



Capitol Skies

The newsletter of the Madison Astronomical Society

June/July 2005

From the President

Greetings Fellow MAS'ers, Firstly, a thank you to you, the MAS membership, and members Mark Hanson, Mary and Tim Ellestad for the beautiful framed picture of M31, taken by Mark, with which I was presented (in absentia) at the March banquet. It will be gratefully appreciated as a memento of my tenure as MAS president, a tenure which is now coming to an end as I recover from last winter's injuries.

I am not running for reelection at this year's June picnic and this brings me to my first "harangue" of this, my last newsletter blurb. I urge each of you to consider offering to serve a term or two as an officer (even as president) of MAS. This club is what we/you make of it and the more people who participate, the more vital and responsive the club will be to the wishes of the membership.

I am pleased to report that one project

near and dear to MY heart is coming at last to fruition; the remounting of MAS's C11 Celestron telescope on a new pier/deck at YRS. While I was intimately involved in the conceptualization and design of the new mounting, my recent injuries have meant that the burden of actually implementing and guiding the construction has fallen to Observatory Director Tim Ellestad.

Tim has worked tirelessly this spring to bring this project into being, and I thank him on behalf of MAS for his commitment of time to assuring the success of this project. If all goes as planned, we should be able to celebrate "first" light for the new mount by the time of the June picnic.

So I thank each of you for your support and involvement during my 3 years of officer service and urge each of you to support the next group of officers with your participation and enthusiasm.

Neil Robinson

-outgoing MAS president

MAS Picnic

Mark your calendars and plan to attend the annual MAS picnic on Saturday, June 11th at Yanna Research Station. This replaces the regular June Friday evening meeting at Space Place (which is a good thing since Space Place is moving - see page 2). You are welcome to show up for the picnic anytime mid-afternoon - there will be a short meeting and election of officers at 4:00 followed by the picnic at 5:00. Please bring a dish to share & your own drinks - MAS provides brats, burgers, hot dogs, plates, utensils, and grills. Call the Ellestad's at 608-233-3305 or any other officer if you need directions to YRS.

Important Picnic Note

We are asking for volunteers to arrive early for the picnic to help clean out the storage shed. Most of the work will be arguing what is good stuff and what is junk. Anyone who wants to have a say about what will be thrown away should show up at 2:00.

Officer Elections at the Picnic

Yes, it's that time of year. The only major item of business carried out at the picnic/meeting in June is the election of officers. The slate appears below. Note the open position at President.

President: (Open)

Vice President: Wynn Wacker (Incumbent)

Treasurer: Mary Ellestad (Incumbent)

Secretary: Dave Odell (Incumbent)

Observatory Director: Tim Ellestad (Incumbent)

Board 1: Mark Hanson (Incumbent)

Board 2: Jeff Shokler

Nominations for the open position of President will be accepted up until the picnic and may also be made at the picnic itself prior to the election.



Officers

PRESIDENT

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Greg Sellek
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Madison Astronomical Society members are active in sharing the pleasures of astronomy with the public, acting as a resource for students and teachers, and exchanging information at Society meetings which occur monthly. The Society continues to pursue its original goal to "promote the science of astronomy and to educate the public in the wonders of the universe."

For more information about the Society, please contact one of the officers listed above.

MAS thanks

Internet Dynamics Corporation
for hosting our web presence.

Visit MAS on the web at:

www.madisonastro.org

Calendar of Events

- June 11 The MAS annual meeting and picnic will be on Saturday, June 11th at Yanna Research Station. This replaces the regular June Friday evening meeting at Space Place. You are welcome to show up anytime mid-afternoon - there will be a short meeting and election of officers at 4:00 followed by the picnic at 5:00. Please bring a dish to share & your own drinks - MAS provides brats, burgers, hot dogs, plates, utensils, and grills. Call the Ellestad's at 608-233-3305 or any other officer if you need directions to YRS.
- July 8 Our regular meeting will be at YRS due to the closing and relocation of the UW Space Place. Call the Ellestad's at 608-233-3305 or any other officer if you need directions to YRS. We'll have an informal program "What have you observed lately?" during which we can share our recent observing experiences. Moderated by Jane Breun. Plan to stay after the business meeting for a star party, weather permitting. Meeting about 7 pm, star party 'till whenever.
- August 12 First MAS meeting at the new Space Place (2300 S. Park St.), we will have a work party to help Jim Lattis set up tables, exhibits, telescopes, whatever he needs. Business meeting 7:00 pm, main meeting 7:30.

