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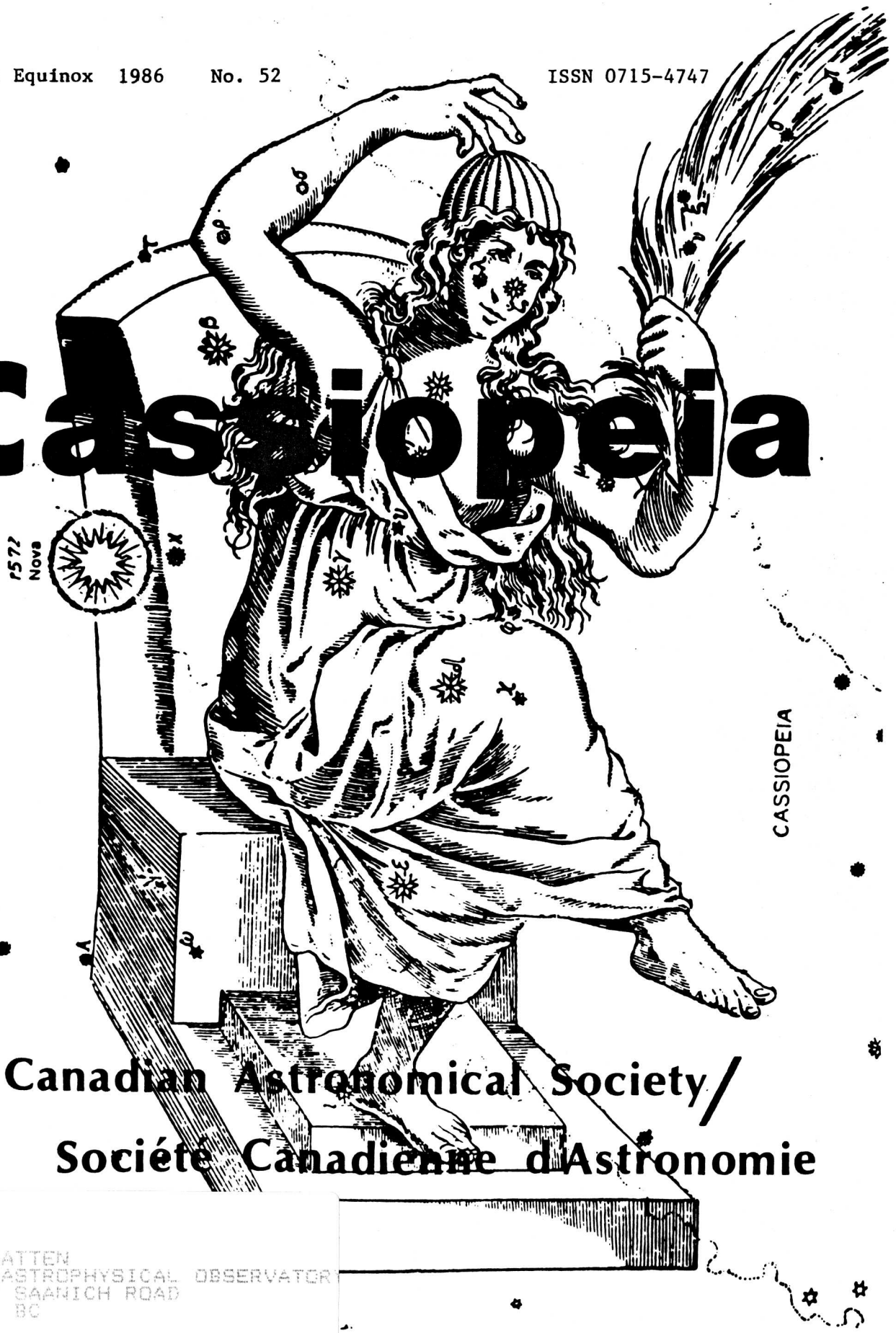
Cassiopeia



Canadian Astronomical Society/
Société Canadienne d'Astronomie

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Cassiopeia

No. 52 Autumnal Equinox 1986

CANADIAN ASTRONOMICAL SOCIETY

SOCIÉTÉ CANADIENNE D'ASTRONOMIE

Editor: Colin Scarfe, University of Victoria

DEADLINE FOR THE WINTER SOLSTICE ISSUE WILL BE DECEMBER 15

Editorial

Several of those who replied to my questionnaire of a year ago urged me to do some prodding in order to reestablish the practice of publishing short accounts of activities in Canadian astronomical institutions and groups. To this end I wrote last spring to people at most of these institutions (apologies to any I overlooked!) asking them to get their colleagues to choose from among their number someone who would be willing to write such an account from time to time. The first fruits of this effort are apparent in this issue. I anticipate that more will be forthcoming, but would be happy to have suggestions and comments from readers that I can forward to these correspondents concerning the nature of these reports and the subjects that would be of interest.

I have heard it suggested that some senior officials in Ottawa are coming to regard the components of HIA as purely national facilities whose purpose is solely to service the observational and computing needs of non-government astronomers. If these suggestions are true, they represent an enormous swing of the pendulum from the view of a couple of decades ago that the government observatories were a privileged group that need not be concerned with the aspirations of external astronomers, although they might at their discretion grant the latter observing time. In the present climate these views both seem to me to be equally absurd.

Of course, to avoid wasteful duplication in these days of tight budgets for expensive equipment and software, it is only sensible to have major items of this sort concentrated in national facilities to which all qualified and interested persons should have access. Thus HIA does have a responsibility to make its facilities available to the outside community. But this is readily accepted. It is vital not to forget, however, that HIA staff are experienced and creative scientists in their own right, and deserve support as such. Moreover their grouping in numbers sufficient for "critical mass" probably enhances their productivity substantially. It would therefore be most unwise to tamper with the present organization of HIA if this would risk impairing either its internal well-being, or its ability to serve the needs of the community as a whole.

Colin Scarfe

The winter meeting of the CASCA Board of Directors will take place in Toronto on Thursday, November 20. Since this is somewhat earlier than usual, please note that any concerns to be raised at that meeting should be in the hands of the President in advance of that date.

Chris Aikman

Geoffrey Edwards
Departement de physique
Université Laval
Québec, Québec
G1K 7P4
August 15, 1986

Mr. Chris Aikman
Dominion Astrophysical Observatory
Victoria, B.C.

Dear Mr. Aikman,

I have some comments to make about the use of the Westar Funds, if you can redirect them to the appropriate person or persons. My understanding, from the report in Cassiopeia, is that the eventual use of these funds is still an open question. I feel that as a finishing doctorate student, I may have something to contribute to the discussion.

While I'm sure most Canadian astronomers are aware of some of the difficulties facing Canadian postdocs today, I would like to review the situation. Shown below is a table giving a breakdown of the new postdoctoral or research associate positions advertised each month in the AAS Job Register. Although some months are missing (due to someone inadvertently throwing out the corresponding bulletins), I believe the table is representative enough to give one a feeling for the current situation.

Month	open research/ general background	ImgProc HST	Instrum	Radio	IR/high E	Sun/Atm Planetary	Theory Can	Theory Other	Total
JUN 1985	4	1	2	0	1	1	0	3	12
SEP 1985	2	3	1	1	2	2	2	3	16
NOV 1985	5	4	1	0	0	1	1	6	18
DEC 1985	2	4	0	3	3	0	0	8	20
JAN 1986	6	2	0	0	1	1	0	3	13
APR 1986	0	0	2	0	1	0	1	0	4
MAY 1986	1	0	1	1	1	2	0	0	6
JUN 1986	0	0	3	0	0	1	0	0	4
JUL 1986	2	0	3	0	1	2	0	0	8

Table 1: List of announced New Jobs which do no require previous postdoctoral experience, and for which a Ph.D is required, drawn from the AAS Job Bulletin. Headings are shown in the following specialized areas: Image Processing, Instrumentation, Radio Astronomy, Infrared and High Energy Astrophysics, Solar, Atmospheric, and Planetary Studies, Canadian theoretical work, Theoretical work in other countries

As the table illustrates, a year ago, the Job Register contained, on the average, five to ten new jobs per month with background requirement wide enough to be applicable to the average finishing doctorate student in observational astronomy. About fifty percent of these jobs were directly related to planned use of the Hubble Space Telescope. The remaining jobs were open research positions (e.g. with no strings), although some of these provided opportunity for working on HST data, and may have been linked to HST funding. An additional five or

six postdocs in theoretical work were also available, along with a few jobs in more specialized areas. Of course, the majority of these positions were in the United States.

In Canada, two positions were advertised which were linked to Space Telescope, both related to the newly founded Canadian Space Astronomy Data Centre. As for other Canadian jobs, about a dozen have been announced over the past year (in both the AAS Bulletin and the CAS Job Registry). About half of these have been for theoretical work, mostly tied to the new Canadian Institute for Theoretical Astrophysics. Of the remaining jobs in Canada, most tend to require two to three years of experience.

The most striking feature of the table shown is the sudden change between January 1986 and April 1986. If the February and March data were included, the effect would be even more dramatic. The reason for this, or course, is the Challenger disaster, which has radically altered the job market for postdoctoral astronomy. Current AAS Job Registers yield at most two new positions per month in fields of general applicability. Furthermore, several of the Space Telescope related positions advertised late last year and in the early part of 1986 lost their funding and were forced to withdraw their offers. And where funding was still available, the number of applicants, in some instances, topped one hundred.

