



FOCUS

Vol. 61, No. 6, June 2019

DELAWARE ASTRONOMICAL SOCIETY

Next Meeting: Tuesday, June 18th
Mount Cuba Astronomical Observatory
Board meeting: 7PM
General meeting: 8PM

See later in this issue for more details and information about the speaker!

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Page numbers are on summer holiday and we pray for their eventual return

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From the President

Rob Lancaster

Dear DAS Members,

Our Dinner Meeting this year was a great success. I thought that our speaker, Jack Clemons, was a very “down to Earth” kind of guy and that his talk about the insider stories from the Apollo era was not only informative, but was also very enjoyable for the entire audience regardless of their scientific background. Congratulations goes out to our Amateur Astronomer of the Year, Tom Harding, and our Luther Porter Award winner, Greg Weaver. Both gentlemen greatly deserve recognition for all of their efforts.

Our projects are progressing very well. For those of you who have been out to Mt. Cuba recently, you have probably noticed the electrical project progression led by Chris Horrocks, but much less visible is the fact that Tom Harding and Dana Wright have made significant progress on the pier installations and that Bill Hanagan has done quite a lot of work recently on getting equipment set up and mounted to the telescopes. We thank all of the volunteers who are putting in all their time to make the Sawin a better place. These projects will be done before you know it!

In other news, we recently completed the DAS Election, run by our election chair Sidney Ocampo. Congratulations to Bill Hanagan, Dave Groski, and Tom Harding for winning the competitive race for Board Members at Large. Our weather is hopefully improving, the other night, I ran a very successful Bellevue State Park outreach event. Hopefully this trend of having to cancel most of these events due to the weather has ended. . .

This Tuesday, we will be concluding our monthly meeting series for this year with a talk about the light in the cosmos by Joe DePasquale. But remember that during the summer, just because we don't have our regular monthly meetings, doesn't mean the club does nothing! We will hold numerous outreach events this summer at Bellevue, Cheslen, DE Museum of Natural History, Woodside Creamery, Newark Reservoir, and other places. We will still hold the Astrophotography Special Interest Group meetings and the Book Club meetings once a month. And we will still have the evening Astronomy Workshop meetings every Tuesday at 7 pm. I hope to see you out at some of these events! Have a great summer!

Thank you,

Rob Lancaster
DAS President

June Speaker

Joe DePasquale

Title: Our Colorful Universe: Translating Cosmic Light



An early representation of Cosmic Light from the psychedelic era, 1968's "2001"—the Star Gate sequence produced using methods related to those that our speaker will describe!!!

Joe is the Senior Science Visuals Developer in the Office of Public Outreach at the Space Telescope Science Institute. Prior to joining STScI in March of 2017, Joe was the Science Imager for NASA's Chandra X-ray Observatory at the Smithsonian Astrophysical

Observatory where he worked for 16 years following his undergraduate training in Astronomy & Astrophysics at Villanova University. Joe has an extensive background in astronomy, as well as training in art and photography giving him a unique skill set well suited to the task of bringing raw observatory data to life in press quality imagery.



6/18/19 DAS Board Meeting Agenda



1. Review of Minutes from Last Meeting—Bill McKibben
2. Treasurer's Report—Bob Trebilcock
3. DAS Election Completion—Sidney Ocampo
4. DAS Picnic Planning—Rob Lancaster
5. Reports on Projects in Progress
 - a. Electrical Project Update—Chris Horrocks and Dave Groski
 - b. Piers and Pods Update—Dana Wright and Tom Harding
 - c. 12" Scope and Refractor Update—Bill Hanagan
 - d. Sawin Upgrades Update—Dave Groski and Tom Harding
2. Project Planning for Spring/Summer—Jeff and Rob
3. Workdays for summer

Report from the Annual Dinner Meeting

Held Tuesday, May 21st at Christ Church in Greenville, DE



There were initial concerns regarding the turnout—everyone is so busy nowadays!



