CASSIOPEIA

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EDITORIAL

Well, **CASCA 25** has come and gone. First of all, a well deserved word of thanks to the Local Organizing Committee for a job well done. **CASCA 25** continued the fine mix of formal meeting and informal camaraderie that has become a tradition of CASCA meetings.

I had hoped to start with a dramatic opening. Something to the effect that 25 years ago a small group of farsighted Canadian astronomers met at UVIC ..... However, on checking my records, I see that in fact the founding meeting was held from 1971 May 13-15 in Victoria so I will have to wait another two years (Queen's University, Kingston) before I can use that opening line. Instead let me confine myself to some thoughts and observations about the meeting itself. I will leave the scientific aspects to my fellow editor at St. Mary's.

Coming from a small college environment, it was interesting, but a little scary, to see that we all seem to have pretty much the same problems. First of all, administrators continue to admister unto themselves and go happily on while all around are losing theirs, funding-wise. As the funding base shrinks there is a continuing need to communicate in order not to keep re-inventing the wheel. Whether it is information about the strategy used by or against administrators or information about new and ongoing programs, I hope that all will continue to use **CASSIOPEIA** as a vehicle for just such communication. Canada's ongoing participation in the Gemini project is, I think, a good example of what can be done if we continue to keep the information flowing.

Anyway, on to the meeting itself. It started on a high note as Peter Martin, the Beals Awardee, gave an excellent demonstration that talks by award winners need not be of the "stand and deliver" variety. There was plenty of change in pace and at one stage just as I was nodding off I had to stand up and make like a vibrating H_2 molecule. Fortunately the number density of those present was such that I rapidly managed to collisionally de-excite myself back to my seat well before my 14 day lifetime was up. Peter also introduced us to the Martin Effect:- *The paper next to the one being read is more interesting.* You can see that his talk was very effective as I have made use of the Effect by including a notice about Society Dues immediately next to this editorial.

Those of us involved with the trip to the Stratford Festival on Wednesday night thought that we were part of the comic opera as two vehicles drove round in what appeared to be ever decreasing circles trying to make contact to exchange a passenger. Fortunately they managed to communicate before disappearing into the black hole. Thereafter things proceeded smoothly through a pleasant and enjoyable evening of Gilbert & Sullivan.

The Society's Annual General Meeting, which was sparsely attended with only about 50% of Conference attendees being present raised a number of important points which should be aired before the minutes are published in the AE issue.

First of all, congratulations to Scott Tremaine, who was recently elected as a Fellow of the Royal Society.

Don Morton's State of the Union address left everyone a little shell-shocked as he announced that HIA would finally be moving and/or slashing deprtments. Molecular Spectroscopy and Solar & Terrestrial Activity will be removed from HIA and all astronomy activities will be moved to BC over the next 3 years. As part of this move a decision still has to be made on whether to move JCMT HQ to Penticton or Victoria. Don looks forward to hearing your input before this decision is made (*morton@hia.nrc.ca).*

One other aspect of budget cuts became evident. There has been a big drop in both CFHT and HST applications. The consensus was that this was a consequence of there being less money to hire data reduction personnel.

In a farther effort to cut costs for the Society I will be looking at ways of distributing **CASSIOPEIA** electronically in some form or other. The first step will probably be to set up a home page at the University of Calgary. This will provide copies of **CASSIOPEIA** for browsing. At this stage I am balking at actually sending the whole issue out via e-mail as I am not sure how much of it will be read. I would welcome your input on this as well.

The BoG has asked the Education Committee to compile a database of present and former graduate students and to try to track them after they have graduated. The BoG hope that this information will be valuable in future when dealing with budgetary considerations and funding applications. The Education Committee (which means me, since I am the incoming chairman) will be in touch with contacts at each institution in the fall to follow up on this. As a farther aid in communicating what is going on across the country, and related to this, I will be willing to publish abstracts of theses in future editions of **CASSIOPEIA.** Thanks to Dave Turner for getting the ball rolling in this issue. You can send ASCII or TeX files to *jpenfold@mtroyal.ab.ca.*

Lloyd Higgs made another plea for donations to the CASCA FSU Fund. See the two items elsewhere in this issue. The other large contribution made to the meeting by Lloyd was, of course, his Presidential Address. It was a light-hearted, brief (according to Lloyd), non-technical discussion of Canada's radio astronomy heritage. A heritage of which we can be justly proud. Lloyd, trying, with the aid of Tom Landecker, to present himself in stereo, because the banquet was held in two adjoining rooms was so inspiring that Anne Underhill was heard to remark that it made her, "almost want to give up stars!" On the serious side, though, Lloyd did take the opportunity to encourage us to have really long term thinking and goals for the future of astronomy in Canada.

Once again Jaymie Matthews managed to insinuate himself into the proceedings. First of all by making a presentation on behalf of UWO grad students, past and present, to the Conference organizers (both scientific and otherwise). This was in fact a fitting end to the Banquet. The following morning we saw another example of Jaymie's versatlity, or possibly it was a consequence of the liquid refreshment he consumed during and after the Banquet. He was back as Tom Bolton to talk about *Bumps and Wiggles in OB Land.* Finally, on the Saturday morning, during the Education Session, he had us wondering how fast one had to approach a red light to turn it back to green.

I have probably gone on for long enough, so without further ado, on to more serious matters.

DUES ANNOUNCEMENT

The BoG has decided, in its infinite wisdom, to raise dues for the coming year. In an attempt to encourage members to pay dues promptly in September, thus avoiding the expense of many reminders, dues will be as follows:-

	If paid before October 1st,	*after October 1st*
Regular:	*$45*	*$55*
Students & Retirees:	*$20*	*$25*

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

Algonquin Cosmology Workshop
7 - 12 September, 1994, Algonquin Space Campus
Dark Matter and its Implications
widrow@lola.phy.queensu.ca (Larry Widrow)
(613)-545-6858; FAX:(613)-545-6463

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

ADASS '94
25-28 September, 1994, Omni Inner Harbour Hotel,
Baltimore, Maryland, USA
softconf@stsci.edu
http://ra.stsci.edu/ADASS.html

SPACE 1994
October 1-2, 1994, York University
Canadian Astronomy and Space Exploration for Everyone
space1994@eol.ists.ca
For more information, please feel free to contact Gabby Lilly at *seds_canada@mtroyal.ab.ca*

CFHT Users' Meeting
May 15 & 16, 1995, Lyons or Toulose
This will be preceeded by a workshop in Paris

CASCA 1995
May 27-31, 1995, Penticton
The Phenomena and Physics of the Interstellar Medium
rsr@drao.nrc.ca (Rob Roger)

The Science to be Done With Large Telescopes
June 1-3, 1995, UBC
usergahw@mtsg.ubc.ca (Gordon Walker)

The Origins, Evolution and Destinies of Binaries in Clusters
19 - 23 June 1995, University of Calgary
milone@acs.ucalgary.ca (Gene Milone)

JOB REGISTER

POSTDOCTORAL STUDENT

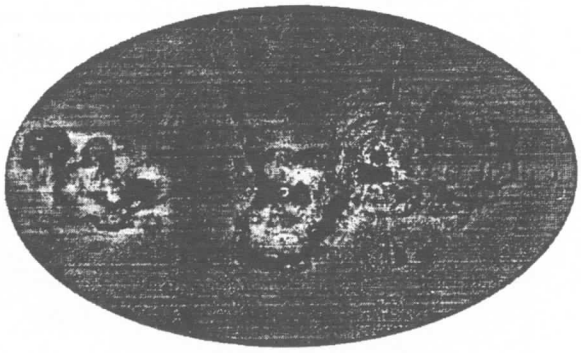
Greg Fahlman and Harvey Richer at UBC are looking for a postdoctoral student who will work with them primarily with Hubble Space Telescope data.
The HST project involves stellar photometry of Galactic globular clusters.
The successful candidate should have some familiarity with reduction techniques for CCD stellar photometry.
Starting date will be no later than 1995 January 1 and the position is for two years.
Interested persons should send a recent CV to:

Dr. H. Richer
Dept of Geophysics & Astronomy
129-2219 Main Mall
University of British Columbia
Vancouver, BC
Canada
V6T 1Z4

HERITAGE COMMITTEE OF CASCA

The Heritage Committee of CASCA is assembling a list of all publications relating to the hist ory of Canadian astronomy that have appeared during the past three years (1991-94). If any member has published items of interest (or know of someone who has), we would apprecia te it if you could provide the publication details to the Chair, Prof R.A. Jarrell, at *rjarrell@vm2. yorku.ca.* Thank you.

Radio Astronomy Visions For the 21st Century



A Workshop
Sponsored by the
National Research Council of Canada
August 3 - 6, 1994
Dominion Radio Astrophysical Observatory
Penticton, British Columbia

Invited Speakers to date:

Alain Baudry, Observatoire de Bordeaux
Francois Boulanger, Institut d'Astrophysique Spatial (Paris)
Robert Braun, Netherlands Foundation for Radio Astronomy
Harvey Butcher, Netherlands Foundation for Radio Astronomy
Walter Duley, University of Waterloo
Denise Gabuzda, University of Calgary and Astro-Space Center (Moscow)
Stephane Guilloteau, Institut de Radio Astronomie Millimetrique (Grenoble)
Carl Heiles, University of California (Berkeley)
Richard Hills, Cambridge University
Ishiguro Masato, National Astronomy Observatory (Japan)
Judith Irwin, Queen's University (Kingston)
Richard Jarrel, York University
David Naylor, University of Lethbridge
Richard Perley, National Radio Astronomy Observatory
Monique Pick, Observatoire de Paris-Meudon
Luis Rodriguez, Instituto de Astronomia (Mexico City)
Chris Rogers, Dominion Radio Astrophysical Observatory
Nicolas Scoville, California Institute of Technology
Ernest Seaquist, University of Toronto
Francois Viallefond, Observatoire de Paris-Meudon

CONTRIBUTED ORAL AND POSTER PAPERS

Ten minute oral or poster presentations in any area of radio astronomy, radio instrumentation, or related research are welcome. Oral contributions in particular should consider how your research could benefit from a future new instrument and what future instrumental capabilities are needed. Since it is especially important not to cramp the time available for open discussion, we will have to limit the number of oral presentations accordingly, probably to 2 per day.

See preliminary program overleaf.

Day 1	Day 2	Day 3	Day 4
Wed, Aug 3	Thu, Aug 4	Fri, Aug 5	Sat, Aug 6
Introductory Address, Morton			
Galaxies	**Cosmology**	**ISM (Chemistry)**	**Solar & Planetary**
Viallefond(FR)	TBD	Duley(CAN)	Pick(FR)
Irwin(CAN)	TBD	TBD	Naylor(CAN)
Cont Papers	Cont Papers	Cont Papers	Cont Papers
COFFEE	COFFEE	COFFEE	COFFEE
Panel Discussion	Panel Discussion	Panel Discussion	Panel Discussion
LUNCH	LUNCH	LUNCH	LUNCH
AGN's	**ISM - Structure & Dynamics**	**Stellar Astrophysics**	**International Prospects for Instr.**
Scoville(US)	Heiles(US)	Rodriguez(MEX)	Ishiguro(JAP)
Gabuzda(CAN)	Rogers(CAN)	Seaquist(CAN)	Braun/Butcher(NL)
Baudry(FR)	Boulanger(FR)	Guilloteau(FR)	Perley(US)
			Viallefond(FR)
Cont Papers	Cont Papers	Cont Papers	Cont Papers
COFFEE	COFFEE	COFFEE	COFFEE
PANEL DISCUSSION	PANEL DISCUSSION	PANEL DISCUSSION	TALKS
			Rodriguez(MEX)
			Hills(UK)
			Others TBD
		DRAO Tour	Conference End
		Banquet	
		Talk: Richard Jarrell	
Poster Papers All Day	Poster Papers All Day	Poster Papers All Day	Poster Papers All Day

FIRST LAKE TRAVERSE COSMOLOGY WORKSHOP

ALGONQUIN PROVINCIAL PARK, ONTARIO, CANADA

SEPTEMBER 7-12, 1994

This September, the Algonquin Space Campus (site of the Algonquin 46 meter Radio Telescope and now home to a summer science camp) will be the setting for a workshop on the general topic of dark matter and its implications. The campus is located on Lake Traverse in Algonquin Provincial Park 88 km west of Pembroke Ontario.

We are planning a number of sessions on topics including theory and observations of the cosmic microwave background, large scale structure, clusters, solar neutrinos, and dark matter candidates. "Formal" talks will be, for the most part, kept short to allow for informal interaction among the participants.

