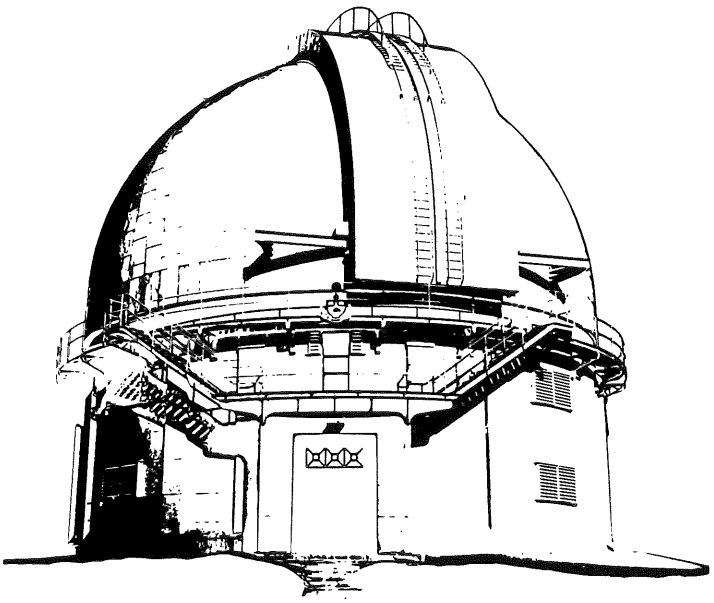
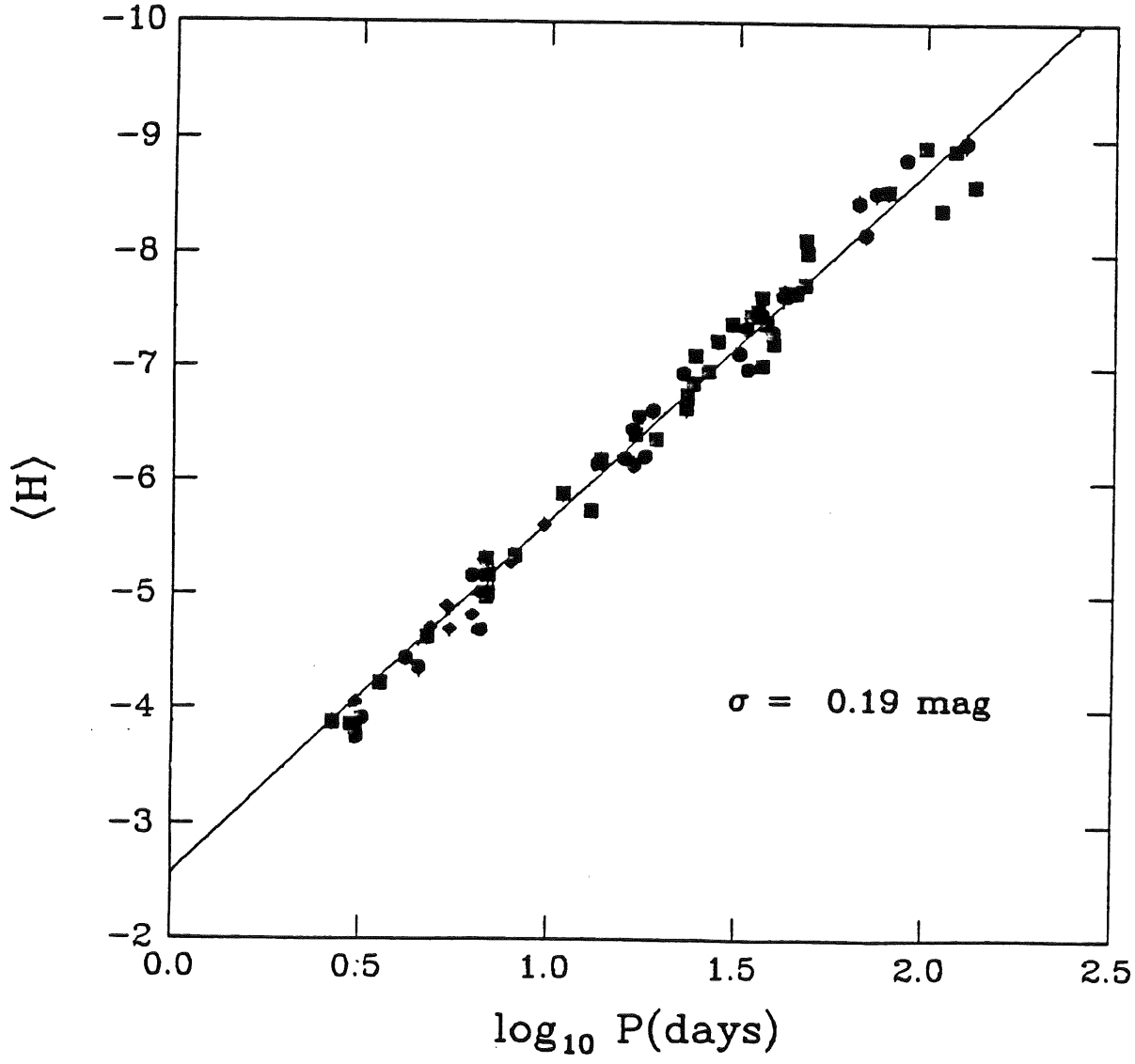


THE DAVID DUNLAP DOINGS

Vol. 19, No. 4 December 1,

COMPOSITE P–L



Our Cover: A composite H P–L relation for Cepheids. From *The Infrared Distance Scale: The Galaxy and the Magellanic Clouds* by D. L. Welch, C. L. McAlary, R. A. McLaren, and B. F. Madore (in IAU Colloquium No. 82, Cepheids: Theory and Observations, Toronto 1984) p.221.

