

THE ^{DAVID} DUNLAP DOINGS

Vol. 19, No. 1 March 3, 1986



Photo by Karl Kamper

C O N G R A T U L A T I O N S

To Peter Leonard who successfully completed his general examination, and can now get down to some research with his supervisor Martin Duncan.

To Dan Blanchard who completed his Masters' degree at the beginning of 1986. Dan is working with Charles Dyer and his masters' involved theoretical work on the observed ellipticities of galaxies at cosmological distances.

I'm happy to report that our editor, Barry Madore, has been awarded a Killam Fellowship for the coming year, renewable for a second year. These fellowships are awarded to young scientists of outstanding ability and potential, paying their salaries so that they may concentrate entirely on research. We offer Barry our warmest congratulations.

Don Fernie

EARTH-SHAKING NEWS

Rick Crowe has been captured (or is it the other way round?) by Debbie Craig and they are being married on 22 March in Hawaii. One of their common interests is music; she is a folk singer and is also involved in theatre. We wish you well, Rick (and you, too, Debbie!)

Ian Shelton has decided to ship over for another year as Resident Observer in Chile. He is now on year 3 and thus has broken all records for longevity. After year 4, he will need a major reorientation programme before rejoining the real world, with all of its clouds, snow, and high people-density.

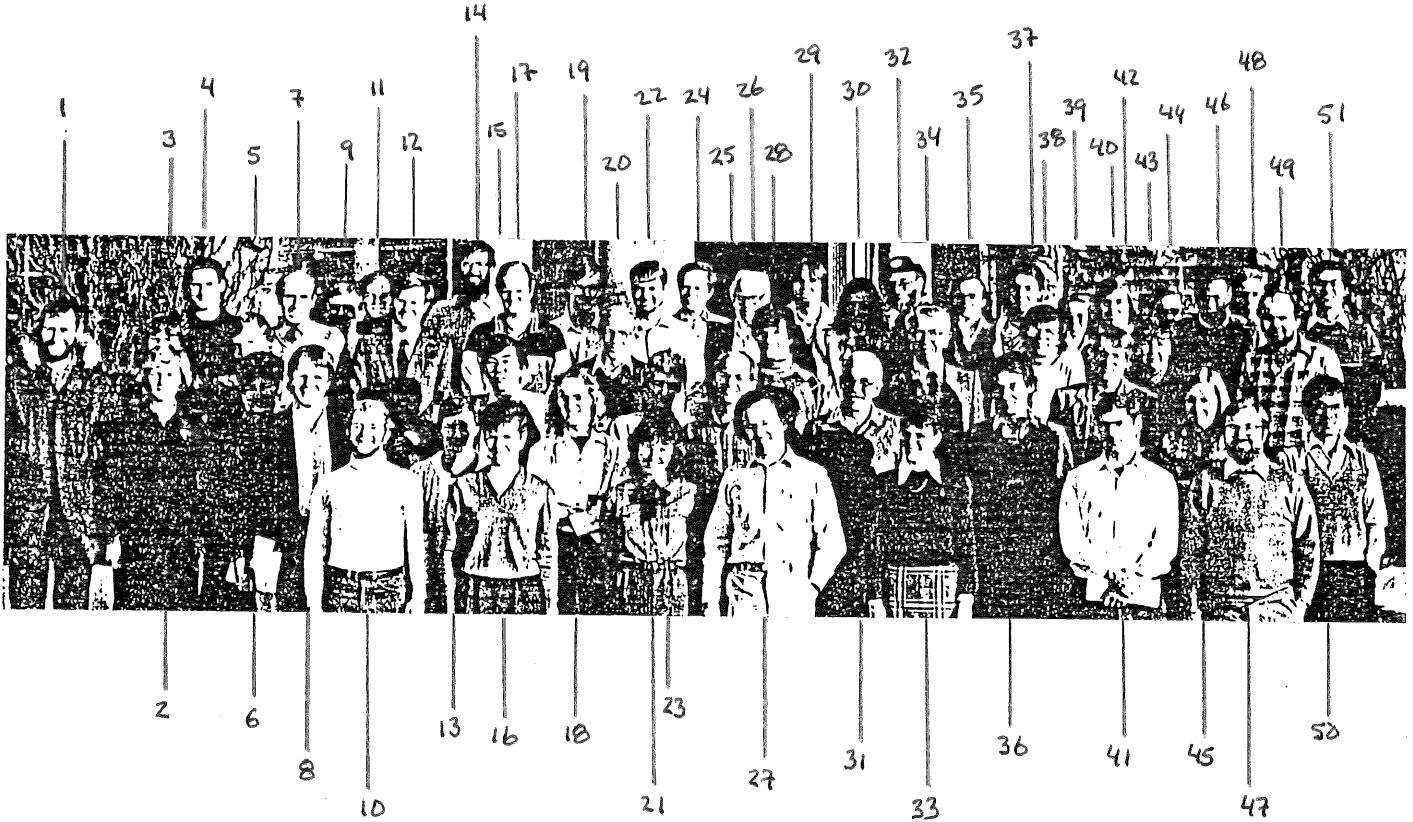
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J.R. Percy Are the Fadings of R Coronae Borealis Truly Random?
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ASSISTANT PROFESSORSHIP