The workshop is being sponsored by the Canadian Institute for Theoretical Astrophysics, Queen's University, the Sudbury Neutrino Observatory, and the Canadian Institute for Advanced Research.

The Algonquin Space Campus is located in the northern section of the park and the setting is that of northern Ontario wilderness. Algonquin is Ontario's largest park covering some 7500 sq. km.. This is Canadian shield country with hundreds of lakes and wonderful oppurtunities for canoeing, swimming, fishing and walking. The park is home to an abundance of wildlife including moose, deer, and loon. Fortunately, by the time we arrive, nearly all of the bugs should be gone.

Participants will stay in Tranquility II, the residence at the ASC. Housing is dormatory style and participants will be asked to share one and two bedroom suites. The facility has a waterfront with canoes, a dock, and a sand beach, a spacious backyard with firepit for campfires, a sand volleyball court, and a paved basketball court.

Local expenses should be about $400-500Cdn which includes 3 meals and 3 snacks daily and use of all recreational facilities. There should be a slight reduction in costs for graduate students.

Travel times from Toronto are 6 to 7 hours by car or 1 hour by air to Pembroke and then 1.5 hours by car. The site is 3 hours by car from downtown Ottawa, and about 4-5 hours by car from Kingston.

Space contraints at the campus limit the number of participants to about 70.
If interested please contact:

Larry Widrow
Dept. of Physics, Queen's University
Kingston, Ontario
widrow@lola.phy.queensu.ca
Phone: 613/545-6858 FAX: 613/545-6463

Please include a brief description of your research interests and indicate whether you would like to give a (probably short) talk. Graduate students, please include the name and phone number or e-mail address of your advisor.

The Fourth Annual Conference on Astronomical Data Analysis Software and Systems (ADASS) September 25-28, 1994, Omni Inner Harbour Hotel, Baltimore, Maryland U.S.A.

The key topics for ADASS IV are Astronomical Data Modeling and Analysis, Design and Development of Graphical User Interfaces, Network Information Systems, and Parallel and Distributed Processing. The invited speakers are Bob Brown (STScI), Joan Centrella (Drexel University), Christine Falsetti (NASA Science Internet), Andrea Ghez (UCLA), **Graham Hill (DAO/HIA/NRC)**, Doug Tody (NOAO), Juri Toomre (University of Colorado -tentative), Don Schneider (Institute for Advanced Study, Penn State -tentative), Jean-Luc Starck (Observatory of Nice), and David Van Buren (IPAC).

Four rooms have been reserved for birds-of-a-feather sessions on Monday evening, September 26th. Anyone wishing to sponsor a BOF should contact the conference organizers at *softconf@stsci.edu.* There will be an all day meeting on Thursday, September 29th at the hotel on the topic of electronic preprint preparation and distribution systems. All ADASS registrants are welcome to participate, although a small registration fee ($25) will be required.

The early registration and abstract deadline is July 15th with fees of $95 and $40 respectively. After July 15th the registration fee will increase to $135. If you would like to register and/or submit an abstract electronically, you will find the necessary information on the World Wide Web (*http://ra.stsci.edu/ADASS.html*). Also, the registration form may be obtained via *anonymous ftp* from *ra.stsci.edu* in either ASCII or Postscript form from *pub/adass.* The directory *pub/adass/abstracts* contains information and the appropriate LaTeX files for abstract submission. Any questions should be directed to *softconf@stsci.edu,* registrations should be addressed to *adass-reg@stsci.edu,* and abstracts should be sent to *adass4_editors@stsci.edu.*

Please note the following corrections to the preliminary program. For the proceedings contributed papers are restricted to four pages in length (not three) and invited papers are limited to ten pages. Also, the space for poster presentations is limited to 2.5 feet in width by four feet in length.

We look forward to your participation in ADASS IV.

AN APPEAL TO CASCA MEMBERS

For the last three years, astronomy in the states of the former Soviet Union (FSU) has been in desperate straits as a result of economic difficulties associated with the transition towards a democratic society. An appeal to the world in 1992 resulted in an immediate campaign of assistance by the American Astronomical Society, and initiated discussion within our Society about how we could help. Over the last year or so, a program of small travel grants for FSU astronomers has been formulated, and has been approved both by our Board and by the Euro-Asian Astronomical Society (EAAS - the blanket organization for astronomers in all the FSU states). This program will provide grants of up to $500 US for travel to research institutions or facilities, either within the FSU or outside the FSU, for research purposes. Revenue Canada has approved this program as a charitable activity of Cascatrust, and the EAAS has set up an Advisory Committee that will propose recipients of the grants to the CASCA FSUTravel Grant Committee for approval. The first funds have been transferred from CASCA to the EAAS and the first proposals are expected later this summer.

When we initially launched this program a year ago, we had a target of about $10,000 over two years. The donations last year totalled about $1,800 for which we sincerely thank our donors, but surely we can do better this year. I would hope that CASCA members should be able, and would be willing, to contribute $5,000 this year. (The American Astronomical Society has in the past two years contributed more than $150,000 in small research grants!). Although conditions are somewhat improved in the FSU over last year, the need for assistance has not lessened. When one considers that the $30 that one might spend on a dinner on the town could pay a large part of the travel costs for an observing trip within the FSU, our contributions can go a long way. Please decide to assist our colleagues in the FSU by filling out the following donation form and sending it, along with a cheque made out to "Cascatrust - FSU Program", to the CASCA Treasurer, Christine Clement. Thank You.

LLoyd Higgs, Chair, CASCA FSU Travel Grant Committee

DONATION TO CASCATRUST

I, _____ wish to donate $_____ to Cascatrust, in support of the FSU
(please print name)
Travel Grant Program, and a cheque for this amount is enclosed. Please mail the receipt to the following address:

_____

_____

_____

_____

Return this form and cheque to:

CASCA Treasurer
Christine M. Clement
Department of Astronomy
University of Toronto
60 St. George Street
Toronto, Ontario
M5S 1A7

EURO-ASIAN ASTRONOMICAL SOCIETY

(Former Soviet Astronomical Society)

A CASCA FSU Fund Update

The following is an edited transcript of a letter from Nikolai Bochkarev, Chairman of the EAAS, to former President, Lloyd Higgs.

To: Dr. L.A. Higgs March 27, 1994
From: Dr. N.G. Bochkarev

Dear Dr. Higgs,

Here are enclosed short information sheets about our Society and examples of our printing production, a copy of our refereed journal in English and the first issue of a new popular magazine.

Could you help us to:- increase subscriptions for Astronomical and Astrophysical Transactions (in English) and to advertise the magazine "Universe and Ourselves" (in Russian) to find subscribers and/or translation and publication in English (sic. I think they might want translators & publishers for the Journals, Ed.) Astronomers are welcome to contribute to our publications.

I send also a copy of an application form to our Society and hope that a few Canadian astronomers will join our Society and help our activities by at least payment of annual fees ($30 US).

Yours sincerely,

Nikolai G. Bochkarev

P.S. I invite you and all Canadian astronomers to participate in our future scientific meetings.

The appplication form is reproduced over the page. Members can also obtain more information about the EAAS and its publications from *lah@drao.nrc.ca*.

EURO-ASIAN ASTRONOMICAL SOCIETY
(FORMER SOVIET ASTRONOMICAL SOCIETY)

APPLICATION FOR MEMBERSHIP

Euro-Asian Astronomical Society
Nikolai G. Bochkarev
Sternberg Astronomical Institute
Universitetskij Prospect 13
199899 Moscow, Russia
Telex: 411483 MGU SU
e-mail: *snn@sai.msk.su*

Dear Dr. Bochkarev:

I would like to join the Euro-Asian Astronomical Society. I understand that the following information is required in order to be considered for membership.

Name: _____ Year Born:_____

Title: _____

Institute: _____

Department: _____

Address: _____

_____ Telex:_____

Telephone:_____ FAX:_____

e-mail:_____

Number of Professional Astronomical Publications: References on any three publications during last 10 years. (Attach separate sheets as necessary.)

_____

_____

_____

_____

_____

_____ _____
Signature Date

N. Bochkarev, EAAS co-chairman.

THE ODIN MISSION: SUBMILLIMETER ASTRONOMY FROM SPACE

Following a recommendation of the Joint Subcommittee for Space Astronomy (JSSA), The Canadian Space Agency (CSA) has successfully concluded negotiations for Canadian participation in the Odin mission. This notice is intended to inform Canadian astronomers of this development, to provide a brief summary of Odin, and to seek out potential users.

THE MISSION: Odin was conceived and developed by the Swedes. Canada and France are international partners. Odin is a combined astronomy/aeronomy mission, 50% of the observing time being devoted to astronomy. Canada has a 20% share of the astronomy and a 20% share of the aeronomy. The total contribution by CSA towards Odin is about $15 m, most of which will be channeled to Canadian industry for construction of spacecraft components. Launch is anticipated in 1997. It is likely, therefore, that Odin will be the first CSA-sponsored astronomy experiment to fly (the other CSA- supported astronomy missions are LYMAN, RADIOASTRON, and SPECTRUM X-Gamma). The duration of the mission is not yet firm, but may be about two years. The antenna will be in the one-meter class: The best current estimate is a diameter of 1.1 meters.

Four submillimeter bands will be accessible, centred on 495, 548, 555, and 571 GHz. The radiometer will provide a 17 GHz tuning range about each of these four frequencies and an instantaneous bandwidth of 1 GHz. There will be a fifth band in the millimeter range, centred on 119 GHz. The spatial resolution at submillimeter wavelengths will be about 2.5 arcminutes.

THE SCIENCE: Many molecular and atomic lines of astronomical interest will be accessible. Some of the most interesting are transitions of H_2O, O_2, CO, Cl, CS, H_2S, and NH_3. A major goal will be the study of oxygen chemistry using water and molecular oxygen. These species are key to the oxygen budget but neither is detectable from the ground. Odin observations will have an impact on a wide range of subjects, including:

molecular cloud chemistry
shock chemistry
star-forming cores
circumstellar envelopes
interstellar grains
photodissociation regions
comets
planetary atmospheres
extragalactic molecules

Important organizational questions are still under discussion. It is likely that several scientific areas will be identified and, for each, an international science team will be selected. JSSA has formed a Canadian Science Working Group consisting of:

Sun Kwok (U. of Calgary and Chair)
Mike Fich (U. of Waterloo)
George Mitchell (Saint Mary's U.)
Chris Rogers (DRAO)
Slavek Rucinski (York/ISTS)

Odin is a general purpose instrument that can address a wide range of important scientific questions. We would like to solicit your input to the observing program. Please identify for us projects that you think will be suitable for Odin. These ideas will be brought forward at international science planning meetings.

George Mitchell and Sun Kwok.
(on behalf of the Odin Science Working Group)
mitchell@husky1.stmarys.ca or
kwok@iras.ucalgary.ca

How to Improve a CFHT Proposal (?)

Since joining the Canadian Time Allocation Committee (CTAC) for the CFHT in 1993, I view proposal writing in a much different light. Indeed, I hope that every astronomer gets an opportunity to serve on the CTAC, if for no other reason than to experience how the process works and to gain an appreciation of what it takes to write a better CFHT proposal.

It seemed to me that it might be possible to pass along some helpful suggestions to those in the astronomical community who are seeking to improve the quality of their proposals. Hence, this article. In no way should this be construed as a prescription which will guarantee CFHT time. On the contrary, I clearly do not know how to write the perfect CFHT proposal because I frequently get turned down, while there are many in our community who already write excellent quality proposals. So with these caveats in mind, here are some personal observations, reflections, and suggestions which you may find useful when writing your next CFHT proposal.

The Nature of the CTAC

It is important for astronomers to be aware of how the CTAC operates. The CTAC is composed of 6 Canadian astronomers who have been chosen by the Director-General of HIA in consultation with the current Chair of the CTAC and the HIA Advisory Board to adjudicate the 50-60 CFHT proposals which are submitted each semester. We meet approximately 5 or 6 weeks after each deadline to rank the proposals, having beforehand solicited the opinions of 2 or 3 external referees per submission. (External reviews are invaluable. We are a small community with disparate interests and unless we are prepared to enlarge the CTAC membership significantly, this is the best way to assess proposals.) The "expert" grades are *not* used in the final ranking per se, although the comments certainly influence the grade we assign to each proposal. During the meeting, every proposal is thoroughly discussed, and its strengths and

Comment améliorer une demande de temps TCFH (?)

