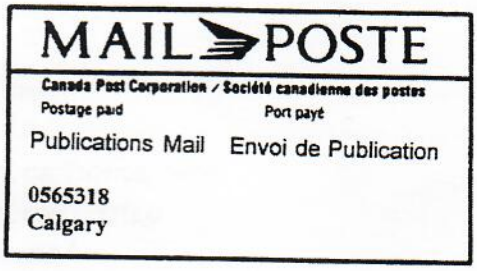

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