The Department of Astronomy, University of Toronto, will have a contractually limited assistant professorship available for one year, with a possible renewal for a second year, starting September 1, 1986. Salary will be \$35,000 p.a.

Duties will consist of research and both undergraduate and graduate teaching; candidates must demonstrate clear strength in both. A Ph.D. is required.

Send a resume and names of three referees to

*Dr. J.D. Fernie
Chairman
Department of Astronomy
University of Toronto
60 St. George Street
Toronto, Ontario
M5S 1A1*

Closing date for applications is June 1, 1986.

In accordance with Canadian Immigration requirements this advertisement is directed to Canadian citizens and permanent residents.

POTPOURRI

Garrison attended and chaired one of the sessions of I.A.U. Colloquium #87 on "Hydrogen Deficient Stars and Related Objects", which was held in Mysore, India from 10-15 November.

At the General Assembly in New Delhi (19-28 November), Garrison was installed as President of Commission #45 on "Stellar Classification". He also gave talks on "The MK Process" and "Faint MK Standard Stars". A resolution on faint standards was endorsed by the General Assembly.

After the General Assembly, Garrison attended I.A.U. Symposium #118 on "Research Programmes for Small Telescopes", which was held in Christchurch, New Zealand from 1-6 December. He gave papers on "The University of Toronto Southern Observatory" and "The Use of the University of Toronto Southern Observatory as Support for Large-Telescope and Satellite Programmes". Our tiny telescope in Chile has a good reputation for producing good results in a variety of research areas.

John Percy attended the IAU General Assembly in New Delhi, representing Canada on the IAU Nominating Committee, and on Commission 46 (The Teaching of Astronomy). He was appointed to the Organizing Committee of Commission 46, and as editor the Commission's semi-annual Newsletter. He continues on the Organizing Committee of Commission 27 (Variable Stars). At the Joint Discussion on "Solar and Stellar Non-radial Pulsation", he gave a review of "Non-radial Pulsation in Be Stars".

John Percy spend January 28-29 at Memorial University of Newfoundland, sponsored by the AAS Harlow Shapley Lectureship Program. He gave two workshops for teachers, a public lecture on "The Cosmic Perspective", and a departmental seminar on "The Physics of Pulsating Stars".

Erindale College sponsored several Halley's Comet Viewing sessions during the week of January 6-12. Two of these were clear, and these attracted nearly 1200 people.

John Percy addressed the U. of T. Senior Alumni at Erindale College on Oct. 31 on the topic "The David Dunlap Observatory: An Informal History".

John Percy attended the fall meeting of the American Association of Variable Star Observers at Mt. Holyoke College on November 1-2, and gave a paper (with several co-authors) on "The 1985 Light Curve of P Cygni".

Halley Open Houses at Scarborough College

The astrophysicists at Scarborough College hosted open houses on the evenings of Tuesday, December 3rd, and Friday, the 6th, which were well attended by College's faculty, students, and the general public. We were quite fortunate that these two of the four nights that we had advertised were clear. The open houses featured a short slide show about comets given by Martin Duncan, and then a chance to see Halley's Comet through the 12-inch Questar telescope. Those who participated (besides Martin) were Charles Dyer, John Harper, Lee Oattes, Dan Blanchard, Janice Leonard, Peter Leonard, and Rachel Webster. In addition, there was a third night in early January which was open to the College's faculty, staff, and their families.