Depuis que je me suis joint au Comité canadien d'évaluation des demandes (CCED) du TCFH en 1993, je vois la rédaction des demandes de temps d'un oeil très différent. En effet, je souhaiterais que tous les astronomes aient l'occasion de participer au CCED, ne serait-ce qu'afin qu'ils voient comment tout se déroule et qu'ils soient sensibilisés à ce qui est nécessaire à une bonne rédaction de demande de temps TCFH.

Il me semble qu'il serait possible de faire part de quelques suggestions aux membres de la communauté astronomique désirant améliorer la qualité de leurs demandes. D'où cet article. N'allez pas croire que ceci constitue une marche-à-suivre garantissant du temps au TCFH. Au contraire, je ne sais pas comment écrire la demande parfaite puisque je me vois fréquemment refuser le temps de télescope alors que d'autres membres de notre communauté écrivent déjà d'excellentes demandes de temps. Gardant ceci à l'esprit, voici quelques suggestions, observations et réflections personnelles qui vous seront possiblement utiles lors de la rédaction de votre prochaine demande de temps TCFH.

Fonctionnement du CCED

Il est important que les astronomes comprennent comment fonctionne le CCED. Le CCED est composé de 6 astronomes canadiens qui ont été choisis par le directeur général de l'IHA, suite à des consultations avec président actuel du CCED et avec le comité consultatif de l'IHA, pour évaluer les 50 à 60 demandes de temps TCFH soumises à chaque semestre. Nous nous réunissons environ 5 ou 6 semaines après chaque échéance dans le but de classer les demandes, après avoir demandé l'opinion de 2 ou 3 arbitres externes pour chaque soumission. (Les évaluations externes sont indispensables. Nous constituons une petite communauté ayant des intérêts disparates et, à moins que nous ne soyons prêts à augmenter considérablement le nombre de membres du CCED, ceci constitue la meilleure

weaknesses are identified. We then compute a final grade for each proposal based on the unweighted mean of the individual grades. (In the case of a conflict of interest, a CTAC member will leave the room during the discussion of that proposal and will not submit a grade for it.)

The CTAC does *not* operate under a quota system; there are no east vs west, stellar vs extragalactic, Canadian vs foreign, quotas. At the conclusion of the meeting, we draw a line on the page corresponding to the number of dark and bright nights Canada has been allotted in the semester. Proposals above get time, those below don't, although the CFHT is responsible for drafting the final schedule and has other constraints which it must consider. This is why *no* proposal is guaranteed time at this stage.

Please keep two things in mind:

1) The CTAC employs a straightforward ranking process. *Many* proposals receive "highest recommendation" from one or more of the external referee(s). But this does not guarantee that it will get time. The only question is, how does it compare relative to the others? This is tough enough for the CTAC to decide, but it is impossible to gauge in isolation.
2) To obtain CFHT time you have to convince *us* that your proposal is wonderful. We are human beings. We can make mistakes. But I believe that these "faults" do not significantly affect the final ranking *for well written proposals.* If you don't believe this, then I recommend that you talk with a current or former CTAC member. I think they'll corroborate my story.

If your proposal fails to get CFHT time, carefully study the "CFHT Observing Proposal Report," which you will eventually receive in the mail. If you still don't understand why your proposal wasn't granted time, then politely contact the chairman of the CTAC who, it is hoped, will elaborate.

façon d'évaluer les demandes.) Bien que leurs commentaires influencent la note que nous accordons à chaque demande, celles attribuées par les experts ne sont pas directement utilisées lors de l'évaluation finale. A la réunion, chaque demande est discutée en profondeur et ses points forts et faibles sont identifiés. Nous calculons alors une note finale pour chaque demande à partir d'une simple moyenne des notes individuelles. (Advenant un conflit d'intérêt, un membre du CCED quittera la salle lors de la discussion de cette demande et ne soumettra pas de note pour celle-ci.)

Le CCED n'a pas de système de quota; il n'y a pas de quota est vs ouest, stellaire vs extragalactique, Canadien vs étranger. A la fin de chaque réunion, nous traçons une ligne sur la page correspondant au nombre de nuits obscures et claires allouées au Canada pour le semestre. Les demandes au-dessus de la ligne se voient accorder du temps de télescope, celles en-dessous, non. Cependant le TCFH est responsable de l'élaboration de l'horaire final et a d'autres contraintes à considérer. C'est pourquoi *aucune* demande n'a de temps garanti à ce stade.

Veuillez garder deux choses à l'esprit:

1) Le CCED emploi une méthode d'évaluation très simple. *Plusieurs* demandes sont fortement recommandées par les arbitres externes. Cependant, ceci n'assure pas qu'elles se verront accorder du temps de télescope. La seule question qui compte est: comment une demande se compare-t-elle aux autres? Cette évaluation est difficile à faire pour le CCED mais tout à fait impossible sans aide externe.
2) Pour obtenir du temps d'observation au TCFH, vous devez *nous* convaincre que votre demande est merveilleuse. Nous sommes humains. Nous pouvons nous tromper. Mais je crois que ces "défauts" n'affectent pas grandement le rang final accordé *aux demandes bien écrites*. Si vous ne me croyez pas, je suggère que vous parliez à un membre, présent ou passé, du CCED. Je crois qu'il sera d'accord avec moi.

Si votre demande ne se voit pas

The Proposal Itself

The four most important parts of a CFHT proposal in the order in which they will be addressed are;
S2, *Summary of the Program;*
S8, *Justify the use of the CFHT and the amount of observing time requested;*
S13, *Report on last observing runs at CFHT;* and
S6, *Scientific Justification.*
Before discussing each of these briefly, I would like to list some of the minor technical irritations to avoid which are not fatal in themselves, but which can put the CTAC in a nasty mood from the start.

Make sure you use the latest version of the proposal form which is available as a LaTeX template through the CFHT via anonymous ftp. There is no excuse for still using the 1988 form. While you're on the CFHT computer, pick up the most recent information bulletins and detector information which the staff has taken great pains to produce. We check things such as exposure times rather carefully, and being significantly out either way can seriously affect your chances for success. Please don't use fonts which are too small. Everything should and can be said using the proper font size within the allotted area. I have found it interesting that some successful proposals do not even use every square cm of the second page of the scientific justification. Only one page of references and/or figures is permitted. The overwhelming fraction of proposals stick to this rule, but about 10% do not. Please be fair.

The most annoying thing from my perspective, however, concerns figures. It seems to me that any figure included in a proposal should illustrate an important scientific or technical point; that this *is* an excellent proposal which *is* technically feasible. But a significant fraction of proposals have casually added figures without captions, or captions which are hand-written and illegible, or figures with symbols or short forms which aren't described in the text or caption(s).

accorder de temps de télescope TCFH, étudiez bien le "Rapport d'évaluation des demandes TCFH" que vous recevrez éventuellement par la poste. Si vous ne comprenez toujours pas pourquoi on ne vous a pas décerné de temps d'observation, alors contactez poliment le président du CCED qui, espérons-le, saura élucider la question.

La demande elle-même

Les quatre parties les plus importantes d'une demande de temps du TCFH sont, dans l'ordre dans lequel elles seront considérées ici:

S2 *Résumé du programme*,
S8 *Justification du l'emploi du TCFH et de la durée d'observation demandée*,
S13 *Rapports sur les dernières observations effectuées au TCFH*, et
S6 *Justification scientifique*. Mais avant de discuter brièvement de chacun de ces sujets, je voudrais dresser une liste d'irritations techniques mineures à éviter qui, quoiqu'elles ne soient pas fatales en soi, peuvent mettre les membres du CCED de mauvaise humeur dès le départ.

Assurez-vous que vous utilisez la plus récente version du formulaire de demande de temps, disponible via ftp anonyme au TCFH sous forme d'un formulaire LaTeX. Il est inexcusable d'utiliser encore le formulaire de 1988. Pendant que vous êtes sur l'ordinateur du TCFH, procurez-vous donc les plus récents bulletins d'information et l'information sur les détecteurs pour la rédaction desquels les employés se sont donné tant de mal. Nous vérifions de près des choses comme les temps de pose, si vous êtes considérablement dans l'erreur, vos chances de succès peuvent en être grandement affectées. Veuillez ne pas utiliser des fontes qui soient trop petites. Tout devrait et peut être écrit en utilisant la grosseur de caractères appropriée, à l'intérieur de l'espace désigné. Je trouve intéressant que plusieurs demandes couronnées de succès n'utilisent pas chaque centimètre carré de la deuxième page de la justification scientifique. Une seule page de références et/ou de figures est permise. La grande majorité des demandes suivent cette règle, mais environ 10% ne la suivent pas. S'il-vous-plaît, soyez équitables.

Summary of the Program:

This section is more important than most people realize. The CTAC is expecting to find a concise encapsulation of what you want to do. In fact some CTAC members like to take a marker and highlight the phrase or sentence which contains the focus of the proposal. If you don't include an easily identifiable focus or rationale of the proposal here, then it seems only fair that CTAC members are free to guess the focus. Of course, our focus may be different from yours! Moreover, it seems that if there isn't a clear objective outlined in this section, then there isn't likely to be one in the scientific justification either.

Technical Justification:

Every successful proposal must justify the total amount of telescope time requested. CFHT telescope time is valuable for a great many reasons. Thus, it is not unreasonable to have you account for every hour. (Canadians have access to a single 4 m class telescope at the moment. For this reason, "large aperture" is a sufficient reason for Canadians to apply to the CFHT. A foreign applicant requiring only a large aperture and who has access to a 4 m class instrument in his or her country, will not have nearly as strong a case, however.)

It goes without saying that exposure times must be based on signal-to-noise (S/N) ratio calculations and instrumental efficiencies, etc., provided in the user manuals. While it is also useful to justify exposure times based on previous observations --- for those who are fortunate to have such data --- it is always good practice to back this claim up with a S/N ratio calculation.

The CTAC often encounters "padding" --- the addition of extra nights to the program over and above what is necessary to fulfill the scientific objectives. (Unfortunately, the oversubscription rate at the CFHT is so high that it is not possible to fold in time for bad weather or instrumental failure.) Most of the time, the CTAC will catch "padding" and trim the proposal back to the bare minimum. The CFHT now has a "minimum time" policy; ie., an instrument must remain on the telescope at least 4 nights, otherwise it will not be

De mon point de vue, la chose la plus agaçante concerne les figures. Il me semble que toute figure incluse dans une demande de temps devrait illustrer un aspect scientifique ou technique important, montrer qu'il s'agit d'une excellente demande de temps qui est techniquement réalisable. Mais une fraction importante des demandes contient des figures ajoutées à la légère, sans légende ou avec des légendes manuscrites illisibles, ou des figures avec des symboles ou des abréviations qui ne sont décrites ni dans le texte, ni dans la légende.

Résumé du programme:

Cette section est plus importante que ne le croit la plupart des gens. Le CCED s'attend à y trouver un résumé concis de ce que vous voulez faire. Certains membres du CCED aiment même prendre un marqueur et souligner la phrase qui contient l'objectif central de la demande. Si vous n'incluez pas ici un objectif facilement identifiable, alors il semble juste que les membres du CCED aient le droit de deviner votre objectif. Bien sûr, il est possible que notre objectif s'avère différent du vôtre! De plus, il me semble que s'il n'y a pas d'objectif clairement défini dans cette section, alors il est probable qu'il n'y en aura pas non plus dans la justification scientifique.

Justification technique:

Toute demande doit justifier le temps de télescope total demandé. Le temps de télescope du TCFH est précieux pour plusieurs raisons. Il n'est donc pas déraisonnable de vous demander de justifier chaque heure. (les Canadiens ont présentement l'usage d'un seul télescope de classe 4 m. Conséquemment, la grande ouverture est une raison suffisante pour plusieurs Canadiens pour demander du temps TCFH. Cependant, une demande d'un requérant étranger qui ne requiert qu'une large ouverture et qui a accès à d'autres instruments de classe 4 m dans son pays n'aura pas autant de poids.)

Il va sans dire que les temps de pose doivent être basés sur le rapport signal-sur-bruit (S/B) et l'efficacité instrumentale, etc., les renseignements appropriés étant fournis dans

scheduled. Users should bear this in mind when submitting a proposal for a unique or new instrument.

Proposers who intend to look at a single object or objects within a narrow range of right ascension should remember to mention what will be done with the part of the night when the object is too far over, normally at the beginning and ending of the night. A justification carries far more weight if the entire night is accounted for, rather than 2/3 of a night.

Finally, it is always good policy to mention briefly a backup proposal; eg., in the event that the seeing is poor, etc. It can only help and takes only a couple of lines.

