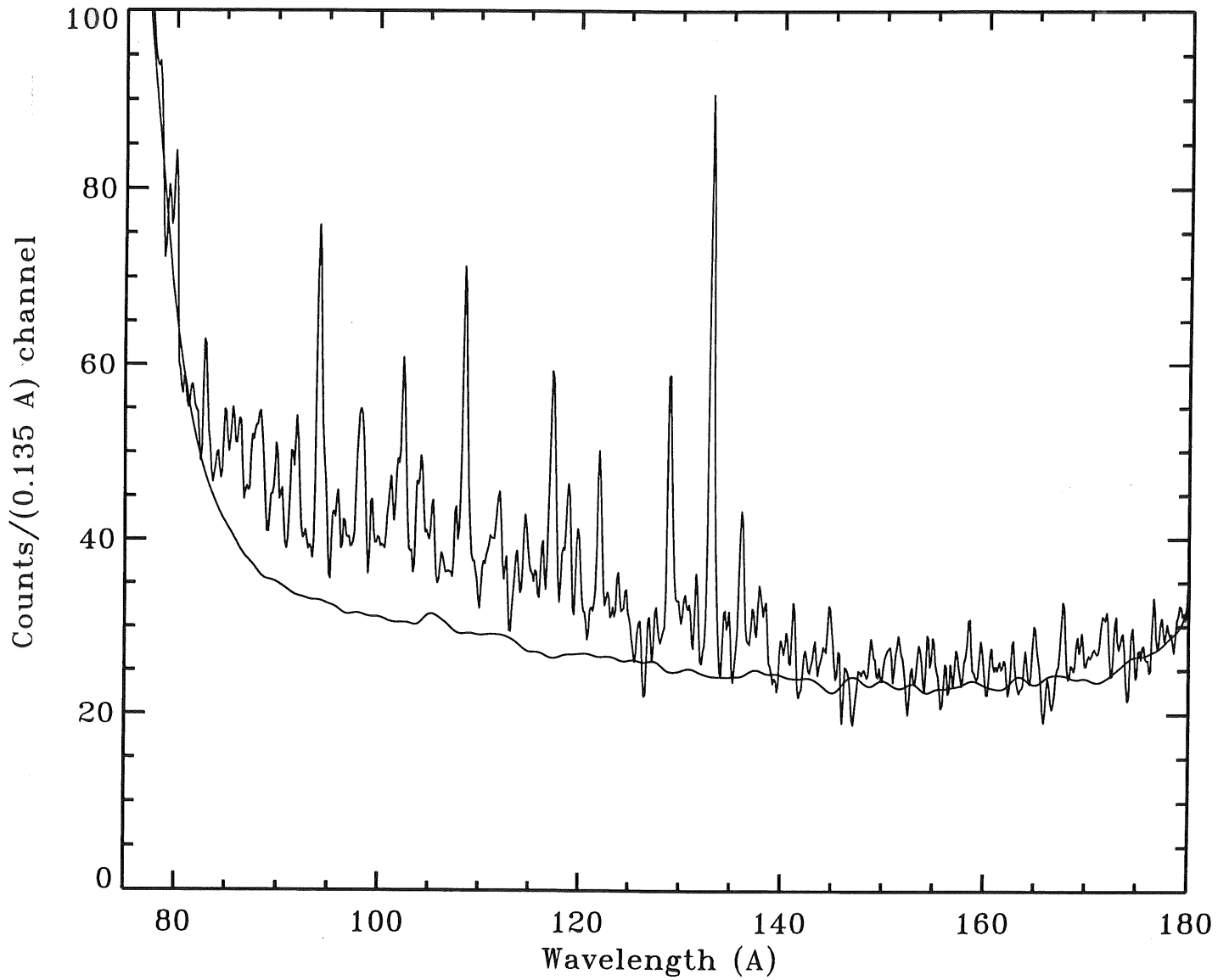


# THE DAVID DUNLAP DOINGS

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EUVE Spectrum of the Active Star AB Doradus