*But then everyone streamed in and
it was standing room only!!!!*



As part of the DAS commitment to wellness, a variety of healthful beverages were made available throughout the evening.



But the real stars were the chefs! Our own Jeff Lawrence on the right, with his father on the left, enjoying the duties of chef-ness!



Dinner! Dessert!
(I also heard rumors of a vegetarian option.)

Our after-dinner speaker, Jack Clemons, brought out the drama and mystery surrounding the Apollo program, and the moon landing in particular. Dinner attendees bought the whole seat, **but they only needed the edge.**



Summer scientist birthday

Brian May
Astrophysicist
Born: July 19, 1947

Who is this guy? Is he a famous scientist? He is famous, and he has PhD in Astrophysics from Imperial College, London, so he is a scientist. That makes him a famous scientist. However, he is famous not as a scientist, but as the lead guitarist for the rock group "Queen". He earned his PhD at age 60, based on work he initiated decades earlier before getting sidetracked.

Dr. May's PhD thesis is entitled: "A SURVEY OF RADIAL VELOCITIES in the ZODIACAL DUST CLOUD" and a fairly careful perusal indicates that this was not a stunt—it appears to be a quite legitimate, high-quality, PhD thesis, based primarily on two high-profile publications from 1972 and 1974.

If you're interested in seeing what rock stars can come up with in astrophysics research, you can easily find this thesis in PDF form on-line.

From Wikipedia:

He was ranked at No. 26 on Rolling Stone's list of the "100 Greatest Guitarists of All Time".



**Dr. Brian May,
astrophysicist, and
expert in the zodiacal light**

Poetry Corner

In honor of this month's featured famous scientist,
our poem will be the lyrics to the Queen song,

Don't Stop me Now

*I encourage you to check this out on youtube to hear what is
evidently some outstanding lead guitar work—you can head straight to time marker 2:18*

<https://www.youtube.com/watch?v=HgZGwKwLmgM>

(but don't forget to listen to the rest of the song too!)

Note that these lyrics are representative of the many astronomical references in the Queen oeuvre, and scholars believe that Dr. May's influence likely explains this, as well as the otherwise bizarre reference to Galileo in Bohemian Rhapsody.

Don't Stop Me Now
Lyrics: Freddie Mercury, 1946-1991

Tonight, I'm gonna have myself a real good time
I feel alive and the world I'll turn it inside out, yeah
And floating around in ecstasy
So don't stop me now don't stop me
'Cause I'm having a good time, having a good
time

I'm a shooting star, leaping through the sky
Like a tiger defying the laws of gravity
I'm a racing car, passing by like Lady Godiva
I'm gonna go, go, go
There's no stopping me

I'm burnin' through the sky, yeah
Two hundred degrees
That's why they call me Mister Fahrenheit
I'm traveling at the speed of light
I wanna make a supersonic man out of you

Don't stop me now, I'm having such a good time
I'm having a ball
Don't stop me now
If you wanna have a good time, just give me a call
Don't stop me now ('cause I'm having a good
time)
Don't stop me now (yes, I'm havin' a good time)
I don't want to stop at all

Yeah, I'm a rocket ship on my way to Mars
On a collision course
I am a satellite, I'm out of control
I am a sex machine, ready to reload
Like an atom bomb about to
Oh, oh, oh, oh, oh explode