Previous CFHT runs:

The main thing that the CTAC learns from this section is, when you have been granted CFHT time in the past, have you used it profitably and informed the community about your work by publishing it. Even if the data are currently unpublished, a status report is very helpful. Ongoing or continuing programs should take this opportunity to inform the CTAC about the progress of the program. *No* program is guaranteed CFHT time based solely on previous work.

Scientific Justification:

A CFHT proposal has the reputation of having one of the toughest scientific justifications to write in all of astronomy. Indeed, one often hears from cynics that a CFHT scientific justification (hereafter SJ) is essentially a journal paper with blanks for the observational results. This isn't much of an exaggeration! A consequence of this is that first-time applicants, eg., young and/or foreign astronomers, may not have the same rate of success at the CFHT as at "single page SJ" telescopes. As a result, some might claim --- based on their initial CFHT experience --- that there must be a bias towards the "Canadian astronomical establishment." But this is not so. All proposals submitted through Ottawa are treated in precisely the same way. It is true, however, that those who successfully master the art of writing a good CFHT SJ will continue to be successful at the CFHT and write higher

le manuel des utilisateurs. Bien qu'il soit utile de justifier un temps de pose en se basant sur des observations précédentes --- pour ceux qui ont la chance d'avoir de telles données --- il est toujours souhaitable de joindre à cette assertion un calcul de rapport signal-sur-bruit.

Le CCED voit souvent l'ajout de nuits supplémentaires, en sus de celles strictement requises pour l'atteinte des objectifs scientifiques. (Malheureusement, le taux de sursouscription au TCFH est tel qu'il n'est pas possible d'inclure du temps pour de mauvaises conditions climatiques ou des bris instrumentaux.) La plupart du temps, le CCED s'apercevra de l'ajout de temps superflu et réduira le temps demandé à son minimum. Le TCFH suit maintenant une politique de "temps minimum", *i.e.* un instrument sera sur le télescope pour au moins 4 nuits ou pas du tout. Les utilisateurs devraient garder ceci à l'esprit lorsqu'ils demandent du temps faisant usage d'un instrument unique ou nouveau.

Les requérants désirant étudier un seul objet ou des objets à l'intérieur d'un intervalle restreint en ascencion droite devraient mentionner ce qui sera fait de la partie de la nuit ou l'objet est trop loin, d'habitude au début et à la fin de la nuit. Une justification a beaucoup plus de poids si elle fait usage de la nuit complète plutôt que, disons, les 2/3 de la nuit.

Enfin, il est toujours bon de mentionner brièvement une alternative en cas, par exemple, de mauvais temps, etc. ça ne peut qu'aider et ne prend que quelques lignes.

Observations précédentes au TCFH:

Dans cette section, si vous avez précédemment obtenu du temps TCFH, le CCED apprend si vous en avez tiré profit et si vous avez informer la communauté de vos résultats dans une publication. Même si les données ne sont pas encore publiées, un rapport sur l'état du projet est utile.

Des programmes déjà en cours devraient profiter de l'occasion pour informer le CCED de leur progrès. L'existence de travaux précédents ne garantit *jamais* du temps TCFH.

quality proposals for other telescopes. With a little reflection, I think you will agree that the high quality demanded of a CFHT SJ only benefits Canadian astronomy.

In general, the SJ requires;

1) an excellent scientific idea,
2) the strategy to exploit this idea observationally, and
3) the ability to communicate this to the CTAC and the external reviewers.

If any of these is lacking, the proposal may not be successful.

A good proposal usually begins with a crisp, concise summary of the problem being addressed. This is followed by about half a page introduction to the problem, about a page outlining your solution --- including a justification of your sample selection --- and finally a demonstration that the project is technically feasible. Most proposers realize that the CTAC members are not all experts in their field and so write a reasonable introduction. If there is a problem with an introduction, it is usually that it is too slow at getting to the point which takes away valuable space for the remaining components.

Once a problem has been identified, it is up to the authors to convince the CTAC that the proposed observing technique will solve it. Very often, a simulation is required so as to justify the sample selection, and/or that the observing parameters are indeed sufficient to obtain the "answer." More and more proposers are making use of packages such as IRAF's ARTDATA or of Monte-Carlo simulations to argue their case persuasively.

Sample selection can be a difficult problem. I know this very well, working on AGNs where a "complete sample" is almost unheard of. The best some of us can do is a "representative sample." That's fine, of course, but then the sample must be described in some detail. It is insufficient to say that, when the time comes, a sample will be selected from a certain list of objects. Humour the CTAC and include the best sample with the proposal.

While S8 is reserved for an explicit discussion of exposure times, the bulk of the technical feasibility arguments should be presented in the SJ as well. You must demonstrate that the novel technique you are proposing can solve the problem in a finite

Justification scientifique:

La demande TCFH est réputée avoir une des justifications scientifiques les plus difficiles à écrire dans le domaine de l'astronomie. On entend souvent certains cyniques dire qu'une telle justification scientifique (ci-après JS) est essentiellement un article scientifique avec des espaces laissés blancs pour les résultats observationels. Ceci n'est pas grandement exagéré! Conséquemment, pour une première demande de temps TCFH, les requérants, qu'ils soient jeunes ou étrangers, ne connaîtront peut-être pas le même taux de succès qu'à d'autres télescopes qui ne requièrent qu'une justification de style "page unique". Suite à cette expérience initiale au TCFH, certains pourraient prétendre qu'il doit y avoir un favoritisme à l'endroit de "l'establishment astronomique canadien." Mais ce n'est pas le cas. Toutes les demandes soumises à Ottawa sont traitées exactement de la même façon. Cependant, il est vrai que les individus qui maîtrisent l'art d'écrire une JS pour le TCFH continueront de connnaître d'y succès et écriront des demandes de qualité supérieure pour d'autres télescopes. Si vous y réfléchissez un peu, je suis certain que vous serez d'accord que la grande qualité requise pour une JS du TCFH ne peut que bénéficier l'astronomie canadienne.

De façon générale, il faut, pour la rédaction d'une JS,

1) une excellente idée scientifique,
2) une stratégie pour exploiter l'idée de façon observationnelle, et
3) l'abilité de communiquer tout ceci au CCED et aux examinateurs externes.

Si un de ces éléments est absent ou faible, le demande n'aura peut-être pas de succès.

Une bonne demande de temps commence d'habitude avec un résumé concis du problème considéré. Suite à ceci, on devrait trouver une introduction au problème d'environ une demie page, une page décrivant votre solution --- incluant une justification de votre choix d'échantillon --- et finalement une démonstration que le projet est techniquement possible. La plupart des requérants se rendent compte que les membres du CCED ne sont

amount of observing time and with the relevant instrument.

Some final (disparate) hints for the SJ:

a) Since space is at a premium, consider using more figures. They may not be worth a thousand words each, but they will help. (But please, see the remarks in the first part of this section!)

b) While one expects every proposal to "blow its own horn," one can only read words such as "crucial" or "critical" so often without becoming desensitized.

c) Read the SJ over carefully, and be sure to use a spelling checker. It is terribly annoying to find incomplete sentences or several spelling errors in a single justification. Have you used esoteric jargon without explaining it?

d) Be as flexible as possible with possible observing dates. This is especially important since the CFHT is tending towards fewer instrument changes and therefore longer gaps between successive appearances on the telescope.

e) The CTAC does have some sort of collective memory; certainly over a one year period. We are usually aware if the proposal is a resubmission which was unsuccessful previously. Moreover, we are more than dimly aware of the last CTAC's suggestions and expect to find that they are either incorporated, or at least addressed, in the current version of the proposal.

f) Is the project well suited for service observing? This could be a very useful option for projects which require a feasibility study, or for projects which need just a couple of more hours to wrap up. The only restrictions are that the instrument requested must be either FOCAM or Redeye, and that it can be completed, including calibration frames, in less than half a night. Please see the "update" section included with the most recent CFHT proposal form for more explicit details.

I hope this has been of some assistance.
Until next semester then;

M. De Robertis, Chairman, CTAC 1994

pas des experts dans leur champ et donc, écrivent une introduction raisonnable. S'il y a un problème avec l'introduction, c'est généralement qu'elle est trop longue et gruge donc de l'espace qui devrait servir aux autres composantes.

Une fois que le problème a été défini, les auteurs doivent convaincre le CCED que les techniques observationnelles qu'ils proposent le résoudront. Souvent, une simulation est requise pour justifier le choix de l'échantillon et/ou pour montrer que les paramètres observationels permettront l'obtention de la réponse. De plus en plus, les requérants font usage de progiciels tels que ARTDATA dans IRAF ou une simulation Monte-Carlo pour justifier leur décision.

Le choix de l'échantillon peut être difficile. J'en suis très conscient puisque je travaille dans le champ des NAG où un échantillon complet est d'une extrême rareté. Le mieux que l'on puisse parfois faire est un échantillon représentatif. C'est acceptable, bien sûr, mais l'échantillon doit alors être décrit de façon assez détaillée. Il n'est pas suffisant de dire que lorsque viendra le temps d'observer, un échantillon sera choisi à l'intérieur d'une certaine liste d'objets. Faites plaisir au CCED en incluant le meilleur échantillon dans la demande de temps.

Bien que la S8 soit réservée pour une discussion des temps de pose, le gros des discussions portant sur le côté technique devrait aussi être présenté dans la JS. Vous devez montrer que la technique innovatrice que vous proposez peut résoudre le problème en un interval de temps fini et à l'aide de l'instrumentation proposée.

Quelques autres suggestions pour la JS:

a) Puisque l'espace est restreint, pensez à utiliser plus de figures. Chaque image ne vaut peut-être pas mille mots, mais elles aideront. (Mais, s'il-vous-plaît, voyez les remarques au début de cette section!)

b) Bien qu'on s'attende à ce que chaque demande fasse de son mieux pour se vendre, il y a une limite au nombre de fois qu'on puisse lire les mots "crucial" et "critique" sans qu'ils ne cessent de faire effet.

CASCA Journals Project
by
Alan Batten

This year Paul Delaney completed a major shipment to the Gaza strip, thus once again creating storage room for more gifts of books and journals. I have sent a much smaller shipment from Victoria to Algeria. We have also received an enquiry from Nigeria and are awaiting a clarification of their needs. As I have found by personal experience, all forms of communication with Nigeria are slow and unreliable.

While we continue to welcome gifts of old journals and books, the crying need in many countries is for current material. To my knowledge, astronomers in Algeria, Nigeria and Viet Nam have no journals at all. I suspect that they are only a few of many similarly situated. I would again ask CASCA members to consider donating journals volume by volume, as each one is completed. It may be inconvenient to have to use the library copy, but at least we ***have*** libraries.

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c) Relisez avec soin la JS et soyez sûr d'en vérifier l'ortographe. Il est agaçant de trouver plusieurs fautes d'ortographe et phrase incomplètes à l'intérieur d'une même justification. Aussi avez-vous utilisé un jargon ésotérique sans l'expliquer?

d) Soyez aussi flexible que possible avec les dates possibles pour les observations. Ceci est particulièrement important puisque le TCFH tend vers une politique consistant à changer les instruments moins souvent, ce qui laisse de plus grands écarts entre les apparitions successives d'un intrument sur le télescope.

e) Le CCED a une sorte de mémoire collective, à tout le moins pour une période d'un an. Nous nous rendons d'habitude compte lorsqu'une demande est une re-soumission d'une demande qui n'a pas connu de succès précédemment. De plus, nous n'avons pas complètement oublié les dernières suggestions du CCED et nous nous attendons à ce qu'elles soient incorporées, ou, au moins, considérées dans la nouvelle version de la demande.

f) Le projet serait-il adéquat pour des observations de service? Ceci pourrait être une option très utile pour des projets qui requièrent une étude de praticabilité, ou pour des projets qui n'ont besoin que de quelques heures de plus pour être terminés. Les seules restrictions sont que les instruments demandés doivent être FOCAM ou Redeye, et qu'il puisse être complété en moins d'une demie nuit, étalonnage inclus. Veuillez consulter la section "mise-à-jour" incluse avec le plus récent formulaire de demande de temps du TCFH pour plus de détails.

J'espère que ceci saura vous être utile.
Au prochain semestre!

M. De Robertis, président du CCED, 1994

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THE SAC REPORT

The Scientific Advisory Council of CFHT held its 45th meeting on May 19th to 21st at the Hotel Clarendon in Quebec City, Canada. The SAC members from Canada are Michael DeROBERTIS, David HANES, Gilles JONCAS and Harvey RICHER (chairperson). The function of the SAC is to advise CFHT on scientific matters.