COVER STORY

Slavek M. Rucinski

A small, truly international team has just concluded analysis of the *Extreme Ultraviolet Explorer* spectra of the pre-main sequence, rapidly-rotating (0.515 day) late-type (K2V) star, AB Doradus (HD 36705). These observations were made during during the first round of the Guest Observer Programme, and were one of the two “Canadian” projects (*i.e.*, ones with a Canadian PI) performed during that round. The team consisted of Jelle Kaastra and Rolf Mewe from the Netherlands, Osmi Vilhu from Finland and Stephen White from Maryland in addition to the author. 201z AB Doradus is one of the most active stars known. Its age is comparable to Pleiades ( $10^6 - 10^7$  years). It is a bright ( $V \simeq 7$ ), relatively nearby (20 – 30 pc) star, but we do not know its distance as it is a single star. (The Hipparchos satellite will measure its parallax). The star’s brightness has recently started the ascending phase of its 15 year dynamo-cycle, with one major spot region dominating the optical light modulation.

A spectrum from 80 to 700 Å (see cover) was accumulated between November 4–11, 1993, with an effective exposure time of 40 hours. No EUVE flares were detected during the observation, which was a nice circumstance for this project, as we wanted to obtain one good, well exposed spectrum. Stephen White, who applied for the EUVE time, to study the time variability from the same dataset was a bit disappointed as the star normally flares about once per rotation (*i.e.*, twice per day). The low flaring activity could be due to the particular phase of the dynamo cycle.

Observing with the EUVE is a bit different than with other satellites. Because of the very strong absorption of the neutral hydrogen in the interstellar space, only the nearest objects can be studied. The satellite has a small telescope with very low efficiency; it has an aperture of about 40 cm, but the effective area is about  $1 - 2 \text{ cm}^2$  in the spectral band 70 – 700 Å, so that exposures typically take days or weeks. The exposures are interrupted by Earth occultations, telemetry hand-shaking procedures, satellite status checks and they last, and last, and last . . . Our observation was the longest so far during the Guest Observer programme. The result is a spectrum looking very much like a low-resolution IUE spectrum. There are three bandpasses: SW – shortwave, 70 – 150 Å, MW – mediumwave, 150 – 310 Å, and LW – longwave, 300 – 700 Å). The resolution ranges between about 0.5 to 2 Å, depending on the bandpass. The noise characteristics are much better than for IUE spectra because the noise is purely Poissonian.

We have fitted the spectrum using our optically-thin plasma model, from which we derive an interstellar hydrogen column density of  $N_H = 2.4 \pm 0.5 \times 10^{18} \text{ cm}^{-2}$  to AB Dor. This is a factor of about 2 times more than previously inferred, but it is known that the space around the Sun is very inhomogeneous and has many clumps and empty “visibility tunnels”, so our result is not surprising. We attempted to determine the differential emission measure (DEM) distribution of the corona between  $2 \times 10^4 - 6 \times 10^7$  K. The DEM measures how the amount of plasma radiating at temperatures within the range to which the EUVE is most sensitive. To our surprise, we found a bimodal structure with two dominant temperature regions:  $2 \times 10^6$  to  $2 \times 10^7$  K, and  $3 \times 10^7$  to  $> 6 \times 10^7$  K. Such bimodal distributions were frequently inferred before, but many

researchers (including those who determined them) suspected that this was due to inadequate spectral information in X-ray spectra (or X-ray “photometry” in just a few bandpasses). Our result lends important additional support for the reality of bimodal coronal structures in active stars. The simplest interpretation of this result is that small (cool) and large (hot) coronal loops coexist in the corona. During our observations the hot component was clearly dominant in AB Dor.

AB Doradus will be observed again by HST, EUVE, and a host of ground-based optical and radio telescopes in November, when it will fall into the Continuing Visibility Zone of HST and can be observed continuously for several days. The PI’s of two separate projects are Osmi Vilhu and Fred Walter, supported by a large team of international observers, which includes those of this project. The UTSO 61 cm telescope, manned by Bob Garrison, will contribute U-filter flare monitoring of AB Doradus and its M-dwarf, very active companion a few arcseconds away.

### CONGRATULATIONS

Congratulations to Scott Tremaine (CITA) on his election to the Royal Society of Canada. Scott is having a VERY good year; in addition to this honour he’s been elected to the Royal Society of London and won a Killam Research Fellowship. Scott is spending the academic year at Cambridge while Dick Bond looks after CITA.