It should be noted that the situation, in the United States at least, is made still worse by the Gramm-Rudman-Hollings Act, due to which funds for research and hiring are indeed drying up, and the situation is expected to deteriorate still further. In addition, the Space Telescope funds are likely to do little more than trickle in over the next year until the space programme gets back on its feet.

Despite the drastic changes on the other side of the border, the Canadian job market has remained relatively stable. I have the impression that some funds may have been earmarked for work on Space Telescope data, but few Canadian astronomers will have access to this data in the first year of operation, unless they happen to be collaborating with the right people. Funding for the Data Centre was approved, and the two jobs advertised were filled. On the other hand, the number of NSERC postdoctorates awarded has declined somewhat, despite efforts to maintain funding in this area.

In the light of this discussion, it should be clear that students graduating from Canadian universities with a doctorate in observational astronomy are in difficulty. Competition for jobs in the United States is ferocious. The same is true for other countries. In Canada, our chances of being hired are better, since most institutions here have a policy of looking at Canadian candidates first. However, the job situation here has not improved from the time when Canadian students were readily finding positions outside the country.

I believe that the Westar funds, or at least the interest earned off the capital, should be used to fund two to three new postdoctoral positions over the next five years. This would not necessarily have to be a permanent arrangement: an evaluation after five years could be carried out in order to determine if the use of these funds in this way is still appropriate. But if Canadian astronomers are not ready to encourage new astronomers by providing jobs, in an increasingly difficult situation, Canada may see a drop in the number of doctoral students over the next few years. Right now several of the graduate students at Laval University are rethinking their options in the light of the current situation. I find it hard to believe that ours is the only institution at which this is occuring.

I see a particular need to support recent graduates, who don't necessarily have the two or three years experience most Canadian institutions seem to require. Perhaps this is just bias on my own part, since I am indeed in just this situation. However, after submitting nearly one hundred job applications over the last year, I feel my experience should count for something. Whether my situation is the exception, or whether other graduating doctorate students have also had similar experiences remains to be verified.

There are two final considerations I would like to discuss. I have been told that students graduating with doctoral work in instrumentation have no problem finding work. A final glance at the table presented above would seem to justify this view...in fact, the table suggests that there may be more job openings in instrumentation now than before. The current situation seems to encourage instrumentation projects, which is perhaps the only positive side to emerge from these circumstances. Nevertheless, not everyone can be a instrumentalist, and my general argument remains untouched. The second objection that can be brought against my arguments is that the job situation in 1985 was artificalially high, due to the excitement over Space Telescope. This is, of course, quite correct. But I believe that the current job situation is considerably worse than it was before Space Telescope. This is partly because of the Gramm-Rudman law in the U.S., and general budget cutbacks in most countries, but it is also no doubt due to an influx of personel in astronomy as a result of HST. Thus the number of jobs is lower, and the number of people searching for jobs higher. This will probably stabalize after a few years, but for the time being my overall arguments remain valid.

I remain

Yours truly

Geoffrey Edwards

Geoffrey Edwards

Ed. Note: This letter is published at the request of its author and with agreement of its addressee.

C.D.S.

PLEASE POST

EMPLOYMENT OPPORTUNITIES IN ASTROPHYSICS

AT THE UNIVERSITÉ DE MONTRÉAL

The Département de Physique at the Université de Montréal invites applications for two temporary positions in astrophysics, one at the research associate level, the other at the postdoctoral level. Appointments will be made for up to two years. Candidates in all areas of astrophysics will be considered, but preference will be given to those working in stellar astrophysics. Successful candidates are expected to interact strongly with the research staff.

Applicants should send a curriculum vitae, bibliography, statement of research interests (including which position they are applying for), and the name of three references to: Chairman, Département de Physique, Université de Montréal, P.O. Box 6128, Station A, Montréal, Québec, Canada H3C 3J7. In accordance with immigration regulations, preference will be given to citizens or permanent residents of Canada.

The deadline for receipt of applications is November 1st 1986.

anada - France - Hawaii Telescope Corporation
P. O. Box 1597 Kamuela, Hawaii 96743 USA

Société du Télescope Canada - France - Hawaii
Telephone (808) 885-7944 Telex 633147 CFHT

3 September 1986

V A C A N C Y N O T I C E

R E S I D E N T A S T R O N O M E R

Applications are invited to fill one of the CFHT Resident Astronomer positions supported by Canada. This appointment, commencing early in 1987, is for an initial period of two years and is renewable either at CFHT or as a Research Associateship at the Herzberg Institute of Astrophysics of the National Research Council Canada.

Resident Astronomers are expected to devote at least one third of their time to research and to be active users of the 3.6-m CFH telescope on Mauna Kea. Observing time may be obtained through the regular competitions and also from the Director's discretionary allocation. The research facilities at the Waimea headquarters include an astronomical library and a VAX 11/750 computer with attached Array Processor and I^{2}S Image Processor.

The other duties include assisting visiting observers, monitoring the performance of CFHT instrumentation, planning for future instrumentation, and various other tasks associated with the scientific activities of the Corporation. Ability to work at an altitude of 4200 m is essential.

The minimum requirements are a Ph.D or equivalent and demonstrated excellence in optical or infrared observational astronomy. Depending on the qualifications and experience of the successful candidate, this position will be filled at the level of Resident Astronomer I, II, or III. The mid-range salaries for each of these categories are respectively, U.S. $30,744, $37,488, and $46,392 per annum. A competitive benefit package and relocation assistance are also provided.

Letters of application must include a curriculum vitae, list of publications, statement of research interests including specific proposals for use of CFHT facilities, and the names of three professional references. Applications will be received until 1 December 1986 by:

Dr. Gérard Lelièvre, Executive Director
Canada-France-Hawaii Telescope Corporation
P.O. Box 1597
Kamuela, Hawaii 96743
U.S.A.

The NRC Research Associateship requires a simultaneous application (Deadline 30 November 1986) on a form which may be obtained from the Research Associates Office, National Research Council Canada, Ottawa, Ontario, Canada K1A 0R6. Information on the terms of the Associateship can also be obtained at this address.

Canada - France - Hawaii Telescope Corporation
P. O. Box 1597 Kamuela, Hawaii 96743 USA

Société du Télescope Canada - France - Hawaii
Telephone (808) 885-7944 Telex 633147 CFHT

3 septembre 1986

A V I S D E V A C A N C E D E P O S T E

A S T R O N O M E R E S I D E N T

La Société du Télescope Canada-France-Hawaii invite des candidatures pour l'un des postes d'Astronome résident financés par le Canada, ouvert dès le début de 1987. La période d'engagement initiale est de deux ans; elle est renouvelable, soit auprès du TCFH, soit en tant qu'Attaché de recherche auprès de l'Institut Herzberg d'Astrophysique du Conseil National de Recherches Canada.

Les astronomes résidents sont appelés à consacrer au moins un tiers de leurs temps à la recherche et à faire usage du télescope CFH de 3,6 m au Mauna Kea. Le temps d'observation peut être obtenu selon la procédure compétitive ordinaire ou par participation à des projets utilisant le temps discrétionnaire du Directeur. Les moyens de recherche au siège de Waimea comprennent une bibliothèque astronomique et un ordinateur VAX 11/750 avec une unité de traitement de tableaux FPS et un processeur d'images I^{2}S associés.

Les autres fonctions comprennent l'assistance aux observateurs en mission, le suivi des performances de l'instrumentation du TCFH, la planification de son instrumentation future ainsi que diverses autres tâches liées aux activités scientifiques de la Société. L'aptitude à travailler à une altitude 4200 m est requise.

Les qualifications minimales sont un doctorat et une expérience comprenant des travaux de haute valeur basés sur les observations astronomiques dans le domaine optique ou infrarouge. Compte tenu des qualifications et de l'expérience du postulant retenu, le poste sera pourvu au grade d'Astronome résident I, II ou III. Les salaires médians de ces grades sont respectivement U.S. $30.744, $37.788 et $46.392 par an. Un ensemble d'avantages sociaux compétitif et une aide au déménagement sont également fournis.

Les candidatures doivent être accompagnées d'un curriculum vitae, d'une liste de publications, d'un exposé des domaines de recherche envisagés comportant des propositions spécifiques pour l'utilisation des moyens du TCFH, ainsi que de trois références professionnelles. Elles seront reçues jusqu'au 1er décembre 1986 par:

M. Gérard Lelièvre, Directeur
Société du Télescope Canada-France-Hawaii
P.O. Box 1597
Kamuela, Hawaii 96743
U.S.A.

Pour obtenir un poste d'Attaché de recherche du CNRC, une candidature simultanée doit être posée (délai au 30 novembre 1986) en utilisant des formules fournies par le Bureau des attachés de recherche, Conseil National de Recherches Canada, Ottawa, Ontario, Canada K1A 0R6. Des renseignements concernant les conditions afférentes aux postes d'Associés peuvent être obtenus à la méme adresse.

ZONTA International

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AREA CODE 312/346-1445 CABLE: ZONTA CHICAGO

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(312) 346-1445

For Immediate Release

Judith Ann Irwin Awarded
1986-87 Amelia Earhart Fellowship

Judith Ann Irwin, doctoral student at the University of Toronto, has been awarded a 1986-87 Zonta Amelia Earhart Fellowship, one of 32 this year. Irwin will use the award to complete research for her thesis, which involves sprial galaxies showing unusual radio emissions, or loops above and below the galaxy's disk, and which appear to originate from the nucleus.