INSTRUMENTATION AND DETECTORS

1. *CCDs:* The problem of the CFHT dewars remaining cold for less than a night has been solved by a remotely operated LN_2 filling system and by contracting with G. Luppino of IfA for several new dewars capable of remaining cold for significantly longer than a winter observing night. The SAC was informed that Loral4, the thinned CCD recently obtained by CFHT, was likely made inoperable by an electrical surge during the testing phase. Although efforts will be made to repair the chip, the prognosis is poor.

2. *MOS:* The MOS/ARGUS configuration within MOS was built at the Paris-Meudon Observatory, and is now proposed by its builders as an additional observing mode of MOS. This configuration uses a 655-fiber bundle at the f/8 focus to feed the MOS, and allows for 2D spectroscopy at MOS. The optical and mechanical layout of this instrument results in a simple by-pass of the MOS mirror and mask, so that its installation requires only minor staff intervention. The SAC recommended to CFHT that this ARGUS mode be supported as a CFHT instrument.

3. *SIS:* The SIS guiding system has been upgraded and it is now possible to fast guide using stars fainter than R = 18. With the current Loral3 CCD the scale with SIS is 0.0867"/pixel, the field of view is 3' x 3' and the spectral range over which SIS can be used is 0.36 to 1 micron. There are plans, through a French-Canadian collaboration, to extend the range of sensitivity of SIS out into the infrared, that is through the J, H and possibly K' bands.

4. *Fourier Transform Spectrometer:* The InGaAs photodiodes recently obtained by CFHT exhibited a lack of sensitivity when used on the sky with the FTS. New photodiodes with higher gain preamplifiers have been obtained and will be tested before the end of the 94I semester.

5. *Herzberg Spectrograph:* The Herzberg Spectrograph was used successfully for near UV observations of several nuclei of comet Shoemaker-Levy. However, one and a half nights of engineering time were required to fully test and verify the operation of the spectrograph which had not previously been used for 20 months. Given the unique capabilities of the instrument (UV capability, moderate resolution, high throughput) and its excellent recent performance, the SAC concluded that it would be premature to decommission it at this time.

6. *Computers and Software:* The archive project with the CADC is continuing and apparently working well. Usage of the World Wide Web network access to the CFHT home pages by mosaic has increased enormously. Several users' manuals are being converted to this format and will thus provide up-to-date access to the status of CFHT instruments for observers at the time of writing proposals for telescope time and prior to their arrival in Hawaii for observing.

Report on the Adaptive Optics Meeting

The SAC, together with CFHT, organized a meeting on the science that can be done with the Adaptive Optics bonnette (called PUEO). This meeting was held just prior to the SAC meeting. Below are some key points from this workshop.

The Workshop "Science with PUEO" was highlighted by the presentation of a number of leading programs that are likely to be performed with CFHT's AO Bonnette which should provide spatial resolution of the order of 0.1-0.2" FWHM at visible and near-IR wavelengths starting early in 1996. Those fields

which will benefit most from PUEO appear to be solar-system studies, the investigation of circumstellar matter around young and evolved stars, rich stellar systems such as globular clusters, extragalactic astronomy including galactic cores and nuclei, AGN's, and, to a lesser extent due to the faintness of the objects involved and the lack of suitably bright reference stars, the study of distant galaxies.

While the presently planned instrumentation (imaging in the visible and near-IR, low-resolution integral field spectroscopy in the visible with OASIS) seems to cover the most urgent needs to take advantage of the high spatial resolution of PUEO and perform the most interesting programs, a real demand was expressed during the workshop for the development of a low-resolution near infrared spectrograph as well as for more exotic instrumentation such as a polarimeter and a coronograph, and for a fiber link between the AOB and the f/4 Coude.

This workshop also offered an opportunity to discuss remaining issues and concerns related to Adaptive Optics at CFHT. One of the major concerns regarding PUEO instrumentation expressed during the workshop is the pixel size of Red-Eye behind the AOB which, as presently planned (0.082 arcsec/pix), does not provide an adequate sampling of the diffraction-limited PSF. Other key issues raised during the workshop included the possibility of achieving good photometric and astrometric accuracy with the AOB. The possible need for dedicated CFHT staff to run the AOB, at least in the early phases of operation, was also mentioned. Finally, it was widely acknowledged that the use of an artificial laser star for wavefront sensing would make the AOB even more attractive by giving access to a much larger fraction of the sky and, therefore, enabling demanding programs, especially those of cosmological interest, to be undertaken.

The proceedings from the workshop are available and can be obtained by contacting Robin Arsenault at CFHT.
arsenault@cfht.hawaii.edu

Gemini North Fiber Link to CFHT

There are no current plans for the Gemini telescope on Mauna Kea --Gemini North -- to be equipped with a high resolution spectrograph. Because high quality, high dispersion spectroscopy is a particularly powerful tool for studying stellar abundances, for example, the Gemini SAC has expressed an interest in fiber feeding the f/4 CFHT coude spectrograph (aka Gecko) from Gemini North. While the distance between the neighbouring telescopes is about 100 meters, the total length of fiber required would be closer to 250 meters if the cable were buried underground. Currently, a fiber of this length appears impractical because of excessive light loss, but with expected improvements in fiber technology in the near future, this option may prove feasible.A study is now underway to investigate fiber feeding the coude spectrograph from the f/8 focus at the CFHT using a 40 meter fiber. Thus far, the study appears to be successful, making the Gemini-CFHT proposal more encouraging.

There are two important aspects of concern to the SAC from this venture apart from its ultimate technical feasibility: The first is the nature of the fiber feed which will have to be built at the CFHT. Presumably its design will involve both the CFHT and Gemini and its cost will be borne by Gemini. The second is the compensation the CFHT corporation would require for use of Gecko by Gemini. This proposal has strong scientific appeal and the SAC considered it important that the CFHT and Gemini continue to discuss both of these concerns, as well as investigating the technical feasibility. The SAC felt that a trading of nights would be of greatest interest to our communities.

MEGACAM

Yannick Mellier presented to SAC a new project for building a wide field CCD camera for the prime focus of CFHT (MEGACAM). The camera is a mosaic of 8x8 2Kx2K thinned CCDs, with 15 micron pixels (0.205 arcsec/pixel) which would cover a total field of view of 55 arc minutes. Eventually, the builders propose to build another camera for the infrared which would consist of 3x3 1Kx1K IR detectors mounted at the prime focus. These camera would be particularly well suited for CFHT which has the best wide field image quality in the world, from U to K'.

The scientists and the institutes involved in the MEGACAM project are L. Vigroux from the Commisariat a l'Energie Atomique (Saclay, France), D. Crampton from the DAO, Y. Mellier

from the Observatoire Midi-Pyrenees (Toulouse, France) and Nick Kaiser from CITA. The main scientific goals are the observation of large scale mass concentrations from weak gravitational shear, the evolution of distant galaxies from wide field deep multiband photometry, and the detection of supernovae. A large number of other scientific programmes could also benefit from the use of MEGACAM.

SAC was very enthusiastic over the scientific goals of the MEGACAM project and recognizes that the project must be discussed in detail at the next CFHT users meeting in May 1995. Regarding the future of the CFH telescope in the era of 8 meter instruments, SAC is interested in identifying new projects which will make CFHT competitive. SAC believes that the MEGACAM project has the potential of being such a project.

Electronic Submission of CFHT Proposals

The Director proposed that observing time requests be submitted by electronic mail only beginning next semester (95I). His arguments were that (1) much preparation time will be saved at the agencies, (2) it will be an economy of paper and postal costs if the CADC is used as a mail exploder, (3) it will increase reliability, and (4) a template of the request form is already available via ftp. The main problem that SAC forsees is the transmission of the figures that accompany many of the proposals. Taking into account the possibility of numerous unforeseen glitches, SAC felt that a test period should be implemented before adopting such a procedure. This test will be done on the proposals submitted for time for semester 95II. Further, it was also noted that both ESO and NRAO give their applicants the choice of using either paper or electronic mail. Therefore, SAC decided that proposers should always have the option of submitting proposals in paper form.

Archiving of CFHT Data

The CADC has developed an efficient procedure whereby all astronomical frames acquired at the CFHT are promptly and securely archived in a database which will prove to be scientifically useful, rather than merely a backup repository. The FITS headers of all frames taken at the telescope with CFHT-supported instruments are electronically transmitted to the CADC within a matter of hours and added to the archive; the frames themselves follow on optical disk when a sufficient number have accumulated. Procedures are in place to permit rudimentary pre-processing and calibration, and to provide cross-referencing by object name or position and other descriptors.

Access to data frames will be restricted within the proprietory period, but thereafter browse facilities will permit general access to any images in the archive; compressed versions of the images will be obtainable over the network for quick inspection. In the long term the archive will prove a valuable astronomical resource, especially given that the CADC provides a gateway to other similar archives (such as HST) wordwide. Further developments will be reported to the community at the 1995 CFHT Users' Meeting.

Immediate and Long Term Strategy for CFHT

CFHT prepared a document for SAC to aid in the continuing discussion between the SAC and the Executive about the possible long term strategies that could be adopted for CFHT. These issues are reviewed below and some ideas concerning the long term strategies are discussed.

There are some obvious differences in the context within which the three member countries of CFHT operate and which have to be kept in mind. (i) UH develops instruments which are tested on smaller telescopes and then used on larger telescopes, so UH will certainly want to maintain the ability to use visitor instruments on CFHT. (ii) Canadians want to have reliable and optimized instruments on CFHT rather than prototypes. (iii) The French community has many laboratories involved in instrumental development and has for many years proposed more visitor instruments than Canadian teams.

In terms of current and soon to be available instrumentation CFHT has available to the user community the following. (i) MOS-SIS stands out above the other instruments as the most competitive, until the 8 meter class telescopes begin to operate similar instruments. A non-thermal IR extension of its use (OSIS) will provide a truly unique capability. (ii) The cassegrain adaptive optics bonnette, complemented by an integral field spectrograph (OASIS), will make use of the exceptional quality of seeing at CFHT. The use will be

limited to narrow fields limited by the isoplanatism, but it will be highly competive for the near term. CFHT will have to decide if it will also operate a laser artificial guide star for adaptive optics. (iii) The wide field corrector available at the prime focus allows for the development of very large field imagery with a mosaic of CCDs and possibly large, non-thermal IR arrays. This is considered as an important niche to be occupied by CFHT. Presently FOCAM and HRCAM use this prime focus, MOCAM and possibly MEGACAM will give CFHT mosaic CCD cameras. HRCAM will be decommissioned as soon as SIS guiding for the tip tilt mirror with APDs sensors is proven more efficient, which is almost assured now. (iv) The Gecko (coude f/4) spectrograph will have tough competition from similar instruments on larger telescopes. It will have to be feed by fibers from the cassegrain (and possibly from the prime focus) as soon as possible to make the set up easier and to complement the block scheduling of cassegrain and prime focus instruments by "bright time" usage of the coude spectrographs. On the longer term, it has a unique advantage of high spectral dispersion and its competitiveness could be significantly increased by a fiber feed from Gemini North. (v) The Fourier Transform Spectrometer, complemented by IR and CCD imaging modes can give unique results, but will not be competive with cooled grating spectrographs on other telescopes. (vi) UV instruments, namely, the Herzberg spectrograph and the coude spectrographs are unique and will have only a limited number of competing instruments on larger telescope in the foreseeable future. But the Herzberg and the coude spectrographs are not presently under high demand. Is it necessary to support them in order to maintain a niche for the future?

Into the next century we cannot imagine a solution for CFHT without significant investment: on the mid-term it will be necessary to specialize the telescope and to develop an instrumentation plan which will reduce the manpower needed to operate it. On the longer term the site CFHT has on Mauna Kea might be better used by a larger telescope. Each of these topics (new instrumentation plan, implantation of an 8m or larger class telescope on the site currently occupied by CFHT) may well need new partners and a modified international agreement to permit CFHT to evolve.

Site for 1995 Users Meeting

The CFHT users meeting will be held on May 15--16 1995 in France. The preferred location is Lyons, but if this proves to be impractical, the meeting will be held in Toulouse. All users of the telescope should consider attending this meeting. It is likely that many issues related to the long term status of CFHT will be discussed and decided upon at this time.

Harvey Richer

CITA ANNUAL REPORT 1993 ICAT

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

The following is an abbreviated version of the CITA Annual Report for 1993. The full report, including a list of publications, is available on request from *citadmin@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 Program 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.