The first night was indeed a night to remember (just as was the sinking of the Titanic) because roughly 400 people showed up, while we were only prepared to handle about 200. This was quite an experience in crowd control for the graduate students; one which none of us would like to repeat. The problems with the large crowd were further complicated by problems with clouds (which forced us to show Jupiter for a while), and a fire alarm (which surprisingly did not result in much of a reaction, as no one wanted to lose their place in line). Some people were dissatisfied with the comet, perhaps because we had put a picture of a comet with a large tail on our advertisement, while the comet they saw looked like a fuzzy star. However, most of the people who did get to see the comet were pleased.

The second and third nights attracted much more managable numbers of about 250, and 100 people, respectively, so those evenings went quite smoothly. The comet was observed from 7 to 10 p.m. on the two December nights, and from 6 to 8 p.m. on the January night. There was a hint of a tail on the latter evening.

The Halley open houses produced the usual unpredictable coverage by the press. John Harper took several photographs of the comet for a Globe and Mail reporter and his photographer before the Tuesday night madness began. The next day the reporter came back claiming that his editor would not print a picture of a fuzzy blob, so Charles Dyer unwillingly posed for a few photographs with the telescope. Much to Charles' horror, Thursday's Globe had a picture in it which bore little resemblance to reality. It showed Charles looking through the telescope, with the dome slit blacked out (to make it look like night), superimposed on one of John's pictures of the comet. The caption read something like "Professor Charles Dyer observes Comet Halley". This surprised Charles as much as anyone else, since he had not even seen the comet up to that point in time, and he was not at the Tuesday night open house. The biggest disappointment of all, besides the lack of an accompanying article, was that John was not mentioned for taking the photograph of the comet. All credit went to the Globe's photographer.

Despite these imperfections, the Halley open houses were successful. The public has many misconceptions about astronomy, and we gave them an opportunity to see what a comet really looks like. In some cases what they saw differed greatly from what they had imagined. One lady thought she had seen the comet on the way into the parking lot, but her husband explained to her that it was only the smoke from the college smokestacks.

Lnd

167th MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY

Houston, Texas, January 5-9, 1986

The January meeting of the AAS was well attended this year (~700 participants) though considerably smaller than the Tucson extravaganza of 1985. Representing the University of Toronto were Martin Duncan, Dale Frail, Peter Leonard, Robert Managan and myself (see abstracts, next page), and recent U. of T. graduates, Doug Gies and Neb Duric, were also present. The format consisted of the usual hurried 5 minute oral presentations along with concurrent display sessions. However, a new addition to the oral sessions this year was the 15 minute Ph.D. dissertations. These, I felt, were more satisfying for the audience than the usual 5 minute tidbits and provided good exposure for the new Ph.D.'s as well. Unfortunately, listening to the oral presentations was occasionally a strain due to poor acoustics and general traffic in and out of the meeting rooms.

The invited talks and prize lectures covered a variety of topics from "Harlow Shapley" to "QSO's and Galaxies", and a number of extra sessions were also held on industrial employment for astronomers, the general observer's program for the Hubble Space Telescope (HST) and moon-based astronomy! The following are just a few highlights from the scientific reports which I found particularly interesting.

S. Keller from NASA gave a report on "Space Astronomy at NASA during the Era of the Great Observatories" with his most poignant point being the announcement of yet another delay in the launch date of the HST. The HST, itself, appears to have no major problems, but more time is needed for system checks. Keller announced the new target date as October, but it is difficult to say how secure this date will be in the light of the recent Shuttle tragedy.

Sandy Faber gave an excellent Heineman Prize Lecture on "Galaxies and the Universe". She and her colleagues have characterized elliptical galaxies by 3 parameters: the velocity dispersion, σ , the peak intensity, I_0 , and an effective radius, R_e . With σ , I_0 and R_e representing axes in 3 dimensions, calibrator galaxies roughly delineate an oblique plane. Then measuring σ , I_0 and the angular radius, θ , for ellipticals of unknown distance, and shifting onto the calibrator plane yields the distance to an accuracy of $\pm 23\%$. Their analysis of the Local Group motion shows that, aside from its $300 \text{ km}\cdot\text{s}^{-1}$ velocity towards the Virgo Cluster, there is a transverse motion of $\sim 450 \text{ km}\cdot\text{s}^{-1}$ resulting in a net $600 \text{ km}\cdot\text{s}^{-1}$ velocity towards the Hydra/Centaurus supercluster. By comparing their elliptical galaxy distances with recessional velocities, they find that the rms noise in the Hubble flow is $400\text{--}600 \text{ km}\cdot\text{s}^{-1}$ (number to be refined) with some deviations as large as $1000 \text{ km}\cdot\text{s}^{-1}$.