Space Place's New Digs

by Jim Lattis

As of July, UW Space Place will be relocated to the Villager complex, 2300 S. Park St., about a mile south of our old location. Our new facilities will include greatly increased space for exhibits, talks, and workshops, as well as a rooftop observing deck with storage for equipment. Space Place looks forward to continuing its association with MAS at our new location and to hosting our jointly sponsored programs as in the past. An official opening date for the new facility has not been set, but we expect it to happen in early September. Please watch for announcements on the UW Space Place web site: <http://spaceplace.wisc.edu>. As the calendar above notes, the new location will be the site of the MAS August meeting, so come get a look at the new place and we'll put you to work too!

Welcome!

Welcome to new members David & Joan Oesper and Don Martin.

FOR SALE

Tele Vue 14mm Radian Eyepiece
Suggested retail price \$295.00. Often sold new for \$250.00.

I'm selling for \$150.00. Email A.J. Carver, acarver@wisc.edu, if you are interested.

Thanks Don!

New member Don Martin donated a telescope to the club at the April meeting. The new scope is a 6" f6 Jaeger's objective and a Edmund's mount with 1" solid shafts. It also has a 50mm finder with illuminated crosshairs.

Tom Jacobs has the scope now for some gentle service and reconditioning. It will eventually see service to the club either as a clubhouse scope at YRS or a 3rd loaner telescope for MAS Scholarship Scope program.

If you meet Don at the picnic, thank him for his donation!

Keeping Up with AJ Carver

Greetings from Seattle! I hope you are well. I returned from Chile on March 29, 2005 and began a quarter as a student at the University of Washington. I am taking a diverse set of classes: Survey of Music, Mexican Immigration, and Extragalactic Astronomy. As I sit in my room looking out the window towards the Cascades, and the ever-changing Seattle sky, the preface sonnet to Vivaldi's *La Primavera* seems very appropriate:

*Spring has come, and joyfully,
The birds greet it with a happy song.
And the streams, fanned by gently breezes,
Flow along with a sweet murmur.
Covering the sky with a black cloak,
Thunder and lightning come to announce the
season.
When these have quieted down, the little
birds
Return to their enchanting song.*

For ten weeks, from January until March, I was a Research Experience for Undergraduate (REU) student at the Cerro Tololo Inter-American Observatory (CTIO) in La Serena, Chile. I was studying Cataclysmic Variable stars (CVs) with Dr. Alan Whiting of CTIO and Linda Schmidtbreick of the European Southern Observatory (ESO). CVs are binary star systems in which the stars orbit around each other in a period of only hours. Usually CV systems are composed of a white dwarf and a red dwarf. The more massive white dwarf will distort the shape of the less massive red dwarf. If the red dwarf is distorted enough, the matter on its outer edges will be more attracted to the white dwarf. That matter will then spiral towards the white dwarf. The matter lost from the red dwarf will form a disc around the white dwarf. CVs are exciting systems to observe because they change in brightness on the time scale of hours and the light curve from two orbits is never the same (unlike other binary systems). For those interested in the details of CVs I recommend "Cataclysmic Variable Stars" by Coel Hellier as an introductory text.

Through the center for backyard astrophysics, (<http://cba.phys.columbia.edu/>) numerous amateurs are making valuable contributions to the study of CVs and many are becoming authors on scientific papers. YRS can do lots of science: obtaining light curves of



AJ on the catwalk of ESO's La Silla Observatory 3.6 meter telescope.

CVs over long periods of time, determining the magnitude of stars in the AAVSO database, determining orbits of minor planets (Matt Mills is active in this area), and more. Enthusiasm, and a little study, by one person could lead to an active MAS research group using YRS facilities.

I enjoy sunsets. Sunsets are a wonderful transition into the world dominated by a different light. Sunsets are wonderful because as the sun drifts behind the horizon I can imagine myself rotating with the earth and in their colorful beauty I can imagine the sun's light being scattered. I experienced many great sights, including sunsets, in Chile. One night at ESO's La Silla observatory, I took a break from the 3.6 meter and NTT (New Technology Telescope) control room to wander outside. The air was brisk and cool. As my eyes became dark-adapted, I walked from the eastward side to the westward side of the site. From the westward side I could see a thunderstorm hundreds of miles away over the Andes mountains (towards Argentina) and above me was the crystal clear sky with the Milky Way, Large Magellanic Cloud, and Small Magellanic cloud. It was breathtaking. I've jokingly thought that my time in Chile was a time trapped in a romantic personal ad - watching sunsets and taking long walks on the beach.

All of the Chileans I met were kind people and Chile was a pleasant country.