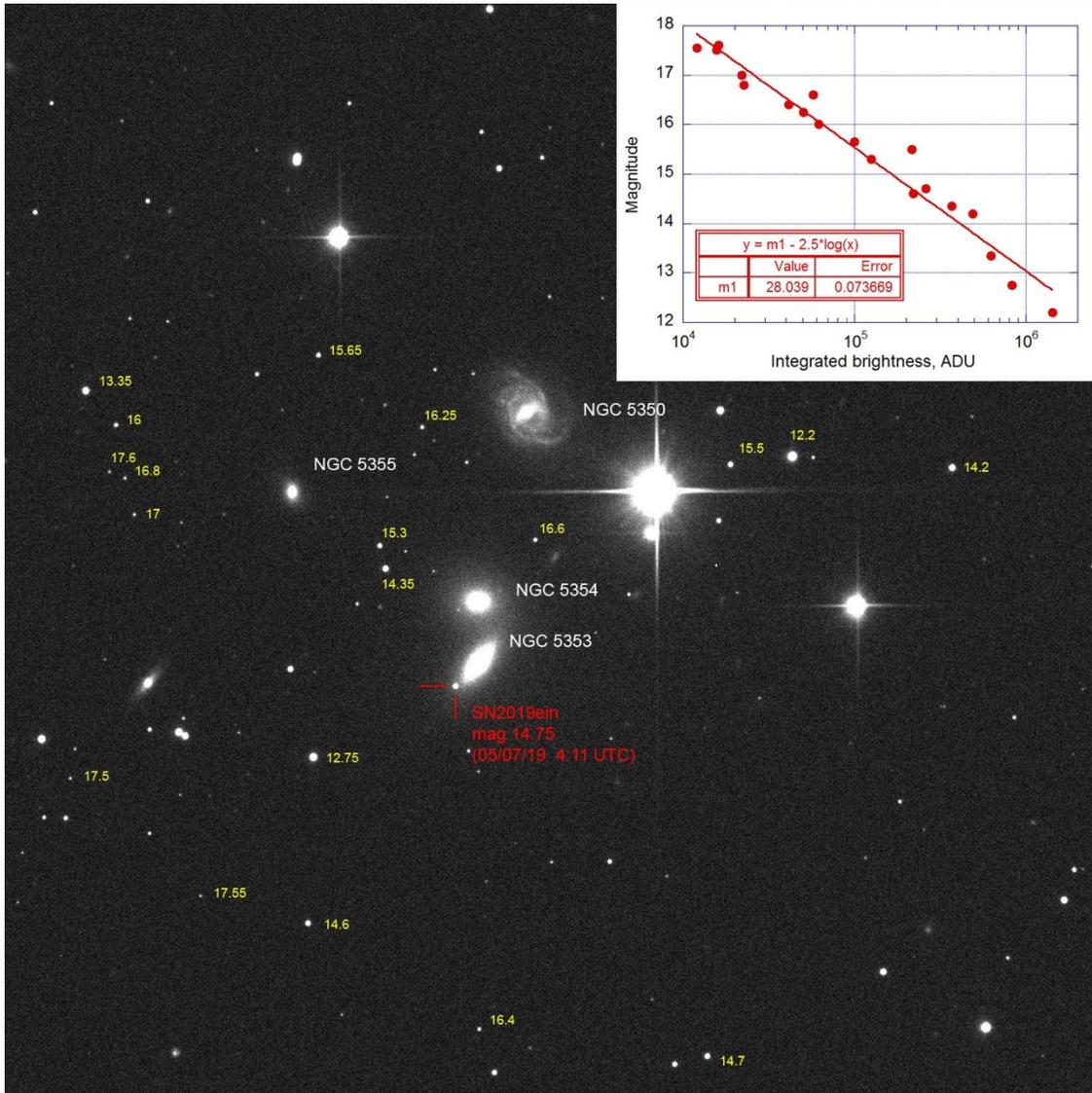
I'm burnin' through the sky, yeah
Two hundred degrees
That's why they call me Mister Fahrenheit
I'm traveling at the speed of light
I wanna make a supersonic woman of you

Don't stop me, don't stop me
Don't stop me, hey, hey, hey
Don't stop me, don't stop me
Ooh ooh ooh, I like it
Don't stop me, don't stop me
Have a good time, good time
Don't stop me, don't stop me, ah
Oh yeah
Alright

Oh, I'm burnin' through the sky, yeah
Two hundred degrees
That's why they call me Mister Fahrenheit
I'm traveling at the speed of light
I wanna make a supersonic man out of you