The $6,000 grants, offered annually tc wcmen for graduate study in aerospace-related science or engineering, memorialize Amelia Earhart, the famous air pioneer and member of Zonta International.

Zonta International is the worldwide classified service organization of executive women in business and the professions. It established the Awards in 1938 and to date has named 271 women from 37 countries as Amelia Earhart Fellows. The grants are funded through annual contributions by the over 490 clubs which comprise Zonta International.

"A world wide service organization of executive women in business and the professions."

National Research Council Canada | Conseil national de recherches Canada

Herzberg Institute of Astrophysics | Institut Herzberg d'astrophysique

Dominion Astrophysical Observatory | Observatoire fédéral d'astrophysique

File Référence

September 14, 1986

JOINT SUBCOMMITTEE ON SPACE ASTRONOMY

Two meetings during September about the Space Station and a WESTAR space astronomy proposal signal that a renewal of activities on the part of JSSA is appropriate. E.R. Seaquist and R.N. Henriksen have proposed that WESTAR funds be used to stimulate the Government to support Canadian *scientific* participation in the Space Station through joint development of an astronomical instrument, perhaps a small UV survey telescope that could build upon knowledge and experience gained from the Starlab program. Their premise is that the Space Station is the one big science/technology project with potential for astronomical impact in which the Government seems to be genuinely interested. Regardless of how WESTAR reacts, its authors have identified what appears to be the only show in town, the Space Station. A new committee, the Advisory Committee on the Scientific Utilization of the Space Station, has been formed under Ralph Nicholls, and the JSSA has been asked to represent astronomers' needs on that committee, which will hold its first meeting in Ottawa on 22 September. The following week an International Space Station Science Meeting will be held in Ottawa, with representatives from Canada (including JSSA), ESA, Japan and NASA. I will report back on these meetings in the next issue of *Cassiopeia*.

Perusal of astronomically oriented projects for Space Station reveals a lengthy, exciting and expensive list dominated by entries from Japan and NASA. It includes old friends like HST, AXAF, and SIRTF, as well as many new ones. All regions of the electromagnetic spectrum and all distances, from planetary to cosmological, are represented. While there is a strong emphasis on co-orbiting facilities, including a Spartan ("low-cost") mission, there is at least one proposal to carry out a planetary search around nearby bright stars utilizing an astrometric telescope to be mounted directly on a Space Station boom. Which of these concepts will eventually be built its hard to say, but the fraction achieved during the first decade after the hoped-for 1992 launch will be small unless something allows significant cost reductions to occur. With the money potentially available for Canadian astronomical participation, we probably should aim to become a junior partner in someone else's project, a role that, with the right experiment, could be scientifically stimulating and cost effective.

During the coming months our Subcommittee will be developing recommendations regarding the best strategy to follow; we continue to welcome input from all members of the community.

James E. Hesser, Chairman, JSSA

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Canada

IAU SYMPOSIUM 123
ADVANCES IN HELIO- AND ASTEROSEISMOLOGY *

Jaymie Matthews
University of Western Ontario

The study of the rapid surface oscillations of the Sun and other stars as a probe of their atmospheres and interiors is still a rather fledgling science. As a result, one might expect the "advances" advertised in the title of this IAU symposium - hosted by the Astronomisk Institut in Aarhus, Denmark, from 7 - 11 July 1986 - to be numerous, and to have far-reaching implications for such a field still in its infancy. However, a comparison with the proceedings of the NATO Workshop on helioseismology held in Cambridge a year before reveals that recent progress has been limited mostly to refinements of earlier work. Many of anticipated major developments await new observing techniques, such as the GONG network of solar monitoring stations (now in the site-testing phase).

This is not to say that the field is currently stagnant or inactive; far from it. This symposium attracted about 130 astronomers from 23 nations, including a Canadian contingent comprised of Drs. William and Amelia Wehlau and Jaymie Matthews (U. Western Ontario), and Drs. Jean-Louis and Monique Tassoul (U. Montreal). Even with such a large attendance, the scientific programme was able to boast a paper-to-participant ratio greater than 1!

The scope of the meeting was very broad, covering subjects which included excitation and damping theory, magnetic effects in solar and stellar oscillations, the oscillations of compact and peculiar A stars, and helio- and asteroseismology from space; comprehensive reviews were presented by the likes of Gough and (in absentia) Dziembowski. Still, a few topics were the focus of particular attention. Among these were:

160-min solar oscillations and WIMPS

The Sun's oscillations with periods near five minutes are widely recognized as acoustic p-modes. Reports of a 160-min oscillation in full-disc Doppler velocity oscillations from Crimea, Stanford, and Tenerife have been touted as the detection of one of the sought-after solar gravity modes. Since g-modes penetrate much more deeply into the Sun than their p-mode counterparts, they would provide a powerful diagnostic of the solar interior. The Tenerife data, as well as new results from Crimea, were unveiled at the meeting. Unfortunately, none of the ground-based observing teams have been able to convincingly identify a series of power peaks, equally spaced in period, which would be a reliable signature of g-mode pulsation. Casting further doubt on the situation, Yerle (Pic-du-Midi) presented compelling arguments that oscillations in the Earth's atmosphere could account for the 160-min periodicity.

Terrestrial effects are absent from space observations, and Frohlich (Davos) has analysed solar irradiance data from the Solar Maximum Mission satellite to search for a uniform pattern of g-mode periods. His best fit (albeit a statistical one) to the data gives a period separation which agrees with the predictions of the WIMP model of Faulker et al. (Lick). (These Weakly Interacting Massive Particles have been proposed as a possible solution to the solar neutrino problem, but have other implications which disagree with preliminary helioseismological findings.)

Evidence for oscillations in ε Eridani and α Centauri A

Earlier reports by Fossat et al. (Nice) of possible five-minute oscillations in α Cen, and by Noyes et al. (CfA) of Ca H and K fluctuations in ε Eri with periods near ten minutes, met with increased skepticism at the symposium.

Attempts to reconcile the claimed p-mode frequency spacing for α Cen with other established parameters have so far failed, while models calculated by Guenther and Demarque (Yale) and by Dappen (HAO) and Soderblom (STSI) to match the supposed eigenfrequency spectrum of ε Eri yield results which are at worst, conflicting, and at best, ambiguous. The consensus (even among several of the observers involved) seemed to be that solar-type oscillations have yet to be positively detected in other stars. The white dwarfs and cool Ap stars are the only cases where rapid stellar pulsations are clearly observed. They are the best candidates for asteroseismology, but their relatively large amplitudes and dramatically non-solar conditions in these stars allow only limited comparisons to the solar oscillations.

The "Inverse" and "Forward Problems"

The Inverse Problem might be described as the helioseismologist's version of The Holy Grail - the ultimate goal of extracting a unique picture of solar(stellar) structure almost exclusively from oscillation data of adequate detail and accuracy. Papers by Shibahashi (Tokyo) and Brodsky and Vorontsov (Academy of Sciences, USSR) suggested specific techniques whereby such data inversion could be applied to determine quantities like sound speed as a function of depth. There was some debate, however, about whether efforts to solve the Inverse Problem would ever bear fruit.

On the other hand, the Forward Problem - iteratively using solar (stellar) models to generate eigenfrequency spectra for comparison with observations - is already being tackled. The aforementioned models of ε Eri and α Cen are examples. Their lack of success in this instance is not a fault of the technique, but rather a lack of observations of sufficient quality. In fact, it is in the analysis of stellar oscillation data (where disc-resolved wave pattern information is not available) that the forward analysis may have its greatest value.

All of the contributed papers at this meeting were presented as posters, but the organizers experimented with the conventional format by introducing "poster discussion" sessions. The concept certainly has promise, but its implementation at the meeting garnered mixed reviews among the participants. Unfortunately, some sessions degenerated into a series of hurried oral abstracts, as moderators vainly tried to allot equal time to as many as twenty posters in an hour.

The busy scientific programme left only one afternoon free to explore Aarhus and its environs. Most people joined an excursion to Den Gamle By (The Old Town) and the Moesgard Museum. The former is an open-air museum where centuries-old buildings from across Denmark have been assembled in an authentic village setting. Visitors to Moesgard were introduced to that museum's most famous attraction: The Grauballe Man, an unfortunate victim of a ritual sacrifice in ∿8 B.C., whose body remained remarkably preserved while resting in a Danish bog. During the week, the long summer evenings afforded everyone ample opportunities to expand their knowledge of Aarhus and its citizens, and to sample Danish staples like open-faced sandwiches, aquavit, and the local beers.

In almost every respect, IAU Symposium 123 can be considered a very successful meeting. Its proceedings (to be published by Dordrecht-Reidel) will reflect the diverse nature of solar/stellar seismology and its potential power in addressing many current astronomical problems. As well, several of the reviews will no doubt become standard references in the field for many years to come.

* Editor's Note: On receiving this interesting contribution, I felt doubtful about the spelling of this word. But it is spelled this way in both the issues of IAU Bulletin in which the Symposium was announced. So I have left it as it is, and hope that it will not affect the spelling of other asterophysical words!!

C.D.S.

CASCA Small Grants Awarded

Following the March 31 submission deadline Small Grants were awarded to four individuals. The successful applicants were:

Jefferey Bishop (CITA) - to travel to the University of Chicago to model elliptical galaxies on a supercomputer.

Tim Davidge (U. Victoria) - to attend the CASCA meeting, Penticton.

John Lattanzio (CITA) - to attend the Calgary Workshop on the Late Stages of Stellar Evolution.

Jaymie Matthews (UWO) - to attend the CASCA meeting, Penticton.