It was an honor to spend ten weeks at a world class astronomical observatory. Thank you Madison Astronomical Society for your support and encouragement. The year I had with the 8" dob, as the MAS Young Astronomer Award winner, was inspirational. I am eager to read the

experiences of the current award recipients and about our new recipients. I hope MAS will expand the Young Astronomer Award so that more students can have an inspirational experience like mine. Acquiring another 8", or larger, dob and doing more to advertise the award are good first steps. An excellent expansion of the MAS Young Astronomer Award, and the MAS Education and Outreach award, would be MAS paying for the recipients tuition to the University of Arizona astronomy camp (assuming the winners applied to camp and were admitted). MAS has proof of concept that these awards promote astronomy and science education. Therefore it should be possible to find grant money for such an expansion.

At the moment it seems the next two years have the opportunity to be very exciting. I think I will have the opportunity to make some hard decisions. I hope I will continue to have my health. I hope I choose right and I hope I have the courage to make hard decisions when I must. The near future is slightly more certain. From Seattle I will fly to Princeton to spend another summer working on the Magnetic Reconnection eXperiment (MRX) at the Princeton Plasma Physics Laboratory (PPPL). This summer I will also be a counselor at two UA astronomy camps.

My website <https://mywebspac.wisc.edu/acarver/web/> is a good way to stay updated about my whereabouts and adventures. The 2005 CTIO REU website is http://www.ctio.noao.edu/REU/ctioreu_2005/REU2005.html

I hope to see you soon and hope to have your continued support.

Take care,
AJ

A note from Tom Jacobs

I am looking for donations of telescope parts that could be used in putting together another telescope for young astronomers for next year. Please contact me at tjacobs@madison.tds.net, or talk to me at the next meeting.

My Introduction to Amateur Spectroscopy

by Eric W. Thiede

As a reader of astronomical literature I've often had my interest aroused by spectroscopy. So many things about distant objects can be learned from it. Until recently it has been the province of professional astronomers, mainly because the low sensitivity of photographic emulsions requires large telescopes to be used to collect enough photons to expose a spectrogram. Now the increased sensitivity of CCDs is starting to change that.

The heart of a spectroscope is an optical component that splits or disperses the light from an object into its spectral colors so that these can be examined or recorded. Early instruments utilized prisms to accomplish this and were used visually, by Father Angelo Secchi and other pioneers in the field. Prisms unfortunately don't disperse the light in a way that is proportional to wavelength, and they can also absorb a lot of light. The young optical genius Joseph Fraunhofer invented the alternative method, the diffraction grating, early in the 19th century. This device dispersed the light linearly, but divided that light up between a number of different spectral orders, including the undispersed zero-order image of the object. With so little light going into the first spectral order (the one we usually use for spectroscopy), the gratings of the time offered few advantages for astronomical work.

Around the beginning of the 20th century, this problem was overcome by the process called "blazing". The many small grooves that make up the grating are shaped in such a way that a larger proportion of the light is reflected (for a reflection grating) or refracted (for a transmission grating) into that precious first order. It is primarily the quality of this blazing that determines the efficiency (and the cost) of a grating.

Astronomical spectrographs are usually large and heavy instruments, again necessitating the use of large telescopes. It was my hope to find a design for a simple instrument that would be light in weight and easy to use. Of course, in such a design, some sacrifices in functionality must be made.

Much of the cumbersome nature of spectrographs is due to the need for many parts besides the grating. The light customarily enters through a slit, is collimated by a

lens or mirror, reflected off or passed through the grating (depending on its type) and then focused with another lens or mirror onto the detector (film or CCD) or the focal plane of an eyepiece (for visual use). If one chooses to restrict the use of the instrument to point sources like stars, and give up a tiny amount of exact linearity of dispersion, the design can be vastly simplified.

Enter the little accessory that any reader of Sky and Telescope has probably seen advertised: the Rainbow Optics Star Spectroscope. I'd wondered about it for years, but always thought it was probably a rather overpriced little toy that couldn't possibly do very much. It is indeed expensive: over \$200. However, there is a reason to justify that expense. I did a lot of Internet research on diffraction gratings, and it turns out that the supposedly useless little toy actually employs by far the best grating easily obtainable. Fully 75% of the light is dispersed into that precious first spectral order. It is much more cost effective to put a relatively small amount of extra cash into a really good grating than to put a huge amount of extra cash into a larger telescope so that one can get the same performance out of a cheaper grating.

When the thing arrived in April, it was of course cloudy. If you want to know why, look at some of the postings of the YRS discussion group. Conclusion reached: the arrival of a new astronomical instrument induces the formation of clouds, for reasons probably better understood by theologians and astrologers than by meteorologists. I've learned not to be in too much of a hurry, so I wasn't too miffed. The next night was clear, and that celestial type A powerhouse Sirius was still available for viewing, so I decided to take a look at it.