Editorial

The theme for this issue is a tribute to Chris McAlary. We have solicited contributions from some of his associates. The cover is an illustration representative of Chris's involvement with the distance scale recalibration.

Contributions to the renewed Doings have continued to flow in even in the short interval since the last issue. Obviously, the newsletter fills the need. Being divided as we are among 3 campuses and Richmond Hill, it is difficult to keep in contact; the newsletter (and VAX mail!) provides the link.

The switch to the electronic medium is working well. More than $\frac{3}{4}$ of the contributions were received via electronic mail (to ATLAS::ROGERS or BITNET%"ROGERS@UTORPHYS"). Instead of spending several days typing the Doings, Esther now spends several hours formatting with TEX. Isn't it wonderful?

Next deadline is 21 January 1987 for the February 1 issue.

rG and Rg

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IN REMEMBRANCE
CHRISTOPHER W. McALARY (1952—1986)

from Doug Welch and Dennis Crabtree ...

On August 4, 1986 Chris McAlary died in Tucson, Arizona, a victim of cancer of the colon. He was 34 years old. During his too short career as an astrophysicist Chris was the driving force behind the recalibration of the Local Group distance scale using infrared photometry of Cepheids and was engaged in research on active galactic nuclei.

Chris was born in Toronto, Ontario on February 7, 1952. The McAlary family moved several times during his childhood, finally settling in Calgary where Chris graduated from high school in 1970. He obtained his B.Sc. from the University of Toronto in 1974 and entered graduate school at the University of Western Ontario. Under the supervision of Dr. W.H. Wehlau, Chris completed an M.Sc. thesis in 1976 entitled "Rapid Photoelectric Photometry of White Dwarfs". His Ph.D. thesis, "A Near-Infrared and Optical Study of X-ray Selected Seyfert Galaxies" was supervised by Dr. R.A. McLaren at the University of Toronto and was successfully defended in December 1981. During his Ph.D. studies at Toronto, Chris married fellow graduate student Lindsey Davis on September 30, 1978. Upon completion of their respective theses, Chris and Lindsey moved to Tucson where Chris worked as a post-doctoral fellow and later as an assistant astronomer at Steward Observatory with George Rieke, while Lindsey took a position as a support scientist at Kitt Peak. Chris's enthusiasm for research in astronomy was reflected in his publication record — 26 papers *published* at the time of his death and several more in preparation — and in his irrepressible desire to observe.

During his graduate years at Toronto Chris actively participated in all aspects of student life. He was an avid softball player who kept the third-base line safe for the Asymptotic Freedom Fighters. He could often be found at the GSU playing volleyball and/or drinking beer. Chris maintained a keen interest in the workings of the Department and took an active role in making improvements. He was also a popular TA for the AST225 (Practical Astronomy) course for many years where he gave the lectures on photoelectric photometry.

Chris led a very active life outside the world of astronomy. He and Lindsey enjoyed camping, hiking and while in Tucson, soaring. Chris enjoyed a wide variety of literature and could contribute something interesting to a conversation on almost any topic. He had little tolerance for incompetence and never kept that a secret.

He first learned of his cancer in January 1985 and an operation was performed soon thereafter. Chris refused to allow chemotherapy to keep him at home one week a month, instead using a portable treatment unit at work. He gave up none of his outside interests until the disease finally confined him to home in summer 1986.

Chris's mischievous grin, terrible jokes, probing questions and eye for good science will be missed by all who knew him. His tragically short career will serve as a reminder and an example of the importance of making every minute count.

from Bob McLaren ...

I would like to share with the readers of the Doings some personal reflections on my association with Chris McAlary, which extended over ten years. Chris was the ideal student to supervise and later, the ideal collaborator and colleague.

Chris possessed in abundance the two characteristics which I believe are the most important for success in research – imagination and drive. The former quality is illustrated by the wide range of his work. During his brief career, he made original and valuable contributions to the study of active galaxies, the distance scale, variable stars, SS 433, planetary atmospheres, and instrumentation.

His drive and enthusiasm were nowhere more evident than at the telescope. I remember one run on particular. It was at the IRTF in the fall of 1980, and it was the first of the many runs in the infrared Cepheid program. The target objects were the dozen or so brightest Cepheids in M33 plus a few cluster Cepheids to start the calibration. Things went pretty well, but as was often the case, not well enough to satisfy the perfectionist in Chris. The biggest problem was the failure of the remote control for the offset guider, with the resulting necessity to leave the observing room and mount the Cass. platform at frequent intervals. Chris was very excited about the project and eager to get as much data as possible. As each night progressed, he would become more impatient with the trips into the dome and more vigorous in his manipulation of the observing room door. I believe they replaced most of the hardware on that door after our run.

I had always hoped that Chris would eventually return to Canada to bolster the ranks of the tiny infrared community working in this country. Sadly, this was not to be. For those of us who worked closely with him, our tragically short association will provide a lifelong source of inspiration.

from Rick Crowe ...