The late-June newspapers carried the news that ex-faculty member Sidney van den Bergh (now at DAO) has been appointed a Member of the Order of Canada. Sidney is a distinguished scientist who has been a powerful influence on the development of astronomy in Canada for more than three decades. We congratulate him on this richly deserved honour.

Congratulations to Simon Lilly on his election as one of the Directors-at-large of Association of Universities for Research in Astronomy (AURA), the organization that manages Kitt Peak National Observatory and Cerro Tololo International Observatory and is responsible for the US share of the *Gemini* project.

Congratulations to Pablo Prado, the resident astronomer at UTSO, whose wife gave birth to a baby girl on May 5th. He reported that his wife and daughter were both fine on May 6th, but provided no other details.

Congratulations to Bob Garrison, whose daughter Alexandra (Ali) gave birth to Bob’s first grandchild, Moya David Garrison Msingwana, on 3 June 1994. Bob reports that her operatic career is on hold for a bit until her diaphragm recovers. In the meantime, Moya will have GREAT operatic lullabies. What a lucky kid.

Congratulations to Steve Eales, who became a Canadian citizen on June 28. Before the ceremony Steve said that he didn’t know what to expect but suspected that after the ceremony he would finally understand the point of “hockey”. [*Not unless Don Cherry was the Citizenship Court judge, Ed.*]

## STAFF CHANGES

Don Fernie, our Acting Chairman and Director for the past year while Ernie Seaquist was on research leave at Cal Tech, has handed the reins of power back to Ernie with a great sigh of relief. Don was counting the minutes until Ernie returned. He reports that he was having nightmares about Ernie being stuck in Arizona with car trouble. Fortunately, this didn't happen. Ernie has reassumed the reins of power with his usual energy.

Tom Bolton has resigned as Associate Director of the David Dunlap Observatory to make more time for research. He has been replaced by Don Fernie (*Sorry Don! Ed.*), and the change has been accompanied by a major reshuffling of duties among Ernie, Don, Karl Kamper, and Brian Beattie. Locals should study the memo from Ernie to find out where to take their requests, problems, *etc.*

John Percy is pleased to announce that his term as Associate Dean (Sciences) and Vice-Principal (Research and Graduate Studies) at Erindale ended on June 30. His replacement is Professor Ulrich Krull (Chemistry), who is an RASC member and an active and sophisticated amateur astronomer!

Several changes in the UTSO staff are noted in Las Campanas News below.

Steve Smith has joined the DDO staff as a telescope operator. He will replace Jason Harlow, who is leaving for graduate school at Penn State at the end of July. Steve started his training at the beginning of July. He is finishing off his undergraduate degree at York University this summer. His background includes a part-time work for Nancy Evans reducing data obtained with our 1.88 m telescope. We wish him clear skies and no equipment problems, especially on *our* nights.

## COMINGS AND GOINGS

Christine Clement was in Chile for an 11 night observing run with the Helen Sawyer Hogg telescope in May. Nine of the nights were clear, but only two were photometric. She continued her program to observe RR Lyrae variables in globular clusters in order to determine their luminosities by the method of Fourier decomposition.

Marlene Cummins attended the Annual Meeting of the Special Libraries Association in Atlanta June 12-16. While there she met with other members of the SOC of the IAU colloquium on Library and Information Services in Astronomy to be held in 1995.

The UofT was well-represented at the CASCA meeting by Christine Clement, Don Fernie, Bob Garrison, Paul Hendry, Inese Ivans, Karl Kamper, Sang-Hee Kim, John Lester, Peter Martin, Stefan Mochnacki, John Percy, Slawek Rucinski, Ian Short, Eric Tittley, Gregg Wade,

Bob Garrison was in Chile for an observing run with the Helen Sawyer Hogg telescope in April. In June, a week of vacation in Maine was interrupted by W.W. Morgan's funeral. Bob will be spending a week at Yerkes Observatory in July, helping to sort Morgan's files. After Morgan's 65 years in the same office, that should be "interesting".