The Rainbow Optics Spectroscope consists of 2 major parts: the grating, which is mounted in a standard filter cell and will screw into the end of an eyepiece, and a cylindrical lens in an aluminum cell that fits over the eye lens of an eyepiece. With the grating alone, one sees a strangely faint zero order star image, and at some distance from it a rather bright first order spectrum. That spectrum is too narrow to reveal many details, being no wider than the star image. The cylindrical lens has no refractive power in

one direction but power in the direction perpendicular to the first. It is functionally similar to the lenses that people with astigmatism use to improve their vision. This lens, properly oriented, turns the point image of the star into a short line, which causes the spectrum to be widened so that more details can be seen.

Sirius is a type A star, and the Balmer absorption lines of hydrogen were very obvious. Alpha CMa is so prodigal with its light that I could see the H-alpha line way down in the red, even though I don't see red very well. It is so far the only A type star with which I have seen H-alpha in the spectrum. I then turned to Betelgeuse, a type M supergiant. Beautiful fluted bands of titanium oxide absorption could be seen in its spectrum. At this point I decided I needed more of a challenge, so I looked at the three stars that make up the triangle in the rear end of Leo. These are mag. 2-3, but I could tell immediately that they were all type A, the easiest spectral class to pick out. Arcturus was rising so I took a look at that. Lots of light, but not much else at first. The focus is rather critical with this contraption, and the spectrum is in best focus at a different place than the zero-order star image. Once I got the focus set, and started watching intently, lines began to appear, at first a few, then more, and more, and more. Arcturus is a type K star, somewhat cooler than the sun. These stars don't have prominent hydrogen lines like type A or molecular bands like type M, but they have many, many lines of metals. Visual spectroscopy can be very much like visual planetary observing. The visibility of the spectral lines in a slitless instrument depends greatly on the seeing, which determines the size and shape of the star image that is being dispersed to form the spectrum. It's a lot like trying to perceive elusive details on Jupiter or Mars. As I watched, the number of lines glimpsed became dozens. Truly a lovely sight for a patient person with decades of planetary observing experience.

My first night was enlightening, but I began to think of ways I might improve the instrument. One thing I noticed was that in my opinion at least, the cylindrical lens provided widened the spectrum unnecessarily much. Only brilliant Sirius could really overcome the disadvantages of that. Anything else might look better with a narrower spectrum that would conserve more of that precious light. The next day I determined that

the cylindrical lens had a focal length of about 60mm. I looked for other lenses, and found one at Anchor Optical Surplus (a spinoff of Edmund Optics) with a focal length of 181mm, or about 1/3 the widening power. All for the princely sum of \$11, and coated, no less. I ordered this, and moved on to other things.

For Christmas I had bought myself a Meade Deep Sky Imager. For only \$297 dollars I thought I'd try my hand at imaging. I had also acquired a Meade 644 flip mirror assembly to which I could attach the Meade DSI. After some experimentation, I found a way to place the grating at the entrance to the flip mirror housing, so I could either examine the spectrum visually or direct it to be focused on the CCD. Much to my surprise, my aging Gateway laptop (free from my friend Tom Thurlow in Silicon Valley) was up to the task of running the camera, provided I used a self-powered USB hub to provide power to it. Soon I discovered that spectra which looked rather faint in the eyepiece could be recorded by the CCD with exposures of a fraction of a second. 2.3 mag Beta Leonis gave me a lovely image of a type A spectrum which recorded in perhaps 1/3 of a second. I then found a star that was about mag 6 and tried to record its spectrum. At this point, the spectrum required several seconds and dark current artifacts plus problems with my telescope drive began to intrude. The drive problem can be partly overcome by having the camera take about 30 exposures, at least one of which is likely to be recorded when the drive isn't doing something too outrageous. To solve the dark current problem, I'm going to have to get image processing software so I can manually subtract dark frames. The DSI has a routine to do that automatically, but for some reason I haven't gotten it to work too well yet with spectra. I finally found a star of 8th mag. (the brightness of a certain variable star of great interest to me) and tried recording its spectrum. That took exposures of 20-30 sec. with all the aforementioned problems magnified proportionally. Not great results, but very encouraging for a beginning. My scope is only 8 rather optically mediocre inches. Much more could probably be done with a bigger, better scope. Can anyone spell 16-inch Cassegrain in Father Secchi's Neighborhood?