Reports of the meetings attended by John Lattanzio and Jaymie Matthews can be found elsewhere in this issue of Cassiopeia.

You are reminded that application deadlines for Small Grants are March 31 and September 30. Information on the Small Grants Programme (in particular, how to apply) can be found in Cassiopeia No. 50, p. 4.

Bruce Campbell

Calgary Workshop on the Late Stages of Stellar Evolution

John Lattanzio, CITA

Between July 2 and 5 the University of Calgary hosted a very successful Workshop on the Late Stages of Stellar Evolution, organized by S. Kwok (University of Calgary) and S. Pottasch (University of Groningen). Sponsors of the meeting were the Canadian Institute for Theoretical Astrophysics, the University of Calgary, the Natural Sciences and Engineering Research Council of Canada, and the Space Sciences Group at the University of Calgary. Together with 18 invited reviews were 14 contributed papers and over 30 excellent poster presentations. The main topics covered were OH/IR stars, asymptotic giant branch (AGB) evolution (including Carbon stars), pulsation and Mira variables, and planetary nebulae.

T.J. Jones provided an informative review of the wide range of infrared behaviour exhibited by OH/IR stars, and M. Dyck emphasized the use of high resolution observations as a probe of their structure. Mass estimates ranged from 1-9$M_\odot$(!) and remain highly uncertain.

Reviews of mass loss were given by G. Knapp, for Carbon stars, and P. Wannier, for O-rich giants. L.A. Willson described some calculations of pulsation which modelled the very outer layers of the stellar envelope, and often resulted in extensive mass loss. The connection between pulsation and mass loss was emphasized many times throughout the meeting, and much fruitful work is still to be done in this area.

I.Iben (Jr.) provided a comprehensive review of the physics of thermal pulses and their consequences. P. Wood gave an overview of the AGB-zoo and cited evidence for rapid (discrete) envelope ejection in at least some circumstances. The effectiveness of semiconvection during the third dredge-up phase in low mass AGB stars was again discussed. This "Iben-Renzini" mechanism has not been reproduced by other authors. At this meeting D. Hollowell presented calculations which showed that semiconvection was mixing matter in the core of these stars, but that the products of the nucleosynthesis failed to reach the stellar surface.

C. Chiosi presented extensive evolutionary calculations including convective over-shooting. He argued that previous estimates of M_{up}, the maximum mass star which develops a degenerate carbon-oxygen core following core helium exhaustion, were too large.

S. Pottasch reviewed what has been learned from infrared observations of planetary nebulae. The transformation from red-giant to planetary nebula was discussed frequently. S. Kwok concentrated on mass loss from the stellar envelope, while in his review, D. Schonberner emphasized the evolution of the central star.

The lively sessions were indicative of the advances made in this field in recent years, but it was clear that much remains to be clarified. The meeting was a great stimulus to further research.

CASCA 1986

Have precision RV measurements revealed the presence of Jovian planets around nearby solar-type stars? What is a realistic effective temperature for a Wolf-Rayet star? How does one spend a $3 million windfall to best benefit Canadian astronomy? And which part of the country boasts the finest astronomical volleyball players: East or West? These were among the questions tackled at the 17th Annual Meeting of CASCA in Penticton, B.C., June 9-13.

The Delta Lakeside Hotel, perched on the southern shore of Okanagan Lake, provided a relaxing environment for the week of oral and poster sessions, meetings, and informal discussion.

The scientific programme at this meeting was a diverse one. The topics of the three invited reviews ranged across a wide spectrum, in a very literal sense. George Mitchell's introduction to chemistry in the interstellar gas took a look at the reaction processes thought to govern the abundances of some of the sixty or so known IS molecules detected by radio observations. In the optical regime, Chris Pritchet demonstrated how CCD's have been used to launch "A Fresh Attack" on distances to M31 and the Virgo Cluster. He presented several graphic examples of the improvements in dynamic range and quantum efficiency offered by CCD's over photographic plates. Finally, the present state of infrared imaging in astronomy was described by Judith Pipher. Her talk included an overview of imaging arrays currently operating at several institutions, the results of IR studies of young stellar objects and the galactic centre, and an advance glimpse at SIRTF, a spaceborne infrared observatory to be carried aloft by the shuttle.

The variety of the invited talks was echoed in the sixty contributed papers as well. Few branches of astronomy seemed unrepresented, although a non-astronomer might have been surprised at the presence of only four papers on Comet Halley in the wake of its passage and associated media blitz.

In fact, a new wrinkle at this year's meeting was the designation of a special "Media Day". Seventeen authors prepared press releases on papers considered to be of potential public interest, but the greatest media interest by far was generated by Bruce Campbell's talk on the possible detection of very-low-mass companions to several solar-type stars. The unprecedented TV coverage of this CASCA meeting will no doubt bolster the public image of Canadian astronomy. (However, I can't help but suspect that the footage of the CASCA audience - trying to peer through the intense camera lights to read the speakers' transparencies - may reinforce the popular stereotype of "squinty-eyed" astronomers!)

Another unusual facet to this gathering was a lively open session, chaired by John MacLeod, on the proposals for use of the WESTAR funds. The discussion soon polarized - not surprisingly - into the choice between spending the capital on "equipment" or the accured interest on "people". Although no consensus was reached, the session certainly dramatised how much will be needed in the coming years to maintain Canadian astronomy at a robust level, and how little $3 million actually represents.

Social activities, both organized and informal, also played an important role during the week. Tuesday night's barbeque at DRAO featured plenty of good

food and drink, music which included Arlo Aaquist's award-winning astronomical ditties, death-defying feats on the dreaded Galtcycles, and of course, the first East-vs-West CASCA Volleyball Championship. Chris Purton did an admirable job as referee, although I think he could have used one of George Mitchell's IS reaction diagrams to fully explain "DRAO rules". In the interests of national unity, I won't identify the eventual winning team here†, but it was a hard-fought contest.

The banquet at the Delta Lakeside was highlighted by another fine meal (this time complemented by specially-bottled wine to mark the CASCA meeting) and award presentations to (among others) the DRAO organizers and Serge "The Cheque Is In The Mail" Pineault. The evening was capped by more music and a review of the present knowledge of SS 433 by John MacLeod, in his Presidential Address.

In all, Rob Roger and his Local Organizing Committee are to be commended for their efforts in making the 1986 Annual Meeting a quite memorable one indeed.

Jaymie Matthews

†Yeah, East!!!

The Dominion Astrophysical Observatory

A report by Sidney van den Bergh, followed by discussion, during the "Open Session on National Facilities II", Thursday, June 12, at the CASCA Annual Meeting. (Recorded by Chris Purton)

Dr. van den Bergh described the past year at DAO as scientifically good and financially disastrous ("the best of times and the worst of times"). Staff publications reached 100, with an additional couple of dozen by visitors. Research programmes involving DAO staff singled out for particular mention were the precision stellar radial velocities, the measurement of RR Lyrae stars in the M31 halo, the detection of a very massive core in the nucleus of NGC 3115, the finding that the core of M32 is probably dynamically collapsed, and the finding that the mass spectrum of stars in globular clusters correlates with cluster metallicity.

Good weather provided 1400 hours of observing with the 48" telescope, and the sum for all telescopes was 2500 hours (three times the total available to Canadian astronomers on the CFHT). The availability of the DAO telescopes is particularly important for both training and long-term projects. Visitors used 75% of the time on the 72", and 38% of the time on the 48".

The Schectograph was finished last December, and work has started on a CCD detector for the spectrograph. Upgrading is in progress for the guiding, setting and drive for all telescopes. New INTEL computers have been installed in both domes, to replace the old NOVAs, and a radial velocity scanner is coming on the 16".

The Canadian Space Astronomy Data Centre was to have occupied one floor of the new building, but the new building has been delayed indefinitely. The people involved with the Centre are Dr. Dennis Crabtree and Dr. Daniel Durand as research associates, and co-op student H. Hissen for the summer. Stephen Morris, Dennis Crabtree and Peter Stetson comprise the initial steering committee, with Morris as Co-ordinator pro tem. Phil Kronberg, Stephen Morris, Chris Pritchet, René Racine, Peter Stetson and Gordon Walker form a committee to advise the DAO Director on CSADC operations. The Centre will demand a large effort from the DAO staff, and possibly another permanent position.

Loss of the Challenger has introduced a two-year setback for the Space Telescope. One year of that can be used by the Data Centre to get things going, leaving the second year for general use by the astronomical community. The Centre will be looking for suggestions for such use: it wishes to be a "demand-driven group" (the audience was left to rate "my cheque is in the mail" versus "I'm from the Government: I'm here to help you").

Discussion:

Morton:	I am interested in the need for the optical shop.
Garrison:	It was of much help in the design, and part of the construction, of the spectrograph at DDO.
van den Bergh:	It contributes directly to the CFH.
Milone:	It has been much help, but the charges have discouraged us.
Morton:	I want to know if the facility is not competitive.
Yang:	I have also used it.
Milone:	We use the shop for re-aluminizing.
Roger:	What will you do about having no money at the end of the summer?
Morton:	I am looking at the problem.
Roger:	The Data Centre could be used for IRAS Data. Do you have the raw data?
Crabtree:	It is on order. Two sets are available now from Goddard, and one will be available in a month. The new set are of better quality.