Another interesting invited talk was given by C. Sarazin on "Cooling Flows and the X-ray emission of Elliptical Galaxies". Apparently, elliptical galaxies contain as much gas as spirals, but it is in the form of hot, x-ray emitting material. The gas is not expelled, therefore, by SN, winds, etc. as has previously been suggested. The high temperature of the gas can be explained very nicely by energy input from the stellar velocity dispersion.

Finally, there was a 5 minute presentation by C. Gwinn et al. who measured the proper motions of masers in the galactic centre with VLBI. Using statistical parallax, they have determined a new distance to the galactic centre: $7.1 \pm 1.4 \text{ Kpc}$.

Judith Irwin

05.17

Encounters Between the Solar System and Giant Molecular Clouds

M.J. Duncan (U. Toronto)

Results are presented of extensive N-body integrations of $\sim 10^5$ orbits of comets (or Nemesis) around the Sun during encounters with Giant Molecular Clouds (GMCs). The overall structure of the GMC is taken to be a Plummer model, while substructure is incorporated by randomly generating $\sim 1-100$ clumps of specified size within the GMC. The tidal field of the Galaxy is included.

For a smooth Plummer model, the numerical results are compared with analytic results based on the impulse approximation. The latter approximation is shown to overestimate the disruptive effects of GMCs for typical long-period cometary orbits. The effects of clumpy substructure modify the results, but substructure is generally unimportant for models which are consistent with the observed column densities in GMCs. The significance of these results for the longevity of the Oort Cloud (and Nemesis) will be discussed.

18.07

A Study of the Periodic Variable Radio Star LSI+61°303 and Its Environs

D.A. Frail, E.R. Seaquist (U. Toronto), A.R. Taylor (U. Groningen)

We present a technique for separating the time-varying and static components of the visibility function measured in radio interferometry. The method has wide application in the study of variable radio sources particularly for low frequency ($\nu \leq 1$ GHz) galactic plane observations of rapidly varying objects.

We have applied this method to study both the flux density variations of the periodic variable radio star LSI+61°303 and the physical environment around LSI+61°303 at 1420 and 408 MHz.

A radio light curve for LSI+61°303 was obtained at 1420 MHz. The rising portion of the light curve at 1420 MHz was modelled well by an adiabatically expanding cloud of relativistic electrons. In the declining phase the simple model fails, requiring a somewhat more complicated system to reproduce the observed behavior. A 408 MHz we report a marginal detection of LSI+61°303. The measured mean flux density of 40 mJy is considered to be a weak upper limit.

A 36' emission feature was detected surrounding LSI+61°303 at both 1420 and 408 MHz. On the basis of several arguments it is concluded that this extended emission is part of the thermal gas that joins the HII regions W4 and W5. No SNR was detected around LSI+61°303.

06.12

Nonaxisymmetric Normal Modes of Rotating Stars

R. A. Managan (U. of Toronto)

A new variational principle is used to study the normal modes of oscillation of rotating stars modeled by uniformly rotating polytropes of indices 1.0 and 1.5. The nonradial and nonaxisymmetric normal modes of these polytropes are investigated over the complete range of rotation allowed by the equilibrium structures. This allows the effects of strong rotation on a large number of modes to be described for the first time. Results are presented for 32 low order f-, p-, and g-modes for each value of the azimuthal wave number m from 0 to 5. The frequencies are plotted and the eigenfunctions described. In summary, the results confirm for nonaxisymmetric modes that the relative equatorial amplitude of the mode increases with increasing rotation, which had been established for axisymmetric modes. As also noted for the axisymmetric modes, the nonaxisymmetric modes experience large changes in their nodal surfaces as the amount of rotation increases. This change is in the direction of moving nodes outward in the equatorial plane while moving them inward on the rotation axis.

34.08

The Capture of Field Stars by Open Clusters: Can it Explain the Blue Stragglers?

P.J.T. Leonard (U. Toronto)

The frequency of capturing field stars by open clusters is investigated. The most efficient capture mechanisms are exchange collisions involving binary stars. This process cannot be dismissed without careful investigation because recent studies in the literature have shown that, under certain conditions, the exchange cross sections can be orders of magnitude

larger than the geometric area of the orbit of the binary star. In fact, several open clusters in our galaxy probably have captured a few field stars. However, the possibility of explaining the blue stragglers as being captured early-type field stars seems doubtful because the number density of the latter is too small. This research is part of an on-going study of the influence of binaries on the dynamical evolution of open clusters.