Don't stop me now, I'm having such a good time
I'm having a ball
Don't stop me now
If you wanna have a good time (wooh)
Just give me a call (alright)
Don't stop me now ('cause I'm having a good time,
yeah yeah)
Don't stop me now (yes, I'm havin' a good time)
I don't want to stop at all

DAS Astrophotography Contributions



Contributed by Igor Peshenko—photometry results

A single 120 sec exposure taken with ASI1600 camera through "luminance" filter was used to estimate apparent visual magnitude of SN2019ein supernova in NGC5353. Raw FIT image was opened in IRIS v. 5.59 astronomical images processing software (<http://www.astrosurf.com/buil/iris-software.html>) and Aperture Photometry tool in IRIS was used to compute integrated pixel's intensity in a circular area that included SN2019ein (for details see http://www.astrosurf.com/buil/iris/tutorial15/doc38_us.htm). Background was subtracted. Intensity of 19 reference stars in the image with known apparent visual magnitude was also measured to establish relationship between integrated pixel's intensity of a star and its visual magnitude. Yellow numbers by the stars in the image correspond to values of their visual magnitude (data from WikiSky). Insert: intensities of 19 individual stars in the image were plotted versus their visual magnitude

and the data were fitted with the following equation: $y = m1 - 2.5 \cdot \log(x)$ where "x" is intensity in ADU, "y" is the magnitude and "m1" is the magnitude constant. The equation was then used to compute SN2019ein magnitude from its brightness.

Equipment used: Orion 8" f3.9 Newtonian astrograph, Paracorr 2" coma corrector, 50 mm f3.2 guider/ QHY 5L-II, ASI1600MM PRO camera, ZWO electronic filter wheel and ZWO 31 mm filters, Orion Atlas mount, Software: Stellarium, EQMOD, AstroPhotography Tools, PHD2.

From Ron Worden: **M27 (NGC 6853) Dumbbell Nebula, a planetary nebula in constellation Vulpecula**



Date: 07/14/2018

Location: Snobie Observatory/Lincoln Control Center.

Bear, Delaware W75° 40' 43.04" N39° 34' 39.7"

Telescope: Meade 10" SCT + Meade 6.3 Focal Reducer 1575mm FL

Mount: Losmandy G11 Guided with Dithering

Cameras: SBIG ST4000XCM + ZWO174 autoguider(+/-2 arcsec)

Temperature: 75°F cooled to 0°C

Filters: OneShotColor

Exposure: 12LFs-300sec subs(1hr)

Software: PixInsight

Frame: 33 x 33 arcmin

Calibration with: 10 dark frames

Observer: Ron Worden

M106 (NGC 4258) is an intermediate spiral galaxy in the constellation Canes Venatici.



Date: 05/23/2018

Location: Snobie Observatory/Lincoln Control Center.

Bear, Delaware W75° 40' 43.04" N39° 34' 39.7"

Telescope: Meade 10" SCT + Meade 6.3 Focal Reducer 1575mm FL

Mount: Losmandy G11 Guided with Dithering

Cameras: SBIG ST2000 + ZWO174 autoguider(+2 arcsec)

Temperature: 55°F cooled to -20°C

Filters: L,Sii,Ha,Oiii

Exposure: 22LFs-22x300sec subs(1.8hrs)

Software: PixInsight

Frame: 19.4x25.8 arcmin

Barnard 33(IC434) Horsehead Nebula, a dark nebula.

Alnitak is the very bright star at left

Flame Nebula (NGC2024 & Sharpless SH2-277) below Alnitak is an emission nebula

NGC2023 below left of Horsehead

Date: 11/17/2017

Location: Snobie Observatory/Lincoln Control Center.