John Percy gave a workshop on "Teaching Astronomy" to student teachers at the Faculty of Education on April 20; gave a talk on "Helen Sawyer Hogg: Canada's 'First Lady' of Astronomy" in the Canadian Perspectives Lecture Series at Erindale on May 5; gave a talk on "Cosmic Evolution" to the assembled students of Branksome Hall on May 9; attended the Spring Meeting of the AAVSO in Houston on May 19-21, and gave a paper (co-authored by Lawrence Yu) on "Small-Amplitude Red Variables in the AAVSO Photoelectric Program: Period Analysis"; and gave a paper on "Astronomical Research Opportunities for High School Students" at the CASCA Education Session on May 28.

Ernie Seaquist paid a quick visit to Chile May 28 - June 4, 1994. The primary purpose was observing symbiotic stars with the Swedish-European Submillimetre Telescope (SEST) on La Silla, but the trip afforded an opportunity to consult with the University of Chile and the Canadian Ambassador to Chile on our plan for a 2 m telescope on Las Campanas. The University of Chile seems interested in pursuing this project with us jointly, as part of an expanded cultural exchange between our two universities.

## ALUMNI NEWS

Alex Fullerton (Ph.D. 1990, supervised by Bolton) has accepted a Post-doctoral Fellowship with Rolf Kudritzki's group at Universität München. He took his new position in May. For the past four years he has been a Post-doctoral Fellow and Research Associate collaborating with Stan Owocki at the Bartol Research Institute, University of Delaware.

In the "It's a Small World" department: Alex will soon be sharing an office with Kim Venn 8T7, who has just completed her Ph.D. thesis at the University of Texas. She defended her thesis, on the atmospheres of A supergiants, late last month.

Congratulations to Peter Ip (Ph.D. 1994, supervised by Charles Dyer) and his wife on the birth of their first son Ryan.

Bob Garrison passes along the following message:

Thu Jul 14 23:07 EDT 1994  
 From: corbally@as.arizona.edu (Chris Corbally)  
 To: garrison@centaur.astro.utoronto.ca  
 Subject: 2nd light at VATT

We got official light at VATT's secondary on 12/13 and repeated it last night. ("Official" because the images 3 weeks ago had so much coma that they didn't count.) The seeing was good on 12/13 and the estimate was 1 arcsec images, achieved without any real thermal control of mirror and dome, or the wave-front sensing needed to go much below that 1 arcsec. Over the 2 arcmin field of the guide camera CCD, the images were totally consistent from corner to corner. We appear to have a real imaging telescope. When I say that we were altering focus in 5 micron steps last night during moderate seeing (2 arcsecs), you'll understand the fine control needed. There'll be some FITS images (M13, M57, Saturn,  $\epsilon$  Lyr, *etc.*) available by FTP soon.

This good news is the result of all kinds of teamwork, technical, organizational, financial, and whatever. It is a great stage to be at and foretells some unique astronomy from VATT. Yes, I'm really happy for the extended team and I want you all to share in the good news.

Best wishes,  
Chris

Bob has supplied some background for those of you who are not be familiar with the VATT project.

The project is mainly Vatican with University of Arizona as a partner supplying the mirror. The primary mirror is the first large spun cast mirror. It was made by the University of Arizona Mirror Lab. It is 1.8 m in diameter and f/1.0. That is FAST!! The telescope is located on the controversial Mt. Graham, about 2 hours east of Tucson. The VATT occupies only 1/4 acre of land on this HUGE mountain and it is not on the highest peak, or even near it. The red squirrel is flourishing, multiplying like mad. Most of the Apaches are very much in favour of the operation, since earlier massive logging has been halted (which may be partly why the squirrel is doing so well, in spite of dire predictions).

Chris Corbally (Ph.D. 1983, supervised by Bob Garrison) is the project scientist for the VATT and has done an enormous amount of work to bring this to fruition.

The *Doings* welcomes both personal and professional news from our alumni. Submissions may be E-mailed to me at [bolton@astro.utoronto.ca](mailto:bolton@astro.utoronto.ca) or snail-mailed to me at the Observatory.

## UNDERGRADUATE NEWS

John Percy has three summer students working at Erindale. Najam Khaja is finishing up a project on V1765 Cyg, and Matt Szczesny and Lawrence Yu are working on the "Hands-On Astrophysics" education project. All three were participants in the University of Toronto Mentorship Program, and all three are entering UofT this year with major scholarships.