When I first heard the news of Chris McAlary's passing, it was a great shock, for despite the fact that I was aware that he was suffering from cancer, I had seen him only six months before here in Hawaii and I recalled that he appeared to be healthy and in good spirits. I was also under the impression that the chemotherapy he was undergoing had stabilized the spreading of the disease. This is yet another sad example of the terrible effects of cancer. On learning of Chris's death, all of the experiences I had shared with him over the 12 years we had known each other started flashing through my mind.

I remember the first time I met him in 1974 (I think it was at a June Institute at U. of T.) being immediately impressed with his enthusiasm and joie de vivre. We both began graduate studies at UWO at the same time in the fall of 1974. I remember the many hours we spent in the classroom together. Chris was a very keen and bright student, and even then, I knew that he would make his mark in astronomy. He was also very helpful in discussing problems and assignments related to classwork. I remember the evenings gabbing in the Elbow Room Pub on campus, the lazy afternoons playing croquet, the baseball games with the Physics graduates, the astronomy group hockey games, the "frockey", or frisbee hockey, matches in the garage and hallways of the old UWO Astronomy Building on Western Road (only during the evenings!). Chris was always extremely competitive when participating in sports, and seemed to be proficient at virtually everything he tried.

I remember having to rewrite the UWO M.Sc. astronomy comprehensive examination along with Chris. We decided that we had to get "in the mood" for the exam, so on the night before, we hauled ourselves over to the Elbow Room to "loosen up", and then we proceeded to a local theatre establishment to enjoy "Monty Python in Search of the Holy Grail". That was one of the most enjoyable evenings I spent as a graduate student at UWO. Not surprisingly, the movie doesn't seem as funny to me now as it did then! We were both totally relaxed when writing the exam, and I guess this technique paid off, since we also both passed it! I also remember the evening that Chris got to know his future wife, Lindsay Davis. It was yet another discussion session at the Elbow Room, with John Conville (who was working as a software technician), Lindsay, Chris and myself present. After that evening, Chris and Lindsay became steady companions.

Chris left UWO in 1976 to move on to the University of Toronto for his Ph.D. studies. I stayed on a few months longer, and then ended up accepting the Resident Observer position at Las Campanas Observatory shortly after my M.Sc. thesis defense in March 1977. It was Chris that first suggested my name to Bob Garrison as a candidate for the position. Between April and June of that year, I remember attending concerts by Bruce Cockburn and Andre Gagnon with Chris and Lindsay. Chris was a keen lover of all types of music, and I recall introducing him to many of my jazz and classical record albums.

In September 1977, Chris was scheduled for an observing run on the U. of Toronto 24-inch telescope, and thus we arranged to spend a few days after the run travelling to Cuzco and Machu Picchu in Peru. The observing itself was fraught with problems (he was doing high-speed photometry of short-period variables, as I recall). We lost one whole night because a few of the relays controlling telescope motion were not working. We had to overturn the control console, figure out which relays were causing the problem, and then replace them. I remember how frustrating it all was, how both of us became short-tempered, and how elated we were to get the telescope "back on track" once again. It was our gyo, that is, our spiritual discipline together. On one of the other nights, which was cloudy, Chris and I sat in Canada House, and listened attentively while Peter Pesch (who was observing on the Swope 40-inch) delivered an amazingly

convincing lecture on why people should study astronomy (from the perspective of an uninitiated layman). Years later, Chris still talked about that memorable evening.

Subsequent to the observing, we then took off for Peru together. I remember that we went sightseeing through Lima (my only visit to that city), and then ended up at Leonard's Lodge in Cuzco, where we had more interesting discussions. Leonard himself related to us some of his fascinating experiences in South America. I remember walking through the ruins of Machu Picchu with Chris, and I still have many pictures of him set against this backdrop. On the way back through Lima, both of us contracted "Inca Quickstep", or "Allende's Revenge", or whatever you want to call it. I remember us catching a taxi to the Jorge Chavez Airport at 5:30 in the morning and how neither one of us wanted to get out of bed because we were both horribly sick. A memorable observing run and an unforgettable trip! I sent my film of the experience back to Canada with Chris, and for some strange reason, the processed slides did not arrive immediately at my parents' house, as had been planned. There were a few worried phone calls from my father to Chris, and then amazingly enough, more than a month later, the slides arrived at Las Campanas Observatory in good shape! Evidently, the wrong return address had been placed on the Kodak mailer.

When I returned in 1979 to U. of T. to begin my Ph.D. studies, Chris was almost finished his thesis. Although I was once again thrown into the midst of some heavy course work, there was time for him and me to participate together in baseball and hockey games. We were both on the Astronomy-Physics softball team (the Asymptotic Freedom Fighters), along with Dennis Crabtree and Geoff Clayton. That year (1979-80), the Freedom Fighters were one of the best teams in the league, in no small measure to Chris's excellent work at third base. Soon after those days, Chris moved on to Arizona, where his astronomical career blossomed. Since his professional interests were somewhat different from mine, we didn't keep in touch very often after he moved from Toronto, but nonetheless, he would pop in from time to time, and would always be willing to drop over to a local pub and discuss past times and experiences. In January of 1984, Chris was at the Las Vegas A.A.S. conference, which I was also attending, and we took the opportunity of taking a grand tour of the local gambling establishments. Once again, that was a memorable evening!