Bear, Delaware W75° 40' 43.04" N39° 34' 39.7"

Telescope: Orion ShortTube 80mm refractor, 400mm FL

Mount: Losmandy G11 Tracking

Camera: ZWO174 B&W

Temperature: 35°F Ambient

Exposure: 228 LF-30sec subs(1.9hrs)

Software: PixInsight

Frame: 60.5 x 96.4 arcmin



May 2019 AP-SIG Meeting Report and Upcoming Meetings

Reported by Bill Hanagan

May 2019 AP-SIG Meeting Report by Bill Hanagan

The May 4 AP-SIG meeting was held on site at Rick Spencer's home. We started off on Rick's deck where he treated us to an assortment of Pizza (Ed.: note to self: "meat lovers pizza" is widely preferred over "vegetable lovers pizza") for dinner. We then moved to the garage where Rick showed us his newly acquired 10" Takahashi CCA-250 Trifocal Astrograph. We stopped for the following group shot in front of the scope.



Above photo: From left to right are Bill Hanagan, Rob Lancaster, Dana Wright, Ron Worden, and our host Rick Spencer.

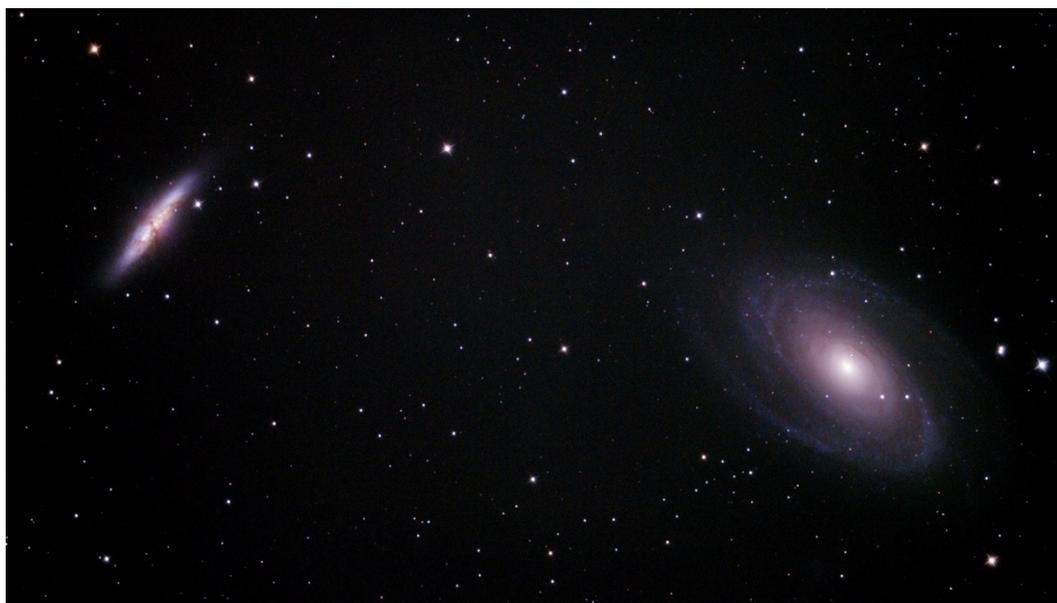
Afterward, we went inside for a discussion of the technical characteristics of Rick's CCA-250. I've put some of the basic details for this scope in the table below.

Takahashi CCA-250 Trifocal Astrograph

Optical Configuration	Add-On Corrector	Nominal Focal Length, in mm	Numeric f/ratio	f/ratio adjusted for light throughput	Image circle, in mm	Metal Back-focus in mm, (actual open space in mm)
Native	None, the 4" 3-element native corrector is a permanent part of the scope	1250	f/5	f/6.02	80	155.4 (~150), with CAA 193.9 (177) w/o CAA
Reduced by 0.72x	Large format "645" reducer/corrector	890	f/3.6	f/4.33	60	90.4 (~73)
Extended by 1.5x	1.5x 82595 extender/corrector	1750	f/7.5	f/9.03	25 to 40	175.5 (~117)

We also had our usual review of astrophotos and Q&A discussion.