Personnel Changes In 1993

Ten new staff joined CITA in 1993. Norm Murray (Caltech) joined the CITA faculty as an assistant professor, and Brian Chaboyer (Yale), Jim Chiang (Stanford), Andrew Jaffe (Chicago), Janna Levin (MIT), Izumi Murakami (Tokyo), Dmitri Pogosyan (IOA, Cambridge), Derek Richardson (IOA, Cambridge), Seshadri Sridhar (Caltech), and Jihad Touma (MIT) were appointed research fellows. They joined research associates Robert Malaney, Glenn Starkman, and Chris Thompson and research fellows Arif Babul, Francis Bernardeau, Scott Grossman, Man Hoi Lee, Rob Nelson, Mike Nowak, Dave Syer, and Rien van de Weygaert.

Ray McLenaghan (Waterloo) spent the winter term of 1993 at CITA as a Reinhardt Fellow, and Mike Fich (Waterloo) was a frequent visitor.

A number of our research fellows have left during the past year. Keith Ashman is now an adjunct assistant professor at the University of Kansas. Omer Blaes is an assistant professor at the University of California, Santa Barbara. Luc Binette is at the European Southern Observatory. Bill Keogh is a visiting assistant professor in the Department of Chemistry, University of Toronto. Lev Kofman is an associate professor at the Institute for Astronomy, University of Hawaii. Avery Meiksin is an Edwin Hubble research scientist at the University of Chicago. Prasenjit Saha is a post-doctoral fellow at Mount Stromlo and Siding Springs Observatories, Australia. John Wang is presently a research associate at JILA, University of Colorado, moving in the fall to an assistant professorship at the University of Maryland. Larry Widrow is an assistant professor at Queen's University. Lin Zuo is a post-doctoral fellow at the Center for Astrophysics and Space Sciences, University of California, San Diego.

In 1993, Nick Kaiser received the Herzberg Medal of the Canadian Association of Physicists, which is awarded for outstanding achievements by a physicist under 40.

Francis Bernardeau was awarded the Daniel Guinier prize from the Société Francaise de Physique.

Francois Rouleau was awarded an NSERC postdoctoral fellowship.

Faculty and research fellows have been involved in the supervision of six Ph.D. students from the University of Toronto: S.-H. Kim, J. Wadsley, P. Wiegert, and P. Zembrowski from Astronomy, and E. Poon and G. Squires from Physics. Undergraduates T. Clarke, D. Giguere, and D. Parker (Toronto) also conducted research at CITA during 1993.

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, our research fellows successfully attracted substantial support from other sources including 2 NSERC Postdoctoral Fellowships (Chaboyer and Lee), 3 of NSERC's Canada International Fellowships (Meiksin, Murakami, and van de Weygaert), 2 NSERC University Research Fellowships (Binette and Boothroyd), 2 NATO SERC fellowships (Ashman and Syer), the Canadian Institute for Advanced Research (Kofman and Starkman), and the Texas Advanced Research Program (Thompson).

National Fellows 1993

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.

- A. Barvinsky (Ph.D. Moscow State University), held at the University of Alberta (1991-1993)
- G. Hayward (Ph.D. University of Alberta), held at the University of Alberta (1992-1994)
- D. Salopek (Ph.D. University of Toronto 1989), held at University of Alberta (1993-1995)
- T. Zannias (Ph.D. University of Alberta 1985), held at Queen's University (1992-1994)

CITA Visitors

CITA has a vigorous visitors program bringing a number of Astronomy and Physics faculty members from other Canadian universities and from abroad for both extended stays and shorter visits.

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), 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 CIAR also collaborated with CITA in 1993 to help support research associates and CIAR Scholars Lev Kofman and Glenn Starkman. 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 entire 12th floor of the McLennan Physical Laboratories at the downtown campus of the University of Toronto. We continue to own a three-eighths share (the remainder being divided between Astronomy and Physics) of a Silicon Graphics 4D/280 (8 processors, 256 Mb), where, until recently, most of our computationally-intensive jobs were run, and which is still heavily used.

In 1993 we used money from an NSERC equipment grant to purchase two Digital Equipment Alpha AXP systems, which have become CITA's primary computer servers. The combined computational power of these two systems (a 32 Mb 3000/400S and a 256 Mb 3000/500S) tends to be approximately the same as that of the entire 4D/280. The configuration provides us with one system for large-memory jobs, and another one for jobs with more modest memory requirements. The 500S will eventually support 1 Gb of memory.

The 4D/280 and the AXPs are supplemented with a network of ten Sun-3/50 workstations, eight Sun Sparcstations, eleven Silicon Graphics Indigos and Personal IRISes, and one DEC Alpha AXP workstation. The SGI systems are used to support research activity demanding 3--D scientific visualization. The disk capacity available to the network currently exceeds 30 Gb.

We are planning to phase out most of our remaining Sun3s over the next year or two, replacing them with X terminals and more powerful workstations.

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. Rika Maniates (Vice-Dean, School of Graduate Studies, University of Toronto) and Peter Sutherland (McMaster University), Chair of the Council, finished their terms during 1993.

Conferences supported by CITA

CITA supports scientific workshops and meetings in Canada on subjects of interest to theoretical astrophysics. Meetings supported by CITA in 1993 were:

- "Workshop on Clusters of Galaxies",
  February 18-23, Banff,
  organizer N. Kaiser, (CITA).
- "Fifth Canadian Conference on General Relativity and Relativistic Astrophysics",
  May 13-15, U. of Waterloo.
- "Instability and Variability of Hot-Star Winds",
  August 23-27, Isle-aux-Coudres,
  organizer A. Moffat (U. de Montréal).
- "Integration Algorithms for Classical Mechanics",
  October 14-17, U. of Waterloo,
  organizers J. Marsden (Fields Institute) and S. Tremaine (CITA).
- "Young Circumstellar Disks",
  October 21-23, U. de Montréal,
  organizer P. Bastien (U. de Montréal).

Scientific Activity 1993

Research at CITA covers a broad range of topics in astrophysical theory, including gravitation theory, large scale structure, the microwave background, gravitational lensing, the interstellar and intergalactic media, dynamics, stellar physics, active galactic nuclei, pulsars, gamma-ray bursts, and solar system astrophysics. Here, we give a brief overview of the reseach activities in 1993.

Levin, together with Freese (Michigan), has investigated the evolution of a universe with Brans-Dicke gravity. Kaiser, Malaney and Starkman have studied a mechanism for creating mixed dark matter, in which a heavy neutrino decays into a lighter one via the stimulated emission of cold bosons.

Kaiser and Squires, collaborating with Fahlman and Woods (UBC), have mapped the dark matter distribution in the X-ray cluster ms1224.7+2007 using the gravitational distortion of the images of faint background galaxies. They find a projected mass three times larger than that derived from virial models; this implies a mean cosmic density parameter $\Omega \approx 2$. Dick Bond continued a broad program of research on the phenomenology and theory of cosmic microwave background anisotropies. He applied Bayesian statistical methods to the FIRS balloon data and first year of COBE data, and further developed these methods for uncleaned CMB anisotropy data. With Crittenden, Davis and Steinhardt (U. Penn.) and Efstathiou (Oxford), he combined large and small angular scale data to constrain the spectral index n of the seed fluctations as well as the relative contributions of gravitational waves and scalar modes. Grossman and Saha have investigated the shape of gravitationally lensed arcs in galaxies clusters, with a view to constraining the cluster density profile. Babul, collaborating with Ferguson (STScI), has developed a spectral synthesis/stellar evolution code for starbusting dwarf galaxies, and applied it to the observed faint galaxy counts.

Bernardeau has studied the quasilinear regime of gravitational clustering in an expanding universe, focussing on the behavior of rare density peaks and the validity of the spherical collapse model. With Kofman, he has analysed the statistical properties of the density field and compared various approximation schemes. He has also obtained exact analytic results for the skewness and kurtosis of large scale cosmic fields, and calculated the effect of window functions on cumulants of the density field. Bond and Myers have developed a method for calculating catalogues of virialized cosmic objects, which generalizes the BBKS peaks theory and takes into account the effects of cosmic shear. They have used it to make deep field X-ray and Sunyaev-Zel'dovich maps; combined with the current X-ray temperature data, these suggest that the spectrum normalization parameter is $\sigma_8 = 0.7 \pm 0.1$. Miralda-Escudé (IAS) and Babul have compared mass estimates from gravitationally lensed arcs in rich clusters with hydrostatic models for the intracluster gas, and conclude that the lensing data imply a mass distribution that is significantly more concentrated. Van de Weygaert has developed a code for distributing particles within a Voronoi cell structure. With Jones (Niels Bohr I.) he has examined the convergence of the cosmic dipole in a universe built of Voronoi cells. He has also completed a code for generating constrained random Gaussian density and velocity fields, which is an ideal tool for studying the formation of rare cosmic objects. With Babul, he has applied this code to study the effects of cosmic shear on the collapse of peaks and voids.

Ashman and Zepf continue to investigate the clues that globular clusters provide about their host galaxies, in particular their merger history and chemical evolution. On the basis of published data and ongoing observational projects, they conclude that the bulk of evidence supports a merger origin for elliptical galaxies.

Meiksin computed detailed numerical models of Lyman-alpha clouds in the minihalo model, including non-equilibrium effects in both spherical and slab geometries. He found a minimum Doppler parameter of $b \sim 25$ km $\cdot s^{-1}$ for absorption lines with column densities $14 < \log N_{HI} < 16$, and a flattening of the column density distribution near log $N^{HI} \sim$ 15-16 due to the formation of a quasi-hydrostatic core. Murakami, with Ikeuchi (Osaka), has calculated the behaviour of gas trapped in minihaloes under an evolving photoionizing UV flux, and determined the resulting number density evolution of the Lyman alpha forest lines. With Umemura (Tsukuba), she has performed two-dimensional hydrodynamical simulations of ram pressure stripping of gas from an elliptical galaxy by cluster gas. Bond and Zuo developed a method for analyzing correlations of lines in the Lyman alpha forest, that is especially useful for the crowded spectra of high redshift quasars. They found a significant excess in the correlation function at $\Delta v \sim 150$ km $\cdot s^{-1}$, which they argue is most likely due to physical clustering. Shapiro and Giroux (U. Texas) and Babul have constructed a self-consistent model for the evolution of the intergalactic medium, that takes into account energy release in collapsing structures. They conclude that a substantial fraction of the baryonic content of the universe may remain uncollapsed in the standard CDM model.

Martin and Rouleau have calculated the angle-averaged extinction due to scattering by two or more proximate Rayleigh spheres, and find significantly lower extinctions that those obtained by effective medium models. Wolff (U. Wisconsin), Martin and colleagues

have examined the effects of porosity on grain scattering cross-sections, using the discrete-dipole approximation. Martin and Kim have used the maximum entropy method to estimate how the size distribution and compositional mix ofinterstellar dust grains varies throughout the Galaxy, based on the observed variations in the shape of the interstellar extinction curve. They have also extracted the size distribution of polarizing dust grains from the wavelength dependence of the interstellar linear polarization. Somerville (UCL), Martin and colleagues have measured the UV interstellar polarization of 2 stars using HST. Whittet (RPI), Martin and colleagues have studied the interstellar polarization, grain alignment, and magnetic field in the Chamaeleon I dark cloud and T-association.

Boothroyd, Martin and Keogh, together with Peterson (U. Toronto) are calculating cross-sections for the excitation and dissociation in H_2-H_2 collsions. They have calculated the electronic potential energy surface of the intermediate H_4 state and fitted it with an analytic expression, and performed a similar calculation for He-H_2.

Sridhar and Goldreich (Caltech) have developed a theory of incompressible Alfvénic turbulence. This promises to explain the power law spectrum of interstellar turbulence which is observed, via scintillation of radio sources, on scales in the range 10^9 cm $\leq l \leq$ 10^{15} cm. A weak turbulent cascade proceeds via 4-mode couplings between waves, and inevitably leads to strong Alfvénic turbulence, for which they have proposed a unique spectrum.