These are the events which flashed through my mind when I learned of Chris McAlary's sudden death. Although I cannot speak very much about Chris's contribution to astronomy, I have had many memorable personal experiences with him. Wherever he may be in spirit, I pray that these moments will be recalled fondly. His love for life was contagious, and he was always very enjoyable company, no matter what the activity. He usually had a twinkle in his eye, and a mischievous grin on his face. When his life was tragically cut short this past summer, we lost not only a brilliant young astronomer, but also a very dear friend. He will be sorely missed, not least of all by me.

Memorial Fund

A memorial fund has been set up to purchase a gift for the library as a tribute to the late Chris McAlary. If the amount collected is sufficient, the item will be the White Oak extension of the Palomar Sky Survey for Chile. Donations may be given to me in the form of a cheque made out to the University of Toronto. Tax receipts will be issued for amounts of $20 or more.

CONGRATULATIONS

To *Tom Bolton* who was one of 18 people named as an Outstanding Richmond Hill Citizen at the annual Richmond Hill Awards Banquet on November 21, 1986. He was presented with a citation and gold cuff links bearing the Town crest. The citation reads in part,"...presented to Dr. C. Thomas Bolton by the Mayor and Council in grateful recognition of contributions to the enrichment and welfare of the community". His work on Cygnus X-1 was mentioned at the presentation, and he was described as "an unexcelled proponent of the Observatory's concerns". Dr. Helen S. Hogg is a previous winner of this award.

To *Janice and Peter Leonard* who became parents for the first time on August 23rd. Ashley Anne Leonard weighed 8lbs 6.5ozs at birth (over twelve lbs now), and she and her mother are doing fine.

To *Mario Pedreros* (Ph.D. 1984), now at St. Mary's University, who will be getting married in Chile during (or maybe just after) an observing run there this January.

COMINGS AND GOINGS

Dennis Crabtree (Ph.D. 1982) stopped in on Nov. 24 enroute from Victoria to the Space Telescope Science Institute. Dennis is a Research Associate at DAO with the Canadian Space Astronomy Data Center (CSADC).

Peter Martin, on sabbatical from CITA at Lick Observatory, spent a productive week back in Toronto when he attended the CASCA Council meeting. He managed to finish a paper with Ann Rusk and John Dove (Chemistry) and consult with members of the "physical processes in star forming regions" group.

Nancy Evans had an IUE observing run at Goddard Oct. 15-17. The project was observations of ZAMS stars, i.e. the Pleiades. This gave her a chance to see old friends, reduce some data, and collect a VAX version of the RDAF IUE reduction software for our system here.

Chris Rogers visited the University of Toledo (Nov. 19-20) where he spent one day discussing supergiant atmospheres with Laurence Anderson and Nancy Morrison and, the next day, Bok globules and reflection nebulae with Adolf Witt.

Dale Frail returned Nov. 5 from two weeks in the jungles of Arecibo, where he was working with Shri Kulkarni from Caltech and Trevor Clifton of Berkeley. They were implementing some home built pulsar observing software to do neutral hydrogen absorption and emission observations toward pulsars.

John Percy gave presentations on "The Search for Extraterrestrial Life" to both teachers and students at the 1986 biennial conference of the Science Teachers' Association of Ontario.

John Percy was Harlow Shapley Visiting Lecturer at SUNY College at Fredonia, New York, giving a series of four lectures to the public, local teachers, and classes at the college.

John Percy spent two days in Boston at the end of October, attending an AAVSO council meeting, and collaborating with Janet Mattei on various research projects.

Bob Garrison gave a lecture on 25 November to the Later-Life-Learning association at Innis College University of Toronto. The topic was "Extraterrestrial Life?"

Bob Garrison spent Oct. 25 at Yerkes Observatory (University of Chicago) working with W. W. Morgan on late-type standard stars.

POTPOURRI

Correction: Our apologies to Doug Welch. In the last issue we gave 1986 as the year he submitted his Ph. D. It was actually 1985. We also spelled his name wrong. Sorry about that Doug!

Martin Duncan writes ... I visited Laval University Nov. 20-21 to give two talks to the Physics Department. The first was on the formation and evolution of the Oort comet cloud, the second on dynamical evolution of galaxies in clusters. The second talk was held in the midst of a snowstorm that would make Torontonians quake but merely signalled the beginning of an excellent ski season to the locals. Total accumulation was in excess of 30 cm.(one foot).

My host (who shall remain anonymous since he's up for tenure) in fact insisted that we celebrate the arrival of the first big storm of the year by running barefoot through the mounting drifts on the evening the storm began. This was followed by a soaking of the traumatized appendages in hot water and consumption of the appropriate internal medicine (herbal tea of course).

Not to be outdone by my host, I left Quebec wearing the ultimate in Toronto footware - two plastic grocery bags held in place by elastic bands enclosing my very porous summer shoes. Look out Pierre Cardin!

The IAU has approved a proposal for a colloquium (No. 105) on " The Teaching of Astronomy: Present and Future," to be held in Williamstown, MA just before the 1988 IAU General Assembly. John Percy is chairman of the Local Organizing Committee [correction Scientific Organizing Committee], Jay Pasachoff is chairman of the Local Organizing Committee. It's back to organizing meetings again for John.

In the current revision of the Ontario Secondary School curriculum, it appeared that astronomy was doomed to disappear entirely; right now, it is an optional topic at about the grade 9 level. A few weeks ago, a possibility appeared for including it as an optional topic in two places: grade 10 science and grade 12 physics. The ministry of education has asked John Percy to lead two small groups which will draft formal guidelines and descriptions of these two "units."