Rick Spencer and I showed our respective images of M81 and M82 from data that Rick and I collected jointly. My version of M81 and M82 appears below. I did all of the image processing in PixInsight. The total exposure time was 35 minutes, sub-divided into 7 x 5 minute sub-exposures. This image holds a great deal more detail than you can see without zooming in, so just in case the program you're using doesn't allow that, two cropped and enlarged views follow.





We used Rick's newly acquired Takahashi CCA-250 Astrograph with its built-in "native" corrector operating at a focal length of 1250 mm and focal ratio of f/5. We acquired the sub-exposures using my Canon EOS 6D DSLR at an ISO of 800. The EOS6D has a large sensor with an active area of 23.9 x 35.9 mm, the same size as a 35mm film frame or a KAI11002 CCD. The 6.54 micron pixels of this sensor combined with the 1250 mm focal length of the telescope gave a

“pixel scale” of 1.08 arc-seconds / pixel, nearly ideal for long exposure deep-sky imaging under average to above average seeing conditions.

The telescope was guided using Rick’s Starlight Xpress Ultrastar guide camera mounted in my Orion 60 mm guide scope, all mounted on top of Rick’s CCA-250 (Ed.: using the aluminum mounting plate fabricated by Dana Wright).

We used my Windows 7 laptop to run all of the software controlling the mount, the cameras, and the CCA-250’s motorized focuser, which was controlled through its ASCOM driver. Backyard EOS (BYE) was used for focusing and image acquisition. PHD2 was used for guiding and Cartes du Ciel was used for mount and alignment and GOTO control of the Astro-Physics 1100GTO mount.

BYE and PHD2 worked together to dither the sub-exposures. Dithering is a technique in which the image is shifted slightly between each sub-exposure so that sensor and camera defects like hot pixels don’t stack up at the same location in the image stack. Dithering followed by pixel rejection at the stacking / image integration step makes it possible for a wide range of errors to be removed from the stack with nearly 100% effectiveness. Errors that can be eliminated using pixel rejection (with dithering) include fixed errors like residual hot or cold pixels and bad sensor columns, as well as spurious errors like cosmic rays, airplane trails, and intermittent electrical interference.

Full-resolution RAW (.CR2) sub-exposures were acquired from my EOS6D and save directly to the computer’s hard drive. Six 300 second dark frames were obtained at ISO 800 along with seven 300 second light frames, also at ISO 800. Ideally, flat frames should have been obtained as well in order to allow histogram expansion to bring out low-brightness detail just above the background level, but the available time ran out.

Minimalist Image Processing for the M81 & M82 Images

I used this “minimalist” image processing scheme because I wanted the image to show what the scope is capable of doing with 35 minutes of total

exposure time, not what heroic image processing is capable of doing. The following PixInsight (PI) processes were run on my Windows 7 laptop, in the order listed.

Image Calibration: The dark frames were stacked to create a master dark frame, which was then used to calibrate each of the light frames.

Blink: The 7 calibrated light frames were carefully examined using Blink, which showed that all of the images were quite sharp and lacked any detectable blurring effects, so all 7 sub-exposures continued through to the Image Integration process.

DeBayering: The calibrated light frames were DeBayered using the default VNG algorithm. The deBayered sub-exposures had a pronounced green color, but a strong color cast is not unusual at this stage.

Star Alignment: At this stage, you can sometimes have trouble aligning light frames that are a little blurry or lack enough stars, but neither was the case here and Star Alignment worked perfectly with no need to experiment to find parameters that would force proper alignment to take place.

Image Integration: This is the stage at which the calibrated and registered sub-exposures are integrated into a single “master light” frame with higher S/N and fewer defects than any of the individual sub-exposures. This is achieved in part through “Pixel Rejection”, in which each contributing pixel in the sub-frames is tested against the average for that pixel from all of the sub-frames to determine if its value should influence the final result. If the value of the pixel is too different from the values of the pixels in the other sub-frames it is rejected and the mean or median value used in its place. Pixel Rejection prevents a wide variety of sensor defects and transient errors like cosmic rays, hot sensor pixels, and dead sensor pixels from affecting the final image, especially when used in combination with dithering at the image acquisition stage.