## LAS CAMPANAS NEWS

by Bob Garrison

The new autoguider has arrived at the University of Toronto Southern Observatory and has been installed on the 0.6 m Helen Sawyer Hogg telescope. It has been the focus of a good fraction of the shop activity for the past year, with special efforts by Karl Kamper and Dave Earlam. Some adjustments and experiments still have to be made before it does a better job than a good observer, but the process seems to be converging at least. Getting perfectly round images is an observing skill mastered by only a few; getting the electronics to give perfectly round images is also a skill mastered by only a few.

Progress is being made on the tip/tilt secondary. Coupled with the autoguider, it should ease the stress of long exposures without compromising the image quality obtained by the best observers. In fact, it should improve the quality of observations dramatically.

Boyd Duffee (BSc, Queens University), the new Resident Observer, is now on the mountain for a training period with Pablo Prado. Pablo is leaving in August, after more than four years of faithful and dedicated service. He holds the record for continuous service; Ian Shelton is a close second with two, 2-yr stints. Pablo has accepted a position at Leoncito Observatory in Argentina. Thanks to Pablo for all his efforts. For those who want to wish him good skies, his e-mail in July will still be pablo@charlie.ctio.noao.edu.

Solange Ramirez has been the Alternate Resident since December. She will be leaving to be a graduate student at Ohio State University starting in September. Best wishes to her in her studies. Our role as minor league training club for the big leagues is continuing.

We had a bit of an adventure with our current observer, Berdnikov, from the Former Soviet Union. He had never been outside the FSU and his English was poor, but his Spanish was non-existent. He arrived in Halifax only a few days before his flight to Chile, with a Canadian visa and a multiple-entry US visa, but NO Chilean visa. Dave Turner, who is sponsoring him, panicked. After a flurry of telephone calls (a “zillion” in Dave’s words), it was established that it normally takes at least a week to get a visa for Chile and even for a special case, it would take at least 3 days, by which time Berdnikov would have lost his discount flight. Our lawyer, Antonio Urrutia-Aninat, came to the rescue. At my suggestion, Dave phoned him to see what could be done. He called the Foreign Affairs Ministry and had a visa for Berdnikov in 24 hours. And people wonder why we retain a lawyer in Chile?

## CASCA MEETING

by Stefan Mochnacki

This year’s annual meeting of the Canadian Astronomical Society, the 25th, was held on the picturesque campus of the University of Western Ontario in London during the last week of May. The meeting had a strongly stellar theme, although there were some excellent non-stellar contributions. A feature of the meeting was the number of longer invited reviews, such as those by Dimitar Sasselov, John Lester, Francois Wesemael, Tony Moffat, Russ Taylor, Slawek Rucinski, and Nikolai Piskunov. Tom Bolton unfortunately was unable to come at the last minute, so Jaymie Matthews took his place. In addition, Peter Martin received the Carlyle S. Beals Award, and spoke on “Interstellar Pinball: A Sometimes Shocking Story of Excited Molecular Hydrogen”. Grant Hill, recipient of the J. S. Plaskett Medal for the outstanding Ph.D. thesis, spoke on “What is Normal among A-type Stars”.

Dennis Crabtree gave extensive Internet demonstrations before and during the meeting. The CADC group at the DAO in Victoria are at the cutting edge of MOSAIC-based Internet applications, making all sorts of data available to astronomers at all Canadian institutions. It was nice to see the astronomers at UWO fully integrated with the Internet. On the final Saturday, an education session was held, providing a showcase for UWO’s highly innovative public outreach programmes in astronomy and science in general.

Don Morton came from Ottawa to report on the Federal government's astronomy programs. The news regarding GEMINI continues to be good. On the other hand, cutbacks at HIA and elsewhere outside the Federal sphere are causing considerable dismay, with several outstanding people losing their jobs. Discussions about new initiatives to replace the lost positions were an undercurrent at this meeting.

The accommodations at Delaware Hall were congenial, and the banquet at Windermere Manor was most pleasant. With the Graduate Student pub just across the road from Delaware Hall, the evenings were definitely convivial. The more cultured took in an evening at Stratford.