Members of the Department gave a very well-received course on astronomy to the Later Life Learning program, a seniors group coordinated by the university's Department of Public and Community Relations. Over 200 people were enrolled in the course.

From Our Far-Flung Graduates ...

Alan Irwin (Ph.D. 1978)

I am glad to hear that DDD will continue. I rely on it to keep track of current and past members of the Toronto astronomical community. I read that you were collecting submissions for DDD. I have never submitted anything before but thought it was time to do so since it has been 6 years since we left Toronto! Please let me know if this file gets to you ok (bitnet address of IRWIN@UVPHYS).

I include news of Barbara, who is now Head of Technical Services, Greater Victoria Public Library. She and her staff are just beginning to realize the potential of their new computer system that integrates accounting, acquistions, cataloging, public on-line catalog, and circulation functions.

My research news is that despite many improvements on my thesis work, I continue to be dissatisfied with the agreement between LTE-synthetic and real late-type spectra. I suspect many of the problems are caused by errors in the temperature structures of late-type theoretical model atmospheres, though I have yet to try Kurucz's new line-blanketed models.

I have two currently active research projects at the University of Victoria. I am refining calculations of molecular partition functions, and I am developing a new method of calculating line-blanketed, LTE, convective, model atmospheres. I hope to eventually use the new method to calculate models with non-local, non-linear convection.

We were saddened to hear of Chris McAlary's death. While Chris and I were in the same office in Toronto, I learned to appreciate his unique views of the world and astronomy. He will be missed!

GASA GOSSIP

Mike Fieldus

GASA Gossip has returned. This is a short column on the varied activities of our graduate students, written by one of the graduates students (me). True to form of any awesome bureaucratic machine, GASA chose me, a new master's student, who doesn't know anyone yet, for the job of telling you about these people. (They gave me the valid reason that, for the time being, they all have important reseach to do while I am only concerned with course work, and thus time will be heavy on my hands anyway.) I am certainly not used to having such honours bestowed upon me, and so soon after I arrived!

During my research into the students of this department, I did notice one unifying theme, that being a preoccupation with cats. My first introduction to this came one morning when I saw Raymond and Brian G deep in discussion in a corner. " Ah," I thought, "radio astronomers. Here's my chance to learn something about these two students, and radio astronomy at the same time." I tried to follow the discussion for five very confusing minutes, after which I realized Raymond was explaining the correct procedure for de-worming a cat. (I'm still not sure where the jets fit in).

Later, talking with Alex about the department, he let on that he actually enjoyed the campus observer job despite any obvious shortcomings. He claimed it gave him a chance to watch a pair of 2nd year students "going at it like cats" in one of the sixteeth floor rooms. I took AST 225 here, and distinctly remember the "no pets in the dome" rule, so I am not sure what he was talking about.

At any rate, in an attempt to be accepted, I went out and bought myself a kitten, only to have Brian Stekelenburg claim that was not the sort he meant when tells us of his weekend experiences. [We'll leave this uncensored until the Ontario Board hears of it; ed.]

A reasonable idea for this first GASA Gossip column would be to introduce all of the new graduate students (the people whom you have seen but do not have a clue who they are). First, Jim Picha is a Phd student from Vancouver. He is working with Ernie Seaquist and Allen Yen doing some wide-field aperture synthesis. Rob Straker is from Calgary, and will be doing Masters work with Chris Rogers on radiative transfer. John Dubinski is a masters student from Waterloo, where he attended the Universtiy of Waterloo in the physic co-op program. He will be working on the N-body problem for Martin Duncan. He sends appolgies to all the women in the readership, as he was just married this last August. Yin Zhan is a Phd. student from Beijing, China. Yin attended Peking University, and completed a Masters degree at Beijing Astronomical Observatory. Last year he was with the Space Telescope Scienific Insitute. (Oh, by the way, I'm Mike Fieldus, from Toronto. I'm working for John Lester and Chris Rogers on spherical model atmospheres. Sounds like fun.)

(Next issue: Dale explains how Raymond is really a KGB agent, Dan Blanchard tells all while finking on his friend(s), and all the latest news about the new couples in the department!)

ADVENTURES IN ETYMOLOGY

Tom Bolton

In my report on the meeting on synoptic observing programs in the last DDD, I added to the confusion that often exists when a new term is first introduced into the astronomical nomenclature. Careful readers of both the Autumnal Equinox issue of Cassiopeia and the DDD will have noticed that stellar seismology was referred to as "asteroseismology" in the former with an editor's query as to why it was not "astroseismology", whereas I used "astereoseismology" in the DDD. rG questioned my spelling immediately before the DDD went to press, but I didn't have time to check it because of an important meeting of the Richmond Hill Town Council. Over Bob's objections, I insisted on my spelling because my notes from the meeting indicated that a strong point had been made about the correct spelling, and I assumed that the spelling in my notes must therefore be correct. Unfortunately, they weren't. The correct spelling is "asteroseismology". This form is preferred because "seismology" is of Greek origin, and "astero-" is Greek, whereas "astro-" is latin. As near as I can tell, the word I invented with my misspelling, "astereoseismolgy", must mean something like "the study of stellar vibrations with only one detector". Hmmmm, maybe I wasn't so far off after all.