The master light frame produced during image integration represents the

final “clean” image before any enhancements are applied.

This is the end of what is often called “Preprocessing”.

Dynamic Background Extraction (DBE): DBE was used to subdue any light pollution gradients in the background, though none were obvious. DBE was also used here because it does an excellent job removing color casts from the dark background of an image.

Histogram Transformation: This was employed in the usual way to expand the compressed tonal range of the deep-sky objects in this image for display.

Color Calibration: This was used to adjust the color balance at the high end of the brightness scale using a large number of stars as a white reference.

Curves Transformation: This was used to non-linearly increase the saturation of colors at brightness levels above the background. This minimizes color noise in the sky background while enhancing the visibility of colors present in the brighter features of the object.

Processing Summary: I used this “minimalist” image processing scheme because I wanted the image to show what the scope is capable of doing with 35 minutes of total exposure time.

----- Upcoming AP-SIG Meetings -----

Plans for the June 28 / 29 AP-SIG Meeting by Bill Hanagan

The June meeting will be held on site at Mark Mitchell’s home in Hockessin. Among other activities, we’ll get a look at Mark’s new cooled CCD camera, which is based on the SONY ICX-694 CCD. This particular sensor is well known for having exceptional quantum efficiency (among front-illuminated CCDs) and very few sensor defects. If the weather allows, Mark will roll his imaging rig out for a demonstration.

Anyone interested in astrophotography, from curious beginner to expert, is welcome to attend!

The exact date and time of the meeting depends on the weather and will be announced via DAS@groups.io email and by direct email to the AP-SIG members.

As usual, we'll also take a look at everyone's most recent photos. When you come, be sure to bring a USB memory stick with your astrophotos and any related project materials that you would like to show the group. Even if some of your photos have imperfections, it's a good idea to bring them with you to promote the discussion of image acquisition and processing techniques.

The AP-SIG is very good at helping beginners improve their images, so don't be shy about bringing imperfect images along to get some advice on how to take even better images. If you are not an AP-SIG member you can always come to the meeting to see what goes on and sign up later.

Upcoming Woodside Creamery Outreach dates



Friday, April 12:	6:30 – 8:00 (rain date Saturday)
Friday, May 10:	7:00- 8:00 (rain date Saturday)
Friday, June 7:	7:30 – 9:00 (rain date Saturday)
Saturday, July 13:	2:00 – 4:00 solar (no rain date)
Friday, August 9:	7:00 – 9:00 (rain date Saturday)
Friday, September 6:	6:30 – 8:00 (rain date Saturday)
Friday, October 4:	6:00 - 8:00 (rain date Saturday)

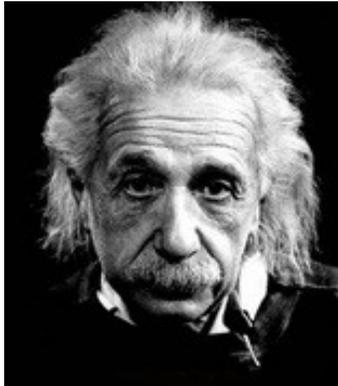


MCAO Volunteers Needed

Hello. I would like to introduce myself. My name is Kim Green and I am the secretary at the Mount Cuba Astronomical Observatory. This year we have increased our field trip activity, we have added many additional Public and Family Nights and we added children's programs to our calendar. The community has requested these programs and we are doing our best to accommodate. With that being said, we are looking for volunteers to help out. We are desperately in need of people who are available to help during our day time led trips. But we would also love to have some evening help as well. So keep an eye out for future emails from me. If you are interested in helping out please contact me at 302-654-6407 or email me at KimGreenMCAO@gmail.com



DAS Loaner Equipment



“Be a loner. That gives you time to wonder, to search for the truth. Have holy curiosity. Make your life worth living.”