Major highlights of the meeting were the tours of Elginfield Observatory, which has a modern 48-inch telescope with Cassegrain and coudé spectrographs, and the Delaware Observatory, an atmospheric sciences facility with a large liquid mirror telescope for LIDAR experiments. I was delighted to find one of our former undergrads, Chris Sparrow, heavily involved in the LIDAR work.

This was a good meeting, most capably organized by the people at UWO, but it would have been good to have seen more theoretical and extragalactic people there.

### POTPOURRI

*Erindale's contribution to the annular eclipse effort included a workshop for 30 teachers by John Percy on April 14, and viewing of the eclipse on May 10. The sky was clear, and several hundred people dropped by at various times. Erindale and the eclipse were featured on the front page of the Mississauga News the next week.*

*The Department did not organize a public viewing of the eclipse on the St. George campus because of limited space, but Sandra Scott organized viewing for denizens of the McLennan Physical Labs, relatives and friends. Several telescopes were set up on the Fifteenth Floor balcony, eclipse viewers (left over from the Baja eclipse expedition) were provided, and the 8-inch telescope was set up to project an image of the Sun. The weather was decent, and during the annularity phase the south side of the balcony was packed with observers.*

*There was no public viewing at the Observatory because it was outside the zone of annularity.*

### GASA GOSSIP

by James P. Brown

Welcome to another exciting edition of the GASA GOSSIP. I have lots of good news this time around, a welcome change from past issues which have focused on the downside of being a graduate student. Plus, I'm returning to form with my usual rant against the department.

First up, we have some very good news. GASA is pleased to congratulate Dr. Peter Ip and his wife on the arrival of their first born son, Ryan. Mother and baby are fine and have already made a quick tour of the department. I don't exactly know why anyone would want to visit. Maybe it was just an excuse to get Peter to come downtown and show his face. Whatever the reason GASA appreciates the gesture and wishes the entire Ip family well in the future.



As if that wasn't enough excitement for one issue, there's more! Congratulations to Felipe Barrientos who entered the sacred trust of matrimony while on observing assignment in Chile. Some of you may have seen his new bride, Dani, around the department this past winter when she came to visit. News of the nuptials took Felipe's roommate Paul Wiegert by surprise, when it seemed like everyone but him knew about the impending marriage. Paul responded with that all time classic "He never tells me anything." There haven't been a lot of details about the honeymoon but this reporter feels it is his duty to ask how much work Felipe actually did while down there. Bob you should check out those observing logs.

In addition, this reporter could not help but notice the definitive absence of a ring on Felipe's hand. This practice which seems to have started with Mr. Lopez-Cruz is most odd. Either these men have very open-minded wives or they have not faced the grim reality that they are MARRIED! That's right guys, you're married: not living with, not involved, not dating, not seeing each other, not even flirting; you're married, end of story. So, I'm sorry to say that you cannot go around advertising yourself as single. Oh, you can still go around giving those not so subtle winks and nods to the first pretty woman you see, but this "Hey, check me out, I'm available!" attitude has got to go.

As you may recall from the last issue of the *Doings*, I told you that the recreational volleyball team was getting set to play for the rec league championship. (Drum roll) I am pleased to announce that the Department of Astronomy now holds the bragging rights to that much coveted title of rec league champs. No matter what happens in the future, in this or any other endeavour here in the department, we can hold our heads high and recall the days when we kicked some serious volleyball butt and took the championship. Despite a small talent pool this scrappy group of players managed to ward off some pretty tough opponents and battle its way to the top of the league. In the near future we should have the proud Astronomy name, Cosmic Anomalies engraved on a plaque in the GSU. So, if you ever find yourself at the GSU be sure to saunter over to the dart board area and take a gander at the rec league plaque which proudly bears our name.

GASA recently held its annual elections. It is my honour to announce the new GASA executive:

President : Paul Wiegert  
 Secretary : Marcin Sawicki  
 Treasurer : James Wadsley

It is befitting that the first order of business was to organize a picnic at the Island. So, one fine summer day GASA set off to the Island for some games, some fun, and a BBQ. In my humble opinion the entire event was a huge success, so I tip my hat to the new executive and say "Let's do it again, and soon". Our esteemed president has also set the date for the annual DDO summer picnic for July 20th. I'm sure everyone is looking forward to it.