IMPRESSIONS OF CHILE AND UTSO

Brian Beattie

I was walking through one of the strangely deserted *poblaciones* in the vast residential plain on the western outskirts of Santiago when a man approached me and said a few sentences in Spanish. I was slightly apprehensive because of the down-and-out appearance of the man and also because it is rare for a Chilean to approach a stranger and start a conversation. If he had wanted to slit my throat, it was certainly the right place and time. I did not understand a word of what the man had said and replied: *"No se, lo siento"*. I think that translates as "I don't know, sorry". In any event that was either the correct response or he concluded that I was a blithering idiot because he shrugged his shoulders and walked away.

As a first time visitor to UTSO in August and September of this year, I was left with many lasting impressions of both the Observatory and Chile. The trivial encounter related in the first paragraph reinforced in my mind that I had not had a single bad experience during my stay in Chile. On the contrary, I was singularly impressed with the friendliness and warmth of the Chilean people. Never before have I made so many friends and acquaintances in such a short period of time, and this in

spite of my language handicap. I made a point of taking some time at the end of my observing run to explore Chile. I hold my impressions of Chile in sharp contrast to experiences on a November trip to the southern United States. Not that Americans in general are unfriendly, but I can't imagine Chileans giving me a reception like the one a friend and I received in a tavern outside Chattanooga. After we walked through the front door every customer looked at us and seemingly thought the same thought: "What the HELL are those yankee puddin' head freaks doin' in here?"

The Observatory is located on what must be some of the most starkly rugged terrain in the world. With a month-long run on the 60cm telescope, one might think that I had lots of time to explore the landscape, but in fact I had little time to depart from my daily regimen of observing, developing plates, eating and sleeping. The demands of astronomy are exhausting. The moments spent viewing the landscape and hiking during a clear-weather run were short in duration (but long in satisfaction). I did not have the chance to go on a single extended hike.

My daily routine at Las Campanas was kept interesting with telescope problems. When the telescope is operating normally, it is a joy to use, but two weeks after my run commenced, the coordinate system for the telescope failed. With Ian Shelton in Canada on a vacation, I had to ask Bill Weller from Cerro Tololo to come up to fix the problem. I was lucky that there was someone in Chile with extensive experience with the telescope. Bill was able to repair the problem so I could continue with my work; but during the repair period the telescope was a bear to use. The cause of the problem was simply age; the telescope has served the University of Toronto well over the last sixteen years, but electronic components do not last indefinitely. The budget cuts are beginning to take their toll.

The next few years will be a dynamic time for the Observatory, with the installation of the CCD, and a dynamic time in Chile. It is a treat to work at a world-class astronomy site located in an interesting and fascinating country and I encourage all observational astronomers at the U. of T. to partake of the UTSO experience.

The Gravitational Lensing Workshop

Dan Blanchard

The emerging importance of gravitational lensing as a probe of the distribution of mass in the universe and as a technique for determining various cosmological parameters has led to a fair amount of recent work in this field. This prompted Rachel Webster, with the support of the Department of Astronomy and CITA, to organize a two day workshop on gravitational lensing that was held at the University of Toronto on October 3 and 4, 1986.

The workshop was attended by roughly 30 people from many different institutions and working on almost as many different aspects of the problem. The workshop opened with a talk summarizing the current state of theoretical work (Peter Schneider, Colorado). In particular, he discussed micro-lensing as a case of non-linear lensing. In micro-lensing, the photon beam passes through a dense field of compact objects and is subjected to several lensing events. The global problem has no analytical solution and must be solved numerically (as opposed to linear lensing where there is only one strong lensing event and an analytical solution often exists).

Jacqueline Hewitt (Haystack Observatory) then reported on a VLA survey which has identified one good lens candidate (2016+112) and is currently studying a further two possible candidates. This survey is sensitive to matter clumped on scales $10^{10} - 10^{12}$ solar masses, and the group has been able to derive a conservative upper limit on the cosmic density in lenses of less than 0.7 for lenses in the above-mentioned mass range. C. Vanderreist (Meudon Observatory) presented data for 0957+561 collected over a six-year time base; so far, no unique time delay can be determined from the data.

Following this, Rachel Webster (Toronto) and John Stocke (Colorado) each described two other surveys presently underway. Rachel talked about an automated survey for gravitational lensing candidates which uses the Automated Plate-Measuring machine at Cambridge, U.K. to automatically select quasar candidates with possible multiple images. This survey has shown that there are no candidates with separations in the range 10" - 2' in their sample of roughly 2500 quasars studied to date. John reported on a study of X-ray AGN's selected near bright foreground galaxies. These sources show some evidence of being micro-lensed by stars in the foreground galaxy.

After lunch, Irwin Shapiro (CfA) discussed both necessary and sufficient conditions for lens identification. Different images will be seen along different photon paths. The different gravitational potentials along the paths will introduce time delays and perhaps a velocity difference. The different absorbing and emitting regions along each path will cause spectral differences between the images.

After this, some theoretical work was presented. Charles Dyer (Toronto) discussed the effects of an inhomogeneous universe on the measurements of cosmological parameters and Myeong-Gu Park (Princeton) described a calculation which used the known separations of double images to place limits on the cosmological constant and the acceleration parameter.

To close out the day, Marc Gorenstein (CfA) described a new survey using archived VLBI data which will be sensitive to multiple images in the range 0.1" - 1.0". Everyone headed out for dinner at one of the many Chinese restaurants on Spadina and enjoyed an excellent meal. The group then split up to visit their favourite night spots including El Mocambo and the GSU.