MULTI-OBJECT SPECTROSCOPY AT CFHT

There are several options possible for multi-aperture spectroscopy at the CFHT. They offer different advantages for different projects so we should try to find out what the priorities are in Canada. The following is a simplified description of our main options. Please let me or your local SAC representative know your preference. In the broadest terms the question is whether you want to observe several (~10) objects at once in a ~5 arcmin field to a very faint magnitude or would you prefer to be able to observe ~50 objects in a 1 degree field but only to perhaps two magnitudes brighter. The former implies using individual slitlets, the latter individual fibres. A second broad question concerns the resolution required for each of these options. Note there is a big distinction between "apertures" or holes and "slitlets": limiting work requiring accurate sky subtraction demands slitlets. Now for details: [My personal comments are enclosed in brackets]

Slitlet or Aperture Spectroscopy at CFHT

PUMA

The french-built focal reducer/PUMA system provides the possibility of obtaining spectra of ~20 objects in an ~5 arcmin field with the aid of an aperture plate containing holes punched at the positions of objects selected from a CCD frame in real time at ~20Å resolution. The device has already produced some nice results but suffers from two drawbacks:

(i) the focal reducer produces very poor images at wavelengths other than near Hα and near Hβ, and has 22 air-glass surfaces. Hence neither its throughput or image quality are optimum.

(ii) holes are punched instead of slits so sky subtraction is not optimal thereby compromising the limiting magnitude.

[Since it exists and can be commissioned cheaply, I say commission it as is with no changes for immediate use]

HICKSON/VAN DEN BERGH FOCAL REDUCER

Harvey Richardson, and Paul Hickson have designed a focal reducer (f/8 - f/2) with only 12 air-glass surfaces and excellent images over 3000 - 12000Å. Paul has the mechanical and electronic components in hand to enable this to be used for direct imaging (lots of filters) and low resolution spectroscopy with or without a slit or slitlets. This device will be comparable to the AAT LDSS (70% transmission on blaze!) and ESO EFOSC devices and will be ideal for spectroscopy at ~50A or lower resolution over a ~6 arcmin field. Note that a conventional spectrograph is a "focal reducer" too, but most use reflecting optics. (The Herzberg spectrograph gives f/8 to f/2 or f/4). Apparently a considerable gain is achieved through use of a transmission grating. [Paul wants to use it next year so he is going ahead on his own - it is not planned to be a "CFHT" instrument]

HERZBERG SPECTROGRAPH + ADAPTOR

We have built a multi-slit module for the Herzberg spectrograph which allows simultaneous spectroscopy of ~10 objects within a 4 arcmin (cass focus) field. The slitlets are made (ahead of time, at DAO) by essentially a photographic process and presently only one "plate" can be installed at a time (quickly but manually). It is desirable to provide for several plates to be carried at the same time -particularly if it were to be used at prime focus (Grundmann has designed a wheel to hold 4 plates - cost ~15K Dollars). This would provide a cheap way to provide multi-object spectroscopy with a variety of wavelength and resolution (0.5 - 10Å) options. It is not the ultimate solution for the faintest objects at low resolution because the transmission of the spectrograph is ~33% on-axis, with increasing vignetting at 2 arcmin off-axis. The best focal reducers (ESO, AAT) get about twice the throughput using transmission gratings.
[Again, since it exists and is cheap, commission it for use now, incorporating the option of using it with real-time mask making (PUMA)]

Fibreoptic Spectroscopy

A fibreoptic input bundle capable of feeding ~50 objects into the slit of the Herzberg spectrograph is being designed by Walter Grundmann. We are following the Durham model which allows each fibre to be positioned with a pickup device while mounted on the telescope. The spectrograph and fibre optic input unit would have to be mounted at the prime focus unless the cass wide field correctors are completed. As stressed above, this would allow spectroscopy with a variety of resolutions and wavelength regions over a one degree field but the finite aperture size, poorer sky subtraction and absorption in the fibres limits the faintness attainable (to about m ~21.5 for quasars). [cost: two years, 150?K Dollars, no funding yet]

Slitlet Fabrication or "10 Little Slitlets"

With the exception of the fibre system, ALL the MOS devices require a method of fabricating slits - in real time in some cases. To exploit the CFHT seeing, these may be very narrow. The only way I know of making these accurately is by a "spark erosion" machine. These are available from a Swiss company but are very expensive (150 K$) and will require someone to learn to operate them. We should either find an alternative or explore this route further.

Alternately we could adopt a different approach and copy the "10 movable slitlets" idea from Palomar or CFA. Basically, one puts ~8 slitlets on individual movable slides. We would follow the CFA design which allows the positions of these slits to be remotely controlled. One is then slightly limited by the fixed slit lengths and positions (in the direction perpendicular to dispersion).

QUESTION: What do YOU want?

5 arcmin field, m < 23, moderate to low resolution, accurate sky subtraction e.g. Herzberg spectrograph + multi-slit adaptor
5 arcmin field, m < 23, highest throughput, low resolution i.e. focal reducer + slitlets
1 degree field, m < 21, moderate to low resolution, ~50 objects i.e. fibres + Herzberg spectrograph at prime focus.

David Crampton

OBSERVING SERVICE AT DAO

The Dominion Astrophysical Observatory is operated by the Canadian National Research Council for the benefit of the scientific community, and, as such, provides telescope time and reduction facilities for all astronomers. Several improvements to the telescopes and instruments have recently been made, particularly in the areas of telescope setting and acquisition capabilities, and detectors. Brief descriptions of the telescopes and instruments are given on the following pages. The faintest objects so far observed with the 1.8-m spectrograph are slightly brighter than $B = 18$. The practical limit with the RV scanner on the 1.2-m telescope is $m = 16$. Beginning this quarter, we are offering SERVICE OBSERVING on a trial basis. The aim is to facilitate use of the telescopes for those with teaching or other commitments given the impossibility of guaranteeing clear weather in a Canadian climate. Priority will be given to clearly defined projects with strong scientific goals. Telescope time is awarded on the basis of scientific merit each calendar quarter, but requests for service observing for this quarter will be entertained immediately.

Extensive data reduction hardware and software (compatibility with STScI is a goal), a large astronomical library, and measuring devices including a PDS microdensitometer (and glass copies of southern and northern sky surveys) are also available. Additional information regarding the facilities, as well as application forms for telescope time, which are due one month preceding each quarter, may be obtained by writing the Director, DAO, 5071 W Saanich Rd., RR5 Victoria, V8X 4M6, Canada.

1.8m SPECTROGRAPH AND DETECTORS

The spectrograph has an f/5, off-axis camera which produces the following resolutions (the gratings all work in first order):

Grating (blaze) g mm^{-1}		Dispersion Å mm^{-1}	Resolution per 15μ	30μ	50μ
1800	(5000)	10	.15Å	.30Å	.5Å
1200	(4100 and 8000)	15	.22	.45	.75
600	(5000)	30	.45	.90	1.5
300	(4200 and 7500)	60	.9	1.8	3.0
150	(5000)	120	1.8	3.6	6.0

The scale is such that 50μ at the spectrograph focus corresponds to 1.1 arcsec on the sky.

There are blue (<5500Å) and red (can be used for all wavelengths) sets of optics and image slicers. A slit or apertures may also be used.

DETECTORS

There are, or soon will be, four detectors which are easily interchangeable:

Bare Reticon - 1×1872	15μ pixels, 40μ resolution
Intensified (analog) Reticon - 1×1872	~50μ resolution
Photon-counting Reticon - 2×3744	~10μ pixels, 50μ resolution
CCD - 640×1024	15μ pixels

EXPOSURE TIMES

Typical exposure times are:

Bare Reticon, 15 Å mm^{-1}	B~ 9 mag	40 min
Intensified Reticon, 30 Å mm^{-1}	B~12 mag	25 min (absorption-line star)
Intensified Reticon, 30 Å mm^{-1} or Shectograph	B~15 mag	24 min (quasars)
Shectograph 120 Å mm^{-1}	B=17.4	20 min (quasar)

The exposure times vary widely depending on sky/seeing conditions and signal-to-noise desired.

The Reticon detector, built by UBC, is one of the best in existence with a readout noise of ~400e.

The Shectograph is in regular use but is still being improved.

The new RCA double density chip will hopefully be commissioned early in 1987.

Setting on faint objects has been greatly facilitated by new encoders which currently give a setting accuracy of better than 30 arcsec. This should improve as our look-up table is improved. Computer controlled setting is still a year or more away.

A new (April 1986) integrating TV system allows acquisition and guiding of objects down to m~18. The system can also be used to offset guide.

1.2m COUDE SPECTROGRAPH AND DETECTORS

The 1.2m telescope has a very efficient coude mirror train with 3 sets of quickly interchangeable optics with high reflectance coatings:

super-blue	<5300Å
extended red	>4500Å
aluminum	

The spectrograph is usually fed with an image slicer but a slit may also be used. There are blue and red image slicers for the 32-inch focal length camera, a blue one for the 96-inch camera, and one for the RV scanner. The gratings and dispersions available are:

Name	Grating (blaze) g mm^{-1}		Dispersion Å mm^{-1}	Resolution per 15μ Å
9682M	830	(4060 II)	2.4	0.04
9681M	830	(8125 I)	4.8	0.07
32121	1200	(5000)	10.1	0.15
	1200H	(6000)		
3282	830	(4060 II)	6.5	0.10
3281	830	(8125 I)	13.1	0.20
3261	600H		17.9	0.27
3231	300	(4200)	40.9	0.61

There are four detectors available:

1×9 or 2×8 inch photographic plates
1872 Reticon
Intensified (analog) Reticon
90mm ITT tube

A rough exposure guide is:

9682M+plates	B=7	180 min
9681M+Reticon	B=7	50 min
9681M+ITT	B=9	60 min
3282+plates	B=8	90 min
3231+Reticon	B=10	120 min

RADIAL VELOCITY SPECTROMETER

The most widely used instrument at present is a Griffin type radial velocity spectrometer useful for measuring velocities of stars later than F5 with an accuracy of ~0.5 km s^{-1}. Stars brighter than magnitude B=9 require about a 2 minute integration, and 15 min is required at B=15 mag.