GASA wants to thank Linda for having the drive to go out and purchase a new coffee maker and kettle for the DA lounge. After many months of truly horrendous coffee we can now look forward to many years of mediocre coffee, at least once we get a new coffee drudge. As some of you may have been aware the previous coffee maker suffered from numerous problems, not least of which was managing to dump half the coffee grounds into the pot. As well, we can now look forward to boiling our hot water in a kettle which doesn't have a one inch thick deposit of green

crud in the bottom of it. However, someone should take the initiative and send a sample of that crud to a lab to find out what exactly we've been putting into our bodies all this time.

The last item for the gossip is Astronomy Day. Astronomy Day took place last May under the careful guidance of Paul Wiegert. Thanks to his almost divinely inspired leadership A-Day was a success. Since this day just happened to coincide with game 7 of the Leafs-Sharks series attendance was not at its peak, but it was healthy. Everything about A-Day was fine except for one thing, faculty participation. Faculty participation in the past has been low, and that's been the expected norm. This year attendance by faculty was zero and that is unacceptable.

A-Day and events like it are the perfect opportunity for the department to show just how enthusiastic it is about astronomy and why the general public should be as well. If you want a more cynical view you can replace general public with potentially huge endowment. Just ask the people at Keck what that can do for you. It's very nice to have students and post-docs around telling people what's new and exciting in astronomy. However, the public does not view us as speaking from authority. For some reason putting a Dr. in front of your name and saying you're professor of astronomy instantly gives you the credibility that a simple grad student doesn't have. The public wants the chance to talk to people in authority.

Moreover, the cynic's eye view is that every person who comes to talk to you, is potentially a huge endowment cheque waiting to be signed. Considering the great lengths the department seems to be going through to get some cash, you would think it would first start by presenting the proper image. I'm sure many faculty have legitimate reasons for not volunteering and I'll be the first to admit that it's not always a fun job. However, it is an important function that carries over outside this department and university. It is therefore, incumbent upon us to present the best possible image.

## DAN'S UNIVERSE

by Dan Hudon

Interview with an Amino Acid

Notebook? Check. Ballpoint pens? Check. Ten thousand toothbrushes? Check. Suitcase full of gravel? Check.

I'm packing for my first assignment as the intrepid, roving, interstellar reporter for the David Dunlap Doings. As soon as I find my compass I will be rocketing out of here to the giant cloud and star formation region Sagittarius B2, near the galactic center, to interview the galaxy's newly discovered extra-terrestrial amino acid. Its name is glycine, or  $\text{H}_2\text{NCH}_2\text{COOH}$  for short. Someone who actually remembers their high-school biology reminded me that glycine is one of those fundamental amino acids which link up to form proteins, compounds which generally make life worth living and replicating (and not just because they are good for you). Glycine's arrival on the interstellar stage was announced at the recent AAS meeting in Minneapolis by students in Lewis Snyder's group from the University of Illinois at Urbana-Champaign and greeted with the usual pomp and circumstance accorded major scientific discoveries — no one believed it. That's why I'm making this excursion to the Galactic Center, to find out exactly how much fuss the little amoeba-wannabe is worth. Assuming I can make the jump to hyperspace and considering that I'll be driving at night when there is less traffic, the trip shouldn't take more than a few mega-jiffies, long enough for me to think up some good questions for the interview.

Since I don't have much interviewing experience, I'm puzzled about how to approach this one. I mean, what do you ask the first known extra-terrestrial amino acid? I could start off with the standard, "Hot enough for ya?" or I could break the ice with something like: "Who do you think is going to win the World Cup?" Either of those should get things under way; then I can follow up with something more serious: "So, what do you want to be when you grow up...in a few hundred million years?" Whereas most of us start out as a wink in the eye, this poor guy was a skeptical spectral line — a glitch in the continuum — at a wavelength of 3 millimetres. Hardly the stuff from which kings are made, let alone the material for advanced (*i.e.*, video-gaming) civilizations, but everybody has to start somewhere, and a glitch is as good as a wink as far as evolution and natural selection are concerned.