In spite of the night before, everyone was up bright and early the next morning to hear Bohdan Paczynski (Princeton) talk about gravitational lensing of gamma ray bursts. Some of the bursts that have been observed may be multiple images of the same event. Robert Wagoner (Stanford) explored the possibility of using supernovae as probes of dark compact objects and Ulf Borgeest (Hamburg) described a parallax method requiring a 0.1 AU baseline which would allow one to determine the size of the quasar emitting region as well as the transverse velocity of the lens. He also described a method for determining the mass of the primary galaxy in the lens using time delays.

Following lunch, Roger Blandford (Cal Tech) summed up the workshop by discussing four major areas of concern. He discussed the problem that even though theory predicts an odd number of images, in each case of known lensing an even number of images is seen. This could be due to absorption, a singular potential or the expected faintness of the missing image. Secondly, on average, the separations are larger than what we expect from known mass distributions. Third, we have yet to find a suitable lensing object for most of the known cases. Finally there is the problem of 2237+03 which is observed close to the center of a bright foreground galaxy. Why do we see it at all?

The upshot of the whole workshop was that we need to verify gravitational lenses. There are nine candidates at present (including the infamous 157" separation of the images of 1146+111) and the wide variety found in this sample indicates further rigourous testing of lenses is necessary.

On a personal note, I enjoyed the workshop not only because of its scientific value but also because it enabled me to put faces to all those names I had hitherto only seen on journal articles. It was a valuable learning experience.

AIPS NEWS

Phil Kronberg

In mid-November Phil Kronberg and Ernie Seaquist took delivery of their new SUN-3 computer. This new, UNIX-based machine and its peripherals will form the new incarnation of the NRAO-AIPS workstation for the radio astronomy group. It is located in room 1606 of the McLennan Physical Labs.

Thanks to the coordinated efforts (and expertise!) of Tom Quinn, Brian Glendenning, Laura Carriere, Phil Kronberg, Lee Oattes, Ernie Seaquist, Charles Dyer and several others, the new computer was up and running within two days, along with its two Fujitsu Eagle disk drives. The latter were transplanted from the VAX 8600. As with the "old" AIPS cage, Laura Carriere will continue as the local AIPS manager.

The SUN-3 will shortly have a direct connection to the new CRAY X-MP at the Centre for Large Scale Computation (which is in the north wing of the McLennan Labs). Thanks to recent progress by the AIPS software group at NRAO, we expect to have AIPS running on the CRAY X-MP at U. of T. early in 1987.

Brian Glendenning has nearly completed an IMAGEN laser graphics device driver (IMGPL) which will shortly be incorporated into AIPS as the counterpart to NRAO's QMSPL. In a more major undertaking, Patricia Monger will be modifying the AIPS software to replace much of the I2S functionality with the new SUN colour graphics hardware. The results of both these efforts will be available to all interested takers. We expect that it will eventually be distributed through the NRAO in Charlottesville Va. In the meantime if you are in a hurry, contact Phil Kronberg.

OIPS

Marshall McCall

Are you bored with the slow pace of low frequency astronomy? Is the waiting for those intensity maxima getting you down? Come on over to the fast lane. **OPTICAL ASTRONOMY WANTS YOU!**

Soon to be operating beside that "other data processing system" will be the **O**ptical **I**mage **P**rocessing **S**tation. Initially, it will consist of my super-duper graphics terminal, colour printer, and a chair, although an upgrade to a fifth generation computer is imminent. I envision it to be our window into IRAF (Interactive Reduction and Analysis Facility), particularly when display of images is required.

Therefore, it is time that you learned how to use IRAF, or, at least, what IRAF has to offer. Although you may not know it, I have had IRAF running on the 8600 for a few months now. The state of the latest version makes it suitable to be unleashed on the University of Toronto.

IRAF can be run using virtually any terminal, as long as you tell it what terminal (see below). In particular, thanks to the help of Dennis Crabtree and the Space Astronomy Data Centre at the D.A.O., IRAF can be accessed fully via the Pericom terminals in Room 1408.

I have left copies of key manuals in a folder titled **IRAF** in Room 1408 and at the D.D.O. Please flip through these to get a rough concept of the system and a rough idea of the capabilities. Inside the folder are the documents "How to Use IRAF", "A User's Introduction to the IRAF Command Language", and "Preliminary Test Procedure for IRAF". The last guides you through the system by having you carry out a few simple operations. In room 1408, there is also a page telling you how to use a Pericom to access IRAF.

If you need more information about anything, please take advantage of the extensive help facilities built in to IRAF, or come and see me. I also have two thick volumes describing in detail most of what you would ever like to know. These include "procedure" manuals for reducing 1D spectroscopy, 2D spectroscopy, multi-aperture spectroscopy, and échelle spectroscopy. Once we have a bookshelf (which I just purchased), I will move them from my office up to OIPS.

UNIVERSITY OF TORONTO
DAVID DUNLAP OBSERVATORY & DEPARTMENT OF ASTRONOMY

LECTURE SERIES

Dec 3	Colloquium	Dr. Richard Wade Steward Observatory	A Modern View of the Dwarf Nova Z Chamaeleontis
Dec 10	Colloquium	Dr. Johannes Andersen Center for Astrophysics	Accurate Stellar Masses and Radii: Comparison with Models of Stellar Evolution
Jan 14	Colloquium	Dr. Andrew Collier Institute for Astronomy Cambridge	T.B.A.
Jan 21	Colloquium	Dr. Nathaniel Carleton Center for Astrophysics Harvard	IR to X-ray Continua of Active Galactic Nuclei
Jan 28	Colloquium	Dimitris Christodoulou Louisiana State University	Star Formation from Phase Transitions in Adiabatic Clouds
Feb 4	Colloquium	Dr. Joel Eaton Indiana University	Chromospheres of M Giants

PAPERS SUBMITTED

Fernie, J.D. δ CrB: a chromospherically active giant? 86.11.10.