The DAS has several telescopes that are designated for loan to members. Our advice to new members is to take any of these telescopes out on loan so you can learn the advantages and disadvantages of the various designs.

- 80mm Celestron Refractor with a NexStar GOTO mount. (On loan from Bill McKibben)
- Meade ETX 90mm Special Edition
- Bushnell Voyager 4” tabletop scope (AstroScan clone)
- Three Dobsonian scopes: two with 6” aperture, one with 8” aperture. This style scope is very easy for beginners.
- Meade 8” LX-10 Telescope: This 8” Meade LX-10 Schmidt Cassegrain Telescope (SCT) is a good loaner if you have any thoughts about buying an SCT telescope on a GoTo fork mount.

Procedure for DAS Members to Sign Out Loaner Equipment Jack Goodwin

1. **Inform:** Please inform DAS Observatory Chair via e-mail -- this is currently how all loaner equipment is being logged/tracked. (email below)

2. Borrower email to include:

- a. Your name and contact information (cell #, email, home number, etc.)
- b. Date equipment borrowed
- c. Description of all equipment being borrowed
- d. Estimated return date for each component borrowed
- e. List any damaged/missing components (if applicable)

3. **Damage:** If the equipment is damaged while you are borrowing the equipment, please notify the DAS Observatory Chair in a timely manner.

4. **A sign out log** will be posted in the near term to compliment the email notification.

NOTE: Currently DAS Loaner equipment is **only available for loan to current DAS members.** (Which is a great excuse to join DAS)

Thank you, Jack
Goodwin,

DAS Observatory Chair Jack_Goodwin@yahoo.com 610-457-2945 (cell)

DAS AMATEUR TELESCOPE MAKING SPECIAL INTEREST GROUP

Bill Hanagan

The DAS Amateur Telescope Making (ATM) Special Interest Group (SIG) is made up of DAS members who get together to work on their own as well as club related telescope making projects. We get together at times and locations appropriate for whatever projects are currently underway.



The general range of activities of the ATM SIG includes all manner of telescope making including Newtonian mirror making, the testing of complete telescopes as well as individual optics, and the making of telescope accessories. In the past, we have made several Newtonian telescope mirrors from scratch and completed some mirrors that members brought in as works in progress, including one that was started in the mid-1960's! We've also made new telescope tubes, made secondary mirror holders, tested numerous telescope objectives, made wire spiders for Newtonian secondaries, and made many solar filters for telescopes and binoculars. We also completed the refiguring of the DAS 17.5" Newtonian mirror used in the Big Dob currently housed in the Sawin Observatory.

If you're interested in telescope making, feel free to email me and let me know what you're interested in doing at hanaganw@verizon.net and include your name, address, and phone number. I'm always glad to provide some guidance and information to other telescope makers.



Images taken before and after adjustment of a typical 2.4 meter space-borne telescope using methods fully endorsed by the ATM-SIG.

How to Join the DAS Groups.io Group

DAS FORUM / E-MAIL SITE ON GROUPS.IO

This is an e-mail service, online forum, and information sharing service for use by DAS members and our astronomy enthusiast friends. To Subscribe to the service, just send an email to: DAS+subscribe <at> groups.io. Then we will compare your name/ email to our lists to make sure that we know you, and if so, we will approve your subscription. If you are not currently a member of the DAS, we strongly encourage you to join.

That is all that you need to do to get into the system. You don't even need to setup an account. But if you want to have more control over how you receive messages from the group or if you want to use the more advanced features, then head over to the website <https://groups.io/login> after you are approved for the DAS Group and you can log in to make any changes you like.

For more information about our group click this link:

<https://groups.io/g/DAS>

New Members Form

Please make checks payable to DAS, print out the following form and mail to:

Robert Trebilcock, DAS Treasurer, 3823 Rotherfield Lane, Chadds Ford, PA 19317

DAS Membership costs \$30 per year, which renews November 1st. We pro-rate membership based on when you