UNIVERSITY OF ALBERTA

At the University of Alberta, Edmonton, research in Astronomy and Astrophysics is conducted within the Departments of Physics (Hube, Israel) and Electrical Engineering (Routledge, Vaneldik, Walker and Landecker).

Werner Israel was appointed University Professor, effective July, 1985. He was awarded a Fellowship by the Royal Society (London) to spend 6 months at the Research Institute for Fundamental Physics at Kyoto University, Japan.

The most important unanswered question in the physics of gravitational collapse is whether a nonspherical collapse might terminate in a singularity that is "naked" or whether a black hole will always form to shield the external world from the effects of the singularity ("cosmic censorship"). Although it is widely believed that cosmic censorship is valid in some form, this has never been proved and the only evidence for it is circumstantial. Israel has re-examined this problem with the conclusion that black holes must always form provided certain regularity conditions are met on the "trapped surfaces" (surfaces that trap light) that form in the collapse. He has also established a previously unproven conjecture - the third law of black hole dynamics - which states that the surface gravity (or temperature) of a black hole cannot be reduced to zero in any finite sequence of operations.

In collaboration with C. Barrabes (France), Israel has begun a study of the kinetics of cosmic strings. It is a currently popular idea that cosmic strings may provide the seeds from which galaxies grow by accretion, so this theory, when further developed, may find useful applications in cosmology.

A new mirror for the 0.5m telescope was completed early in September, 1986. The original TI990/4 computer,used for telescope control and data acquisition at the Devon Observatory, has become increasingly unreliable, and the limitations in memory and speed have severely restricted the development and operation of the 2-star photometer. A replacement in the form of an IBM PC/AT has been acquired, and the development of the necessary hardware and software is well-underway. The clock board and associated software to read WWVB time signals are complete and installed.

Hube, partly in collaboration with Hill and Fisher, has been observing a number of early-type binary systems with the 1.88m telescope at the D.A.O. In collaboration with M. Anderson, a new eclipsing binary has been recognized (HD174853), and the application of cross-correlation techniques to the analysis of high quality Reticon data has made it possible to spectroscopically resolve the secondary component.

The Radio Astronomy Group designed and built a new coolable microwave test fixture for GaAsFET's and HEMT's. A 2-channel cooled 1.35 - 1.75 GHz front end was installed on the DRAO 26m telescope in 1985, and a set of 10 uncooled 1.40 - 1.46 GHz amplifiers for the DRAO Synthesis Telescope was delivered in 1986.

Routledge, Landecker and Vaneldik have completed continuum and HI mapping at 1420 MHz of the SNR OA184 with the DRAO Synthesis Telescope. The SNR appears to be an aggregation of spherical bubbles. Two HI features at -30 km/s are physically associated with the SNR, implying a distance of 8 $\pm$ 2 kpc.

Combined DRAO and VLA observations were used to produce a 1.4 GHz map of the SNR VRO 42.05.01 with 20 arcsec resolution. The model in which the SNR is breaking out of a warm, moderately dense slab into a hot, tenuous interstellar cavity was shown to be quantitatvely consistent with hydrodynamical calculations in the literature. A study of HI in the vicinity of this SNR is underway.

DRAO observations were used to produce a 408 MHz synthesis map of the SNR HB3. The map shows a clear shell structure and shows HB3 extending further north than previously recognized. Evidence is being sought to investigate whether the SNR is actually interacting with W3, whose distance is widely used for that of HB3.

Doug Hube

News from DAO

During the past few months we have said farewell to Research Associate John Stauffer (now at NASA AMES), and long term visitors Lu and Hamabe who have returned to China and Japan, respectively. Dennis Crabtree has started his term as CSADC Research Associate in Victoria, and is now spending several months at STScI in Baltimore. He is joined there by Daniel Durant, also on the same appointment. New Research Associates Dave Westpfahl and Kavin Ratnatunga arrive in September, and Graham Smith will leave for a fellowship at STScI when his term expires in November. Ernie Pfannenschmidt retired this summer after many years on DAO staff.

We were pleased to have the following summer and sabbatical visitors: C.Peterson (Missouri), P. Fitzgerald (Waterloo), A. Cowley (Arizona), B. Hrivnak (Valparaiso), and D. Popper (UCLA). In addition, extended observing trips were made by S. Adelman (GSFC), J. Rose (Hawaii), K. Yoss (Illinios), R. Crowe (CFHT), S. Shawl (Kansas), and R. Griffin (Cambridge). We were also host to five summer students. One of these worked in the electronics shop, one worked with casual time programmer R. Edwards on CSADC development, and three were research assistants. We presently have no fall student positions.

The 1.8m telescope has been upgraded in several significant ways. The photon-counting 'shectograph' detector, built in our shops under J.Stillburn, is now in routine operation as faint object detector. There is a new and much improved TV acquisition and guiding camera, which greatly facilitates observing. Finally, encoders have been installed which allow more accurate and convenient setting. The CCD development program is continuing under B. Campbell as a future detector system.

We have been hit by NRC's budget problems, and the plans for the DAO building extension were put on hold for several months. We hope that detailed planning will resume again soon. We have had two visits from the new Director of HIA, Don Morton, to discuss both scientific and administrative matters. One result has been the formalization of an instrumentation group headed by D. Crampton, with W. Grundman as manager. They aim to develop instruments particularly for DAO and CFH telescopes.

The library now has a full computer listing and search program on the DAO computer, as well as the excellent reference retrieval system through CISTI. Information on these facilities is available through the librarian, Eric Leblanc.

Note that in recent issues of Cassiopeia, there have been a report and questionnaire on the CSADC, observing statistics for the past year, an observing request form, and a listing of the new staff telephone numbers.

John Hutchings

ASTRONOMIE ET ASTROPHYSIQUE

A L'UNIVERSITE DE MONTREAL

Le groupe d''astro' du Département de physique de l'Université de Montréal compte maintenant 13 chercheurs et 2 professionnels dont les expertises couvrent un large spectre en astrophysique stellaire et en astronomie galactique et extragalactique. Puisqu'un bon moment s'est déjà écoulé depuis le dernier rapport d'activités présenté dans CASSIOPEIA, il paraît utile de rappeler d'abord à la communauté la composition de l'équipe et les champs de recherche de chacun par la liste qui suit:

Pierre BASTIEN,	chercheur boursier: objets protostellaires; théorie et observations d'étoiles T Tauri; polarimétrie.
Gilles BEAUDET,	professeur et directeur du Département de physique; astrophysique nucléaire; structure stellaire.
Claude CARIGNAN,	chercheur boursier: dynamique interne des galaxies; études optiques et radio des disques et bulbes.
Yves CHARLAND,	programmeur et responsable de l'équipement informatique à Montréal: atmosphères stellaires.
Serge DEMERS,	professeur: populations stellaires des galaxies naines; photométrie et spectroscopie d'étoiles chaudes du halo.
Gilles FONTAINE,	professeur: structure et atmosphères d'étoiles évoluées; théorie et observation de naines blanches, variables ZZ Ceti.
John GLASPEY,	astronome-ingénieur: instrumentation optique et informatique au mont Mégantic: spectrophotométrie stellaire.
Robert LAMONTAGNE,	attaché de recherche: spectroscopie et photométrie UV et optique; étoiles Wolf-Rayet et naines blanches.
Georges MICHAUD,	professeur: atmosphères stellaires; abondance des éléments et phénomènes de diffusion dans les étoiles.
Anthony MOFFAT,	professeur: populations stellaires des galaxies; étoiles massives, Wolf-Rayet, novae.
Daniel NADEAU,	chercheur boursier: astronomie infrarouge; nuages moléculaires H_2 protostellaires.
René RACINE,	professeur et directeur de l'Observatoire du mont Mégantic: amas globulaires et halos galactiques.
Jean-Louis TASSOUL,	professeur: hydrodynamique stellaire.
François WESEMAEL,	professeur: théorie et observation des atmosphères d'étoiles chaudes; spectroscopie UV (IUE); naines blanches.
Howard YEE,	chercheur boursier: amas de galaxies à grands redshifts; environnement et évolution des quasars.

MM. Jean-Pierre MAILLARD (STCFH et IAP) et Hubert REEVES (CEN-Saclay) ont fait des stages prolongés avec nous au cours de l'année passée.

Le groupe est présentement à la recherche de candidats pour deux postes temporaires récemment ouverts, soit un stagiaire post-doctoral et un attaché de recherche (voir annonce ailleurs dans ce numéro).

La population d'étudiant(e)s gradué(e)s se spécialisant en astronomie/astrophysique à Montréal s'est accrue rapidement d'environ un facteur trois entre 1978 et 1985 pour se stabiliser au présent niveau. En septembre 1986, notre groupe encadre 25 gradué(e)s dont 12 au niveau du Ph.D. et 13 au M.Sc. Plusieurs de nos étudiant(e)s ont déposé leur mémoire de maîtrise au cours des douze derniers mois et nous en donnons ici la liste qui illustre plusieurs des travaux de recherhce en cours à Montréal. Les noms des directeurs de thèses sont aussi indiqués.