There are more pressing questions: why don't we hear his amino brothers and acid sisters crying for attention in the stellar nursery of Sgr B2. I mean, where is everybody? One amino acid doesn't make for much of a party, certainly not a lively one. It takes two to tango, the more the merrier and all that. I want to know if he's aware of who his neighbours are since the report at the AAS meeting included the detection of other large crunchy molecules like ethyl cyanide, vinyl cyanide and methyl formate — not quite the three essential vitamins, but they are molecules of similar size and complexity to glycine which adds credibility to its detection.

Then there's the ever-popular age-old philosophical brain teaser, "Why are you here?" In Sgr B2-glycine's case, the question takes on a special significance because "here" is in a star-forming cloud, that is, a place where there is no recently cooled planet underfoot. For those of us who thought that our own origins were, long before the wink in the eye, a couple of complex molecules mixed in the ocean with a few stabs of lightning while firmly rooted on good ol' Mother Earth thank-you very much, this exo-biological announcement comes as a bit of a surprise. The ego of man-the-tool-maker, once at the center of the Universe, suffers another blow as it seems he (not that he was there to do it) had to season his own primordial soup with extraterrestrial ingredients in order to make it palatable.

Thus, the \$64,000 question must be, "So Mr. Glycine, building block of life as we know it and all-round great guy, sir, are there any comets or asteroids that you plan to latch onto so that you can eventually crash into a planet and kick-start the local biology? And, by the way, is that one of your buddies steering the kamikaze comet named Shoemaker-Levy back in the Western Rim of the Galaxy? Why don't you tell him to turn on the afterburners and crash into one of the Galilean satellites instead. At least that way we could see the fruits of the boom."

After the interview I suppose I'll tour the Galactic Center, probably have a chilled betelgeuse at the bar and make a wish as I toss lucky pennies into the central black hole, assuming it's open. On the other hand, I could always look for my lost socks. Don't worry, I'll send an interstellar fax when I get work.

Note added in proof: After completing this article, I learned that the article (in *New Scientist*) on which it is based seems to have jumped the gun (*i.e.* the reporter misinterpreted "search for . . ." in the AAS poster as "detection of . . .").

## W. W. MORGAN

Dr. William Wilson Morgan died June 21st at age 88. He was one of the great astronomers of the 20th century. Morgan originated the MK System of spectral classification, the UBV system of photometry and the Yerkes system of galaxy classification. He discovered Ap and Am stars, was the first to determine the spiral structure of the Milky Way galaxy and the stellar contents of galaxies.

Morgan has been especially influential for at least two DDO faculty. He supervised Bob Garrison's Ph.D. thesis. Tom Bolton's M.S. thesis was supervised by one of Morgan's students, William P. Bidelman, and his Ph.D. thesis was supervised by Charles Cowley, who was influenced by Morgan when he was a staff member at the Yerkes Observatory.

### W. W. MORGAN: A PERSONAL VIEW

by Bob Garrison

Dr. William Wilson Morgan died on 21 June 1994, precisely in the middle of the night after the longest day of the year. Such symmetries characterized his life. At the age of 88, he had lived and worked at Yerkes Observatory from 1926 to the present.

His passing marks the end of an era in which he played a very significant role. His publication of the *Atlas of Stellar Spectra* was a landmark in the history of stellar classification, but the effects of his work were far more widespread. He went on to originate the UBV system (which was subsequently developed by Johnson, working with Morgan) and the Yerkes morphological classification of galaxies. Using the MK and UBV tools, he discovered the spiral structure of the Milky Way Galaxy (for which he received a standing ovation at the 1951 AAS meeting). With Nick Mayall, he initiated the study of the integrated spectra of clusters and galaxies and was the first to describe the stellar content of galaxies on the basis of their spectral characteristics. Am stars, Ap stars, cD galaxies, N galaxies, metal-weak stars, CN-strong stars, and lots of other peculiar objects are now part of the astronomical vocabulary, thanks to the contributions of W. W. Morgan.

Morgan was truly a giant in twentieth-century astronomy. We won't see the likes of him again, so his passing is a real loss. I regret that the current generation of graduate students (and many faculty members) will never have a chance to see his mind in action, either in an intense one-to-one interaction, or in a small classroom. He was a marvelous teacher, though certainly not a traditional one. He taught by "showing" rather than describing, and students learned from experiencing rather than memorizing. His classes were so inspiring that we couldn't wait to observe or read about the stars he discussed. He brought them to life for us.