Tremaine and a group of 7 other observers and theorists lead by Faber (U.C. Santa Cruz) has obtained HST images of some 50 early-type galaxies. They find that most galaxies have "cores" which exhibit power law photometric profiles at the smallest observed radii, $I(r) \propto r^{\gamma}$, with γ ranging from -0.1 for bright ellipticals to -0.9 for faint ellipticals. Spectroscopy with the repaired HST may help to determine whether black holes are responsible for some of these power-law profiles. Nelson and Tremaine have investigated the damping and excitation of galactic warps through their gravitational interaction with the surrounding dark matter halo. They find that, under certain conditions, a warp can actually gain energy from an anisotropic halo. Lee and Goodman (Princeton) are studying the relaxation of rotating axisymmetric stellar systems, using a direct-integration Fokker-Planck code developed by Goodman. Richardson and Thomson (Cambridge) are performing numerical simulations of grazing parabolic encounters between galaxies of unequal mass to model the formation and dynamics of "shreds". Syer and Tremaine have studied stellar dynamics in a phase space where particles are restricted to discrete points on a rectangular lattice. The resulting lattice equations yield the collisionless Boltzmann equation in the continuum limit, and can be used to find true equilibrium solutions for the phase space distribution function. Syer derived an expression for the dynamical friction force on a relativistic test mass in an ambient medium of relativistic light particles. He applied this to the problem of capture of a star by a neutrino ball.

Williams (Rutgers) and Saha have studied the details kinematics of 5 elliptical galaxies, by taking long-slit spectra along 2-4 position angles each, and analyzing these to find rotation curves and general broadening functions.

Murray and Goldreich (Caltech) suggested that scattering of solar p-modes by convective turbulence is the source of the observed p-mode linewidths. The strongest scattering occurs neat the top of the acoustic cavity, where the mode changes character from propagating to evanescent. This scattering damps p-modes, but excites f-modes. Together with Kumar (MIT), they also calculated the rates at which energy is supplied to individual p-modes from turbulent motions. They were able to reproduce the scaling of mode energy with frequency at both low and high frequencies. Boothroyd and Sackmann (Caltech) have studied nucleosynthesis (due to helium shell flashes or thermal pulses) in AGB stars. They find that the choice of molecular opacities has a significant effect on the temperature at the base of the convective envelope, and thus on the extent of hot-bottom burning enountered by more massive AGB stars ($> 4\ M_{\odot}$). They have also made a systematic study of the surface compositional changes resulting from the first and second dredge-ups, as a function of stellar mass and metallicity.

Chiang, together with Michelson (Stanford) and the EGRET team, has determined the luminosity function and luminosity evolution of the gamma-ray loud AGN discovered by EGRET, and has calculated their contribution to the diffuse gamma-ray background. Binette, collaborating with Fosbury and Parker (ST-ECF), has analysed the Hß equivalent width in various classes of AGN, and finds no trend over 5 orders of magnitude of continuum power. Martin and Urry (STScI) have measured the ultraviolet variability of the BL Lac object PKS 2155-304. Edelson (NASA/GSFC), Martin, et al. have detected strong correlations between different spectral bands from the radio to the x-rays, and suggest that these observations are most consistent with the entire radio to x-ray continuum arising from direct synchrotron emission from a relativistic jet.

Nowak and Wagoner (Stanford) have calculated the turbulent excitation of trapped modes in black hole accretion disks, and have estimated the resulting modulation of the UV and optical emission from AGN. Blaes and Balbus (Virginia) have analyzed the magnetic shearing instability in partially ionized accretion disks, such as protoplanetary disks and the molecular tori seen in the centers of galaxies. They find that the instability is still present if the collision frequency between ions and neutrals exceeds the orbital frequency, although if ionization equilibrium holds in the disk then a much higher collision frequency is required.

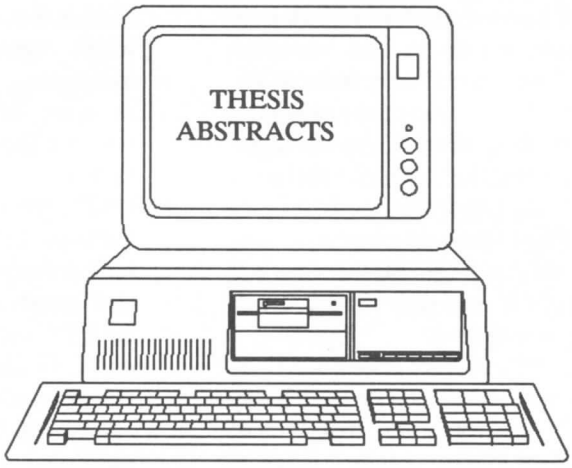
Blaes and Madau (STScI) have continued their examination of quiescent and transient UV and X-ray radiation from isolated old neutron stars that accrete interstellar material. They have made detailed predictions for the numbers of such stars detectable by EUVE and by the ROSAT-PSPC all sky survey. Nelson and Wang, in collaboration with Salpeter and Wasserman (Cornell), predict that low luminosity accreting neutron stars with strong magnetic fields should emit a substantial fraction (0.5 - 5%) of their total luminosity in a narrow ($E/\epsilon E$ ~ 2-4) cyclotron emission line which peaks in the energy range 5-20 keV. This nonthermal cyclotron component should be absorbed much less than the thermal continuum. It may be observable in Be/X-ray binaries, and may be the only detectable radiative signature from isolated accreting neutron stars. Wang and Nelson also suggest that the same cyclotron line would be present in quiescent emission from gamma-ray burst sources (if these sources are galactic neutron stars).

Nowak has developed a detailed kinematic model of X-ray power spectra of black hole candidates in their "very high state", based on the viscous and thermal instabilities that are believed to be present in accretion disks. He has made specific comparisons between the model and data for GX339-4. Chiang and Romani (Stanford) have modeled the gamma-ray light curves and phase-resolved spectra of young, rapidly spinning pulsars. They have calculated in detail the pair-photon cascade triggered by single-photon pair production off the magnetic field, as well as by photon-photon collisions.

Thompson and Duncan (U. Texas) have proposed that the soft-gamma repeaters are a class of neutron stars with external magnetic fields much stronger than those of ordinary pulsars. They have developed a detailed radiative model for the SGR bursts that explains their weak spectral evolution and strongly super-Eddington luminosities. Malaney and Holdom (U. Toronto) have proposed that the neutrino emission from a supernova-type explosion can be converted into a gamma-ray burst of total energy ~ 10^{50} erg, if the explosion is situated inside a ball of trapped neutrinos, which in turn may lie in a galactic core. Grossman and Nowak have made a detailed computation of the rate at which cosmological gamma-ray bursts are lensed by intervening galaxies, using improved lensing cross-sections, burst fluxes and spectra, and taking into account the duty cycle of the BATSE detector. They have also developed new statistical test for distinguishing GRB light curves, which involves fourier transforming the burst light curves and then comparing pairs of bursts only at frequencies that are signal-dominated. They find that nearly all the bursts in the publically available BATSE catalogue are distinguishable. Nowak has explored the sensitivity of recent claims of nearest neighbor correlations in the angular positions of gamma-ray bursts, to both the burst subclasses and the burst positional errors. Syer and Saha have computed bookmaker's odds for competing models of the sky distribution of gamma-ray bursts, and on the basis of the first BATSE catalogue have concluded that an isotropic distribution is favored, but only weakly. Blaes, Clarke and Tremaine have investigated the possibility that gamma-ray burst sources lie in the Oort cloud, and conclude that such models face serious problems.

Richardson is developing a tree code optimized for local simulations of flattened dynamical systems such as the solar system and planetary rings. Dones and Tremaine have examined the statistical properties of the large impacts that probably occured during the last stages of planetary accumulation. They have calculated the mass of the largest expected impactor, the expected spin, and so on, and compared their results with Wetherill's simulations. Tremaine, Webster (Melbourne) and their collaborators have searched for satellites of Uranus and Neptune using automated measurements of large Schmidt plates. No new satellites were found, to a limiting magnitude of B_J = 20.5. Saha and Tremaine have devised an integration scheme for planetary orbits which uses a different timestep for each planet, and which is symplectic and time-reversible. Tremaine and Wiegert are investigating the evolution of the orbits of long-period comets in the combined gravitational field of the Sun, the giant planets, and the Galactic tide.

Arnold Boothroyd Christopher Thompson



The Star Forming Core of Mon R2

Jean Giannakopoulou
M.Sc. Thesis, Saint Mary's University, 1993 September
Thesis Supervisor: George F. Mitchell

In this thesis, the nature of the star forming core of the Mon R2 cloud is investigated using new, high spatial resolution observations. The new data include: maps of 12CO J=3-2, HCN J=4-3 and H2C0 J(K-1,K+1) =5(1,5)-4(1,4), spectra of 12CO J=2-1 and 13CO J=3-2 at 12 positions, an infrared M-band spectrum, and finally sub-millimeter and millimeter continuum maps (450 microns, 800 microns, 1100 microns and 1300 microns). Based on the spatial distribution of the intensity of the 12CO J=3-2 transition, we present a qualitative description of the region which consists of complexes and clumps. The complexes surround a central area of lower intensity which corresponds to the compact H II region in the cloud core. The radiation from the sub-millimeter and millimeter continuum maps is believed to be due to thermal emission from dust, located in and around the H II region. Some differences between maps are believed to be due to the increasing importance in the millimeter maps of free-free emission from ionized gas.

The complexes incorporate 13 smaller intensity peaks (clumps), which have large masses (2.7 to 0.007 solar masses) and large velocity dispersions (typically 30 km/s). The CO clumps are not distributed in a bipolar fashion. They probably formed from the interaction of the large outflow with the ambient gas. The source of the outflow is not clearly identified. We propose that the outflow could originate from IRS 3, which has gone through a quiescent phase.

The CO excitation temperature, Tex, varies between 5 and 60 K. Although the CO J=3-2 transition can locate the position of the dense gas, it misses a large fraction of the dense quiescent gas (70-80%) due to self-absorption.

The sum of the magnetic and the gravitational energy (12 x 10[45] erg) is somewhat smaller than the total kinetic energy of the inner core of the Mon R2 cloud (15 x 10[45] erg), and hence, the core is either in the process of disruption or in dynamical equilibrium.

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Empirical Confirmation of the Mass Dependence for White Dwarf Luminosities

Jeremy R. W. Beckett
M.Sc. Thesis, Saint Mary's University, 1993 December
Thesis Supervisor: David G. Turner

Existing calibrations of white dwarf luminosities have invariably relied upon the inhomogeneous sample of refractor parallaxes published in the General Catalogue of Trigonometric Stellar Parallaxes. We have completed a new calibration of white dwarf absolute magnitudes using a compilation of homogeneous and very accurate reflector parallaxes published by the U.S. Naval Observatory. The properties of the stars in this sample are well enough established that statistical luminosity corrections resulting from the combination of parallax errors with the space distribution peculiar to the stars can be

established fairly reliably. The resulting luminosity calibration is in very good agreement with previously published results, and is of sufficient accuracy to investigate for the subset of DA-type stars the expected dependence on surface gravity (or mass) predicted theoretically from the white dwarf mass-radius relation. The results are in complete accord with expected results, which indicates that a full knowledge of the luminosity for any DA-type white dwarf requires information on its surface gravity as well as effective temperature. A byproduct of this study is a new estimate for the distance to the Hyades cluster, which contains several member DA stars.

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Neutrino Oscillations as an Explanation for the Solar Neutrino Problem

David C. Taylor
B.Sc. Thesis, Saint Mary's University,
1994 May
Thesis Supervisor: Malcolm N. Butler

One possible solution to the solar neutrino problem is that neutrinos may have mass, which leads to the possibility of one flavour of neutrino converting to another as it travels from the Sun to the Earth. We are investigating the possibility that all three known flavours of neutrinos are involved in this process, and whether the signals that are seen in Earth-based solar neutrino detectors can be used to differentiate the many theoretical models for the neutrino mass hierarchy. The Zee model is a simple case to explore the possible reasons for the discrepancy in the observed solar neutrinos. This model requires at least one of the neutrinos to have mass and then flavour changing can occur between neutrinos.

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Oblique Magnetic Fields in Cosmic-Ray Mediated MHD Shocks

Jonathan Dursi
Honours B.Sc. Thesis, Saint Mary's University,
1994 May
Thesis Supervisor: David A. Clarke

In this report, the results of several time-dependent numerical simulations, based on the two-fluid model, of cosmic-ray mediated MHD shocks are presented. One-dimensional shocks with magnetic fields oblique to the shock normal are examined. The dependence of the shock structure on the angle between the magnetic field and the shock normal, and the magnitude of the ambient magnetic field is investigated.

It is found that for weak fields the orientation of the B-field plays only a very small role, whereas for stronger fields,there is a large directional dependence. The orientation can strongly influence the transient features of the shock structure, but the steady-state values are almost unaffected, even in stronger fields. Furthermore, in the one-dimensional case, the orientation of the magnetic field will affect the "effective" Alfven speed of the fluid, as only the perpendicular component of the magnetic field will contribute to signal speed. The cosmic ray acceleration efficiency is found to depend on the angle, as a strong perpendicular component of the magnetic field will act to decrease the acceleration efficiency. There is no dependence on the parallel component of the magnetic field.