Irwin, Judith A., E.R. Seaquist, A.R. Taylor and N. Duric. Evidence for ram pressure stripping of NGC3073 by outflowing gas from NGC3079. 86.11.20.

Kim, Kwang Tae, P.P. Kronberg, P.E. Dewdney and T.L. Landecker. The radio halo and magnetic field in the Coma cluster of galaxies. 86.10.14.

Kronberg, P.P. Magnetic fields and Faraday-active clouds out to the distances of quasars. 86.10.21.

Turner, D.G., Peter J.T. Leonard, Darlene A. English. Cepheid reddenings from KHG photometry: a re-examination. 86.10.15.

LIBRARY NEWS

Marlene Cummins

On the PR front, the library has recently added a new publication to its activities. We now compile and print out a List of Selected Astronomy Book Reviews. This is an elaboration of a system I set up some time ago to help with our own acquisitions. Subsequent to the recent distribution of this list to astronomy librarians internationally, we received a tremendous number of appreciative letters.

The library's IBM PC AT has arrived and is up and running. I am presently doing on-line searching and word processing; other functions will be added as more software and hardware arrive and our other terminal is connected for Rosemary.

THESIS ABSTRACTS

Circumstellar Material in the Algol System

Mercedes T. Richards

I have studied the Hα line profile of Algol (β Persei) in order to determine the kinematics and spatial location of the circumstellar material in that system. For this purpose, Hα difference profiles were obtained by subtracting the composite theoretical photospheric spectrum of the three stars in Algol from the observed spectrum. The IIIaF spectra used in the analysis were obtained in 1976 and 1977 and cover the full orbit of the binary in Algol, with a resolution of approximately 0.02 in phase. Some of the parameter values used in the calculation of the composite photospheric spectrum were obtained from the literature, while the others were evaluated via detailed analyses of the multicolour light curves, the IIaO and IIIaJ spectra of Algol, and the Hγ line profiles from 1972 and 1985. These analyses have shown that the inclination of the binary is 81.4 $\pm$ 0.2 degrees, Algol A has a temperature of 13000 $\pm$ 500 K, Algol B is a K0 to K2 subgiant, Algol C is a marginal Am star with a temperature of 7000 $\pm$ 200 K, and the circumstellar material has a significant effect on the Hγ line profile.

From an analysis of the geometry and radial velocities of the Hα difference profiles, I have developed a model in which the emission and absorption seen in these profiles arise primarily from a localized region which is located well above the oribital plane, and above the photosphere of Algol A, between Algol A and B, about one-fifth of the distance from the substellar point on Algol A to the inner Lagrangian point. The region is close to the line of centres of Algol A and B, and is displaced towards the trailing side of Algol A, at an angle to the line of centres which is smaller than that predicted by the hydrodynamical model of Lubow and Shu. This region can be explained by the interaction between the gas stream from Algol B and material circulating around Algol A. Analyses of both the Hα and Hγ profiles indicate that the circumstellar material in Algol is variable on time scales from months to years.

The A-type Stars: Refined Classification, Confrontation with Stromgren Photometry and the Effects of Rotation

Richard O. Gray

The A-type stars have been studied spectroscopically to 1) refine the MK- classification system for the A-type stars (B8-F2), 2) to investigate in detail the relationships between the $uvby\beta$ photometric system and the refined classification system, and 3) to explore the effect rotation has on MK classification, the $uvby\beta$ system and the relationship between these two systems.

The MK-classification system for the A-type stars has been refined in two ways: 1) the classification criteria (which are used as guidelines in the process of comparing program spectra with standard spectra) have been critically evaluated and modifications have been made which help to improve the consistency of the spectral classifications. 2) Parallel systems of narrow-lined and broad-lined standards have been set up. This refinement greatly facilitates the process of the comparison of program stars with the standards and helps to remove systematic effects with rotation in the classification system.

Detailed comparisons of the resulting precise classifications (of 1135 stars from the field and 15 open clusters) have been made with $uvby\beta$ photometry. The relationships between these two systems are found to be strongly dependent on the presence of rotation; some theoretical effects of rotation on the $uvby\beta$ indices (especially the β and δc_1 indices) have been confirmed qualitatively.

The λ Bootis stars have been studied in some detail and they have been found to fall into two distinct classes distinguished by their hydrogen-line profiles. A shell-like mechanism has been proposed to explain the second class which is characterized by peculiar hydrogen-line profiles. The δ Delphini stars have also been critically examined and have been found to be an inhomogeneous class of stars. It is recommended that the classification "δ Delphini" be dropped and that these stars be classified morphologically. However, attention is drawn to a class of stars with spectra similar to ρ Puppis (formerly classified as δ Delphini stars) whose study may give us insight into the relationship between convection and metallicity.

An MK-M_v map (absolute-magnitude calibration of the spectral classes) has been derived for the A-type stars. Vega is over-luminous for its spectral type; it is proposed that this might be understood if Vega is a rapid rotator seen pole-on.