Stéphane Béland: "Etude de la dynamique de l'hydrogène moléculaire dans le nuage interstellaire DR21 à l'aide d'un spectromètre interférentiel Fabry-Pérot" (D. Nadeau).

Pierre Bergeron: "Etude des forces radiatives sur les métaux dans les étoiles sous-naines de Type B" (F. Wesemael).

Pierre Brossard: "Calcul des spectres synthétiques de naines blanches en pulsations non-radiales" (F. Wesemael).

Laurent Drissen: "Etude de la polarisation d'étoiles WR" (A. Moffat).

Jean Dupuis: "Les étoiles riches en He de la séquence principale" (G. Michaud).

Rédouane Fakir: "La couronne des étoiles HgMn: nouvelles lumières sur l'énigme des anomalies d'abondances" (G. Michaud).

Claude Lejeune: "Etude de la formation des étoiles et du spectre de masse stellaire à partir de solutions analytiques de l'équation de coagulation" (P. Bastien).

François Ménard: "Etude de la polarisation causée par des grains dans les étoiles T Tauri" (P. Bastien).

Daniel Puche: "Découverte du système d'amas globulaires de M81" (R. Racine).

Daniel Roussin: "Etude des vitesses des métaux et du CO dans l'atmosphère de la géante rouge Khi Peg" (D. Nadeau et J.-P. Maillard).

Claude Shield: "Traitement préliminaires d'images astronomiques digitales" (S. Demers et J. Glaspey).

Stéphane Vennes: "Forces radiatives sur l'Hélium" (G. Fontaine).

Notes personnelles

Gilles Fontaine s'est mérité la Bourse commémorative E.W.R. Steacie 1986 du CRSNG pour ses travaux sur les naines blanches. Il est membre du Comité exécutif de Physique et d'Astronomie (PAC) du CRSNG et président du Groupe de travail du CRSNG sur les superordinateurs.

François Wesemael a été intégré au corps professoral du Département après cinq ans à Montréal comme chercheur-boursier du CRSNG.

Tony Moffat siège au Comité de sélection 'Espace et Astronomie' du CRSNG. Il est aussi membre du sous-comité pour l'astronomie optique du Comité associé du CNRC. Il siège sur le Board of Directors du Montreal Centre de la RASC.

Georges Michaud terminait le 31 mars 1986 son mandat de président du Comité associé pour l'astronomie du CNRC.

Pierre Bastien a été président de la Société d'Astronomie de Montréal jusqu'à la fin de 1985 et demeure l'éditeur de l'Annuaire astronomique publié par la SAM.

René Racine est membre du Comité associé pour l'astronomie du CNRC et siège au Conseil de direction de l'Institut canadien de recherches avancées (CIAR).

Les quelques informations qui précèdent veulent donner une vue d'ensemble de l'ampleur et des activités du Groupe d'astronomie et d'astrophysique de l'Université de Montréal. Un rapport plus détaillé des recherches en cours se trouve dans B.A.A.S. Vol. 17, No. 1 (1985), pp. 309-315. Les activités propres à l'Observatoire astronomique du mont Mégantic, administré conjointement par l'Université de Montréal et l'Université Laval feront l'objet d'un rapport dans le prochain numéro de CASSIOPEIA.

René Racine

SAINT MARY'S UNIVERSITY

The last report in Cassiopeia from Saint Mary's was in 1977, and needless to say many activities of the Department of Astronomy have gone unrecorded over the last nine years. This summary highlights some of the more notable events which have occurred at Saint Mary's since 1977.

Faculty and Staff

The current complement of the Department includes George Mitchell (Professor and Chairman), Gary Welch (Associate Professor and Observatory Director), David Turner (Associate Professor and NSERC University Research Fellow), Laurie Reed (Technician), Mario Pedreros (Research Associate) and Florence Elliot (Secretary). Cameron Reed of the Department of Physics is also closely associated with the Department and takes part in all astronomy activities, including graduate student supervision. Henry Bradford of the Canadian Coast Guard College is an Adjunct Professor of Astronomy at Saint Mary's, but takes no part in Department activities.

Norman Scrimger held various faculty positions at Saint Mary's from 1979-85 during faculty sabbaticals and leaves of absence, but subsequently left for a year of graduate study in Computer Science at the Technical University of Nova Scotia. He is now on the faculty of Mount Saint Vincent University.

David Dupuy left the Department in 1982 on a leave of absence in order to take a faculty position at Virginia Military Institute. He was formally replaced in 1984 by David Turner, who until then held a temporary position as Associate Professor and NSERC University Research Fellow at Laurentian University.

A position in the Department of Physics at the Assistant Professor level became open in 1983 subsequent to a faculty retirement. In an effort to strengthen the astronomy research component of Saint Mary's, the Dean of Science directed that the position be filled by an astrophysicist. The successful applicant for this tenure-stream appointment was Cameron Reed, who at the time was just completing his Ph.D. thesis at the University of Waterloo.

Randall Brooks, the Department Technician, left for the United Kingdom in January of 1986 on a leave of absence from Saint Mary's in order to pursue a graduate degree in the history of scientific technology. He was replaced by Laurie Reed (nee Burgoyne), alias Mrs. Cameron Reed, who is a recent graduate from the Astronomy M.Sc. program.

Mario Pedreros is the most recent addition to the Department, having arrived in July to begin a stay as Research Associate within a recently formed faculty group (Turner, Welch, Reed) whose current research is directed towards the study of star clusters, variable stars, galactic structure and early-type galaxies. Mario is on a leave of absence from the University of Chile.

Activities

George Mitchell succeeded Gary Welch as Department Chairman in May, 1985, and also serves on the Board of Directors for CITA and CASSCA. His primary research interest is in the physical and chemical processes in the interstellar gas, although he is also interested in the structure of comets. It was as a consequence of this latter specialty that George became the local "resident expert" during the busy year of Comet Halley's passage.

Gary Welch became heavily involved in the development (with Dave Dupuy) of a travelling CCD camera system following his return from sabbatical in 1982. The completed system was tested on the Burke-Gaffney 0.4-m telescope in the summer of 1984 before being taken to Lowell Observatory for observing runs in December, 1984, and June, 1985. Gary is currently coordinating the data reduction from these runs, which entailed observations for his own research on early-type galaxies as well as collaborative work with Dupuy, Turner and Reed.

Dave Turner has been slowly worked into a full teaching load since his arrival in 1984 with a NSERC URF. His main research involves photometric and radial velocity studies for the many open clusters associated with Cepheid variables, but he is also involved with the study of clusters and associations containing Wolf-Rayet stars and with Sidney van den Bergh's search for associations near southern hemisphere long period Cepheids.

Cameron Reed has recently been involved in collaborative research involving the structural parameters and photometric properties of globular clusters, but continues his primary interests in stellar distributions and open clusters. With Turner and Scrimger he recently directed the completion of mechanical modifications to the Department's iris astrophotometer which have transformed it into a partially automated instrument with computerized recording of data. This instrument is now heavily used for faculty research and student thesis work, but is available for visitor use.

The Burke-Gaffney Observatory is nearing the completion of a number of recent renovation projects – telescope drive modifications, new carpeting and cabinets, new paint and colour scheme – which are designed to enhance its function as an observing facility for undergraduate students and the general public. Increased enrolments in all years of the undergraduate program have placed heavy demands on its use for student laboratory projects and general observing. However, deterioration of the site due to city and campus lights near the Loyola Residence have severely restricted its use for research.

Graduate Studies

Enrolment in the Astronomy M.Sc. program is currently leveling off from a period of fluctuation in recent years. Completed M.Sc. theses since the last report in 1977 include those by Hironobu Funakawa (1978, A Steady-State Calculation of Column Densities of Interstellar Species Toward ζ Ophiuchi, o Persei and Lynds 134), Colin Calnan (1979, Core Radii Determinations for Four Clusters of Galaxies), Darlene English (1979, The Surface Brightness Profiles of Elliptical and Supergiant Galaxies), Steve Morris (1979, A Photoelectric Study of Three Southern δ Scuti Stars), Jeff Hayes (1981, A Study of the Double Galaxy in Abell Cluster 1775), Mike Swift (1981, Models of Cometary Comae), Bill Allwright (1985, The Development of CCD Image Processing Techniques and Their Application to Surface Photometry of NGC 6166) and Laurie Reed (1986, A Search for Multiple Periodicities in Three δ Scuti Stars).

Current thesis work involves two full-time students, Jennifer Wells (A Search for OB Associations in the Fields of Some Southern WR Stars of Early Excitation Class) and Bob Slawson (A Star Density Analysis of MW 268 in Vela), and two part-time students, Terry Danks (Photographic UBV Photometry in the Field of the Long Period Cepheids GT Carinae and U Carinae) and Terry Deveau (Interstellar Shocks and the Chemistry of Shocked Gas). New and continuing students who are presently involved in M.Sc. course work include Ken Belcourt (Eastern Connecticut State), John Takala (Toronto), David Yorston (U.P.E.I.) and Walter Zukauskas (Dalhousie).

- Dave Turner, Saint Mary's University

University of Victoria

Since the last of these contributions Don VandenBerg has joined the regular faculty via the second five-year term of a University Research Fellowship. Tad Pryor has returned to the U.S.A., after three years here as a postdoctoral fellow, to take up a faculty position at Vanderbilt University. Chris Pritchet has been promoted to Associate Professor and Jeremy Tatum to Professor.