Having tried out CCD spectrography, I went back to visual spectroscopy. Eventually my cylindrical lens arrived, and I

dug through my collection of plastic bottle caps and tubing to build a cell for it that would fit over a 20 mm eyepiece. The narrower spectrum was better, and I was able to see spectral lines in Arcturus and Regulus that I hadn't seen before. It turned out that it was a negative cylindrical lens rather a positive one like the one provided but that doesn't really matter. The spectrum is widened just the same. At times I still long for a narrower spectrum with fainter objects. I'm in the process of trying to find other

cylindrical lenses and I may have found one of 300mm and one of 435 mm focal length. Cylindrical lenses other than eyeglass parts are harder to find than a lot of more common optical components.

The flip mirror has the proper knurled ring to screw onto almost any SCT, and I have an adapter to allow use with a 2-inch focuser (which the old 16-inch Cass has). I'm hoping to bring this equipment to YRS at some point and see what can be seen. In the meantime, clear skies to all.

Pleasant Weather Returns to YRS

by Tim Ellestad

Our Yanna Research Station is again basking in warm, pleasant weather. The winter driveway barricade has been retired until next winter. Spring is sprung, the grass is rising - and we'll soon be needing mowing volunteers for another growing season. You'll be hearing from your Observatory Director soon.

Spring has brought a few more changes to the observatory. The long awaited re-installation of our Celestron C11 telescope is not far off. The new pier and deck for this instrument are completed. Electrical wiring is being scheduled and work to finish the roll-off enclosure is underway. This telescope will be truly wheelchair accessible.

This new observatory is sited along our Kelly Road setback between the Walter Scott Houston Memorial Observatory (our 17.5 inch Dobsonian) and the double size concrete pad. The footprint of the new deck and wheelchair ramp was carefully chosen to preserve the "heavy vehicle" alley that exists between the concrete telescope pads and the Dobsonian roll-off allowing trucks or cranes to get to the AKO should it be necessary.

Our privy has received an upgrade. While working at YRS on the C11 project the Alliance Construction crew installed a new combination storm/screen door - identical to the ones installed on the clubhouse last fall. It will be nice to be able to air out the privy on balmy

summer evenings without letting in all sorts of flies and mosquitoes.

Reliable modest overnight temperatures will revive our YRS painting efforts which were initiated last season. Several members have already committed to the remaining tasks and it will be only a short time now before we can safely paint, continuing our volunteer efforts to preserve YRS. In addition to the painting a little landscaping repair needs to be done at YRS also. A few volunteers willing to wield a shovel or rake will be necessary to complete a couple of small jobs. Please contact the Observatory Director.

The return of green living things to the landscape will probably signal the return of our neighbor Jon Yanna's horses to their pasture. This grazing area is immediately adjacent to YRS and recognizable by its electric fence. You should count on the fence being "live". Take care - mowing will automatically bring you into very close proximity. The shock isn't lethal but it will definitely get your attention!

Several Observing Members haven't scheduled their YRS orientation sessions yet. Please call the Observatory Director to do so - 608 233-3305.

I'm wishing everyone warm, pleasant spring and summer observing. Don't hesitate to come out to YRS on any clear night. We have a wonderful facility - let's give it plenty of use.



Capitol Skies
 2810 Mason Street
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First Class

MAS would like to thank:



for hosting our web presence

This resource list is made up of people who have special interests which they are willing, even eager, to share with others in the Society. Many members, not listed, also are interested in particular aspects of astronomy and have considerable expertise in viewing and imaging the skies. Members are encouraged to come to the monthly meetings, not only to get to know the other members, but to discuss and enjoy their special or general interests in various aspects of astronomy. This is a Society of beginners and experienced amateurs. From time to time we have seasoned professionals attending. The meetings are a good time to meet these people as well. See you there.

Resource People and Special Interests

The resource list is currently being revised and rebuilt. If you would like to be listed as a club resource, please submit your name and contact info to darksky25@charter.net.

Possible areas of expertise include:

- Variable stars
- Planetary and lunar observing and imaging
- Deep space object observing and imaging
- Solar observing and imaging
- Observatory design and construction
- History of astronomy
- Computers and software
- Comet and asteroid astrometry and photometry
- Occultations and grazes

MAS Membership Form	
Name:	_____
Address:	_____
City/State/Zip:	_____
Phone:	_____
Email:	_____
Please circle membership type: <i>Enclose check and make payable to the Madison Astronomical Society. Mail to MAS Attention: Mary Ellstead, 2810 Mason Street Madison, WI 53705</i>	
Student (\$5.00)	<input type="checkbox"/>
Regular (\$25.00)	<input type="checkbox"/>
Observing (\$60.00)	<input type="checkbox"/>