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AUDITORS' REPORT

To the Members
of
CANADIAN ASTRONOMICAL SOCIETY

We have audited the balance sheet of the Canadian Astronomical Society as at March 31, 1994, and the statement of income and operating surplus for the year then ended. These financial statements are the responsibility of the management. Our responsibility is to express an opinion on these financial statements.

Except as explained in the following paragraph, we conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management as well as evaluating the overall financial statement presentation.

In common with many non profit organizations, the organization derives revenue from membership fees, the completeness of which is not susceptible of satisfactory audit verification. Accordingly, our verification of these revenues was limited to the amounts recorded in the records of the organization and we were not able to determine whether any adjustments might be necessary to membership fee revenue, excess of revenues over expense, assets and operating surplus.

In our opinion, except for the effect of adjustments, if any, which we might have determined to be necessary had we been able to satisfy ourselves concerning the completeness of the membership fees referred to in the preceding paragraph, these financial statements present fairly, in all material respects, the financial position of the Canadian Astronomical Society as at March 31, 1994, and the results of its operations for the year then ended in accordance with generally accepted accounting principles.

TORONTO, Ontario
April 25, 1994

Tinkham & Associates
CHARTERED ACCOUNTANTS

CANADIAN ASTRONOMICAL SOCIETY
BALANCE SHEET
AS AT MARCH 31, 1994

	1994	1993
ASSETS		
CURRENT		
Cash	$ 20,504	$ 19,844
Investments	27,200	27,200
Interest receivable	679	848
	48,383	47,892
OTHER		
Due from trust	-	4,060
	$ 48,383	$ 51,952
LIABILITIES and OPERATING SURPLUS		
CURRENT		
Accounts payable	$ 451	$ 300
OPERATING SURPLUS	47,932	51,652
	$ 48,383	$ 51,952

Accounting policies - Note 1

On behalf of the Board:

C A. Higgs Board Member

Christine M Clement Board Member

CANADIAN ASTRONOMICAL SOCIETY
STATEMENT OF INCOME AND OPERATING SURPLUS
FOR THE YEAR ENDED MARCH 31, 1994

	1994	1993
REVENUE		
Membership fees	$ 12,127	$ 12,153
Interest income	1,643	3,448
Miscellaneous revenue	-	112
	13,770	15,713
EXPENSE		
Lecture and awards		
Hogg lecture	-	616
Petrie lecture	1,733	-
Beals award	-	1,583
Plaskett award	-	1,328
	1,733	3,527
Office and General		
Astronomical Society of the Pacific	928	631
Donations	4,665	-
Newsletter	6,163	4,182
Office-treasurer	490	670
Office-secretary	2,124	1,815
Shipments to Third World	-	1,253
Publication costs	861	-
Professional	526	300
	15,757	8,851
	17,490	12,378
EXCESS OF (EXPENSE OVER REVENUE) REVENUE OVER EXPENSE FOR THE YEAR	(3,720)	3,335
OPERATING SURPLUS, April 1	51,652	48,317
OPERATING SURPLUS, March 31	$ 47,932	$ 51,652

CANADIAN ASTRONOMICAL SOCIETY
NOTES TO FINANCIAL STATEMENTS
MARCH 31, 1994

NOTE 1 SIGNIFICANT ACCOUNTING POLICIES

(a) Revenue and expense recognition

Membership fees and contributions are recorded when received.

NOTE 2 ORGANIZATION

The Canadian Astronomical Society is a non-profit organization incorporated without share capital for the purpose of promoting public awareness of science in Canada.

NOTE 3 RELATED PARTY TRANSACTIONS

During the year, the society forgave $4,060 which was due from Cascatrust. It was expensed in the current year as a donation.

NOTE 4 STATEMENT OF CHANGE IN FINANCIAL POSITION

A statement of changes in financial position has not been provided because all the information is available to management and the statement will not add meaningful information to these financial statements.

Tinkham & Associates
CHARTERED ACCOUNTANTS

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AUDITORS' REPORT

To the Trustees
of
CASCATRUST

We have audited the balance sheet of the Cascatrust as at March 31, 1994. and the statement of income and operating surplus for the year then ended. These financial statements are the responsibility of the management. Our responsibility is to express an opinion on these financial statements.

Except as explained in the following paragraph, we have conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In common with many charitable organizations, the organization derives revenue from donations the completeness of which is not susceptible of satisfactory audit verification. Accordingly, our verification of these revenues was limited to the amounts recorded in the records of the organization and we were not able to determine whether any adjustments might be necessary to donation revenues. excess of expense over revenue, assets and operating surplus.

In our opinion, these financial statements present fairly, in all material respects, the financial position of the Cascatrust as at March 31, 1994, and the results of its operations for the year then ended in accordance with generally accepted accounting principles.

TORONTO, Ontario
April 25, 1994

Tinkham & Associates
CHARTERED ACCOUNTANTS

CASCATRUST
BALANCE SHEET
AS AT MARCH 31, 1994

	1994	1993
ASSETS		
CURRENT		
Cash	$ 2,514	$ 3,220
Investments	1,000	1,000
Interest receivable	34	36
	3,548	4,256
LONG TERM		
Restricted funds (Note 1)	100	100
	$ 3,648	$ 4,356
LIABILITIES and OPERATING SURPLUS		
CURRENT		
Accounts payable	$ 200	$ 200
OTHER		
Due to related party	-	4,060
	200	4,260
OPERATING SURPLUS	3,448	96
	$ 3,648	$ 4,356

On behalf of the Trustees:

Christine M Clement Trustee

Trustee

CASCATRUST
STATEMENT OF INCOME AND OPERATING SURPLUS
FOR THE YEAR ENDED MARCH 31, 1994

	1994	1993
REVENUE		
Donations	$ 5,713	$ 100
Interest income	65	46
Royalties	-	1,224
	5,778	1,370
EXPENSE		
Lectures and awards		
Plaskett medal	761	-
Hogg lecture	1,323	-
	2,084	-
Operating expense		
Bank charges	1	14
Printing costs	127	-
Professional	214	1,260
	342	1,274
	2,426	1,274
EXCESS OF REVENUE OVER EXPENSE FOR THE YEAR	3,352	96
OPERATING SURPLUS, April 1	96	-
OPERATING SURPLUS, March 31	$ 3,448	$ 96

CASCATRUST
NOTES TO FINANCIAL STATEMENTS
MARCH 31, 1994

NOTE 1 RESTRICTED FUNDS

A gift of $100 is restricted for a period of ten years commencing in 1993.

NOTE 2 ORGANIZATION

The Cascatrust is a charitable trust without share capital constituted for the purpose of advancement of education in astronomy and is a registered charity for income tax purposes.

NOTE 3 RELATED PARTY TRANSACTIONS

During the year, the Canadian Astronomical Society forgave $4,060 which was due from Cascatrust. It was taken into income in the current year as a donation.

NOTE 4 STATEMENT OF CHANGES IN FINANCIAL POSITION

A statement of changes in financial position has not been provided because all the information is available to management and the statement will not add meaningful information to these finanacial statements.

CANADIAN ASTRONOMY PUBLICATIONS
March 14 to June 21, 1994

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.

Bastien, P.; Asselin, L.; Menard, F. *The circumstellar environment of two HAEBE stars.* Obs. Mont Megantic. 2-May-1994

Bernardeau, F.; Kofman, L. *Properties of the cosmological density distribution function.* CITA. 7-Apr-1994

Bernardeau, F. *The effects of smoothing on the statistical properties of large-scale cosmic fields.* CITA. 24-Mar-1994

Bernardeau, F.; et al. *Omega from the skewness of the cosmic velocity divergence.* CITA. 12-May-1994

Borra, E.F. *Are BL Lacertae objects beamed QSO remnants?* Obs. Mont Megantic. 30-May-1994

Buonanno, R.; Pecci, F.F.; Fahlman, G.G.; Richer, H.B. *Two young galactic globular clusters: Terzan 7 and Arp 2.* UBC. 14-Apr-1994

Chaboyer, B. *The primordial abundance of 6Li and 9Be.* CITA. 9-Jun-1994

Chaboyer, B.; Demarque, P. *7Li abundances in halo stars: testing stellar evolution models and the primordial 7Li abundance.* CITA. 21-Apr-1994

Coiol, R.; Demers, S.; Barneoud, R.; Pena, M. *The Montreal blue galaxy survey II. Second list of UV-bright candidates.* Obs. Mont Megantic. 2-May-1994

Curry, C.; Pudritz, R.E.; Sutherland, P.G. *On the global stability of magnetized accretion disks: axisymmetric modes.* McMaster U. 19-Apr-1994

Davidge, T.J.; Simons, D.A. *Deep infrared array photometry of globular clusters. II. M71.* DAO. 3-May-1994

Deliyannis, C.P.; Malaney, R.A. *Flare production of 6Li in population II stars.* CITA. 3-Jun-1994

Evans, N.R.; Massa, D.; Teays, T.J. *S Mus B revisited.* ISTS York U. 14-Apr-1994

Fahlman, G.; et al. *Dark matter in ms1224 from distortion of background galaxies.* CITA. 24-May-1994

Frail, D.A.; Beasley, A.J. *Stellar OH masers toward globular clusters.* NRAO. 31-May-1994

Freedman, W.L. *The local group as a stepping stone to the universe.* Obs. Carnegie Inst. 27-May-1994

Gabuzda, D.C.; et al. *Unusual evolution in the VLBI structure of 0735+178.* U Calgary. 18-May-1994

Gabuzda, D.C.; et al. *Evolution of the milliarcsecond total intensity and polarization structures of BL Lacertae objects.* U Calgary. 18-May-1994

Glaspey, J.W.; Pritchet, C.J.; Stetson, P.B. *Lithium in high velocity A and F stars: constraints on the blue straggler phenomenon.* CFHT. 13-May-1994

Hutchings, J.B.; et al. *HST imaging of QSOs with WFPC2.* DAO. 3-May-1994

Hutchings, J.B.; Morris, S.C.; Gower, A.C.; Lister, M.L. *Correlated optical and radio structure in the QSO 1302-102.* DAO. 3-May-1994

Keogh, W.G.; Martin, P.G. *Molecular trajectory calculations on a network of workstations using PVM.* CITA. 24-May-1994

Kim, S.-H.; Martin, P.G. *The size distribution of interstellar dust particles as determined from polarization: infinite cylinders.* CITA. 29-Mar-1994

Kofman, L.; Pogosyan, D. *Equations of gravitational instability are non-local.* CITA. 24-Mar-1994

Langill, P.P.; Kwok, S.; Hrivnak, B.J. *High resolution optical imaging of the 'frosty Leo nebula'* U Calgary. 20-May-1994

Malaney, R.A.; Starkman, G.D.; Tremaine, S. *Time delays of supernova neutrinos from new long-range interactions.* CITA. 21-Jun-1994

Meurer, G.R.; Mackie, G.; Carignan, C. *Optical observations of NGC 2915: a nearby blue compact dwarf galaxy.* Obs. Mont Megantic. 2-May-1994

Murray, N.; Grossman, S.A.; Chiang, J. *Accretion disk winds from active galactic nuclei.* CITA. 21-Jun-1994

Piatek, S.; et al. *Mass-to-light ratios for globular clusters. III. M107 (NGC 6171; GC 1629-129)* DAO. 3-May-1994

Piche, F.; Vrba, F.J.; Luginbuhl, C.B. *An optical-infrared color-color diagram for finding young stars with infrared excess.* U Rochester. 9-Jun-1994

Pineault, S.; Landry, S. *Impact of small bodies on the discs around compact objects - I. Impact statistics.* Obs. Mont Megantic. 2-May-1994

Pritchet, C.J.; van den Bergh, S. *Faint surface photometry of the halo of M31.* DAO. 3-May-1994

Saha, P.; Tremaine, S. *Long-term planetary integration with individual time steps.* CITA. 29-Mar-1994

Stockton, A.; Ridgway, S.E.; Lilly, S. *Continuum and line emission in Cygnus A.* U Hawaii. 11-May-1994

Syer, D. *Relativistic dynamical friction in the weak scattering limit.* CITA. 30-May-1994

Syer, D. *Implications of neutrino balls as the source of gamma-ray bursts.* CITA. 30-May-1994

Vader, J.P.; Chaboyer, B. *The RSA survey of dwarf galaxies I. Optical photometry.* CITA. 21-Jun-1994

Wehlau, A.; Froelich, N. *The variables of M14.* UWO. 18-Mar-1994

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