Peter Dawson, now at Trent University, completed his Ph.D. thesis, entitled "A New Determination of the Luminosity Function of the Galactic Halo". M.Sc.'s have been awarded to Carl Grillmair, Leopoldo Infante, Elisabet Jylänne, Lewis Knee, Charles Morgan, and Robert von Rudloff, for theses respectively entitled, "Distribution of Globular Clusters in M87", "Faint Galaxy Content of a High Galactic Latitude Field", "A Colour-Magnitude Diagram for the Galactic Bulge", "A New Model of the Eclipsing System RZ Ophiuchi", "Galaxy Groups and Binaries and the Value of Ω_o", and "The Thermal Stability of Hydrogen-Burning Shells". Leopoldo Infante has stayed on, in a Ph.D. program, whereas Charles Morgan already has a Ph.D., and is in fact a Professor of Philosophy at this University.

The most notable new instrument acquired in recent years is the image processing system, which is finding wide use in research such as that leading to Carl Grillmair's thesis. In addition Russell Robb has brought the 0.5 m telescope under the control of a Commodore-64 microcomputer.

Colin Scarfe

YORK UNIVERSITY

As of September 1, 1986 the Astronomy Group of the Department of Physics at York University consisted of:
Faculty - Kim A. Innanen, Stanley Jeffers, John J. Caldwell, and Ray G. Carlberg;
University Research Fellow - Michael De Robertis;
Postdoctoral Fellows - Sheng-Pan Zhang, and Seppo Mikkola;
Astronomy Technician - Paul Delaney;
Graduate Students - Tom Stiff and David Anthony

Staff Changes:

Kim Innanen began a five year term as the Dean of Science on July 1, 1986. John Caldwell, an interdisciplinary scientist on Space Telescope, was hired as a full professor on July 1. Ray Carlberg was promoted to associate professor also effective July 1.
Michael De Robertis began the first year of a URF at York in October 1985. Seppo Mikkola arrived from Turku University, Finland to take up a post-doctoral position with Kim Innanen on September 2, 1986 joining Sheng-Pan Zhang who arrived in August 1985 from Nanjing University in China. Paul Delaney, previously with McGraw-Hill Observatory, joined the department as an astronomy technician to oversee the 12" and 24" telescopes on the York campus. Tom Stiff continued working towards his (observational) Ph.D. thesis on B and Be stars with Stan Jeffers. David Anthony continued working on (theoretical) N-body simulations of self-gravitating accretion discs for his M.Sc. under Ray Carlberg. Roger Hunt from the University of Alberta worked as an NSERC summer student with Stan Jeffers and Michael De Robertis.

Kim Innanen was on sabbatical leave from January-June, spending several weeks as a senior fellow at CITA. He also gave an invited review at the Harvard IAU meeting on Globular Clusters in External Galaxies. Stan Jeffers was on sabbatical leave from January-June, working on the analysis of spectrophotometric data of Of stars and low light level diffraction experiments. Ray Carlberg was a visitor at Johns Hopkins University and the STScI from January-August. He gave invited reviews at the Princeton IAU meeting on Elliptical Galaxies, and the Santa Cruz workshop on Nearly Normal Galaxies.

Hardware development:

In 1986, astronomers at York purchased a MicroVAX II with 13 Mb physical memory and 210 Mb hard disk storage, and an Imagen Imagestation laser printer for research purposes. A Starlight 1 photon-counting photometer was acquired for upper-year astronomy labs and research projects. From York's portion of the Ontario government's Provincial Excellence Fund, the astronomy group was awarded sufficient funds to purchase colour image processing and display hardware from Advanced Electronics Designs, Inc. to be used with the MicroVAX II.

Michael De Robertis

CANADIAN ASTRONOMY PREPRINT LIST

JUNE 24 TO SEPTEMBER 9, 1986

The following file contains a list of preprints written by Canadian astronomers. All preprints were received at the Astronomy Library within the dates as stated above.

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Aaquist, O. and Sun Kwok. Visibility analysis of compact nebulae. U Calgary. 86.08.20.

Arquilla, Richard and Sun Kwok. CO observations of IRAS circular No. 9 sources 19520+2759 and 01133+6434 - regions of star formation. U Calgary. 86.08.20

Arquilla, R., Sun Kwok and D.A. Leahy. CO observations of IRAS sources with SiC emission features. U Calgary. 86.08.20.

Borderies, N., P. Goldreich and S. Tremaine. Nonlinear density waves in planetary rings. CITA. 86.07.10.

Borra, Ermanno F., Louis Noreau and Franco Petrucci. A multicolor study of the quasar PHL 1070 and its environment. U Laval. 86.08.29.

Bridle, Alan H., Richard A. Perley and Richard N. Henriksen. Collimation and polarization of the jets in 3C219. NRAO and Queens. 86.08.15.

Carr, B.J. and C.G. Lacey. Dark clusters in galactic halos? CITA. 86.07.31.

Crampton, David, A.P. Cowley, F.D.A. Hartwick. The space distribution of faint quasars from the CFHT survey. DAO. 86.08.29.

Evans, Nancy Remage and C. Thomas Bolton. The mass of the classical cepheid SU Cygni. DDO/U of T. 86.09.08.

Fitchett, Michael and Rachel Webster. Substructure in the Coma cluster. CITA. 86.07.10.

Goldreich, P., S. Tremaine and Nicole Borderies. Towards a theory for Neptune's arc rings. CITA. 86.07.14.

Gray, David F. Line-shaping phenomena in cool stars. UWO. 86.07.25.

Gregory, P.C. and A.R. Taylor. Radio patrol of the northern Milky Way: A catalog of sources. II. UBC. 86.09.08.

Hickson, Paul, J.B. Hutchings. Imaging spectroscopy of five QSOs. DAO. 86.08.29.

Hutchings, J.B. Relationships between Seyfert galaxies, QSOs, and BL Lacs. DAO. 86.08.22.

Hutchings, J.B. 1411+422: optical imaging of BAL QSO. DAO. 86.08.22.

Hutchings, J.B. and S.G. Neff. Morphology and spectroscopy of Markarian 231. DAO. 86.08.22.

Kronberg, P.P., R. Wielebinski and D.A. Graham. VLA and 100-m telescope observations of two giant radio galaxies: 0634-20 and 3C 445 (2221-02). DDO/U of T. 86.06.27.

Kwok, Sun. Wind accretion and interaction in long period binary systems. U Calgary. 86-0782.

Kwok, Sun, Bruce J. Hrivnak, R.T. Boreiko. Ground-based observations of IRAS candidates for late asymptotic giant branch stars. U Calgary. 86.08.20.

Lattanzio, John C. Asymptotic giant branch evolution in the Magellanic Clouds. CITA. 86.07.10.

Lee, Man Hoi and C. Rogers. Thermal emission from Bok globules. DDO/U of T. 86.08.18.

Matthews, H.E., S.C. Madden, L.W. Avery and W.M. Irvine. The C_3H_2 $2_{20} - 2_{11}$ transition: absorption in the cold dark clouds. HIA. 86.07.30.

Matthews, H.E., P.A. Feldman and P.F. Bernath. Upper limits to interstellar PO. HIA. 86.07.30.

Matthews, Jaymie M., Donald W. Kurtz and William H. Wehlau. The rich p-mode spectrum of the rapidly oscillating peculiar A star HD 60435. UWO. 86.06.30.

Merritt, David. The distribution of dark matter in the Coma cluster. CITA. 86.07.14.

Morbey, C.L. and R.F. Griffin. On the reality of certain spectroscopic orbits. DAO. 86.08.22.

Nemec, James M. and Hugh C. Harris. Blue straggler stars in the globular cluster NGC5466. DAO. 86.08.22.

Noreau, Louis and P.P. Kronberg. The amorphous galaxy NGC 3448. I: Photometry, dynamics, and modelling. DDO/U of T. 86.07.23.

Peterson, Charles J. and B. Cameron Reed. Structural parameters and luminosities of globular clusters. DAO. 86.08.29.

Peterson, Charles J. A bibliography of globular cluster color magnitude diagram studies. DAO. 86.08.29.

Peterson, Charles J. Ages of globular clusters. DAO. 86.08.29.

Pritchet, C.J. RR Lyrae stars in the halo of M31 - a preliminary report. U Victoria. 86.08.11.

Pritchet, Christopher J. and Sidney van den Bergh. Observations of novae in the Virgo cluster. U Victoria. 86.08.11.

Seaquist, E.R. and A.R. Taylor. Detailed analysis of the radio emission from the symbiotic star RX Puppis. DDO/U of T. 86.07.14.

Tapping, K.F. Recent solar radio astronomy at cm wavelengths: the temporal variability of the 10.7cm flux. HIA. 86.07.30.

Tapping, K.F. A double layer model for solar X-ray and microwave pulsations. HIA. 86.07.30.

Volk, Kevin and Sun Kwok. Evolution of the infrared spectra of AGB stars. U Calgary. 86.08.20.

Wehlau, Amelia, Serge Demers and David Bohlender. A newly discovered distant RR Lyrae variable. UWO. 86.06.30.

Wehlau, Amelia and Serge Demers. Magnitudes of bright variables in the Draco dwarf galaxy. UWO. 86.07.30.

Vallee, J.P., J.M. Macleod and N.W. Broten. Magnetic field excess observed in a cluster of galaxies. HIA. 86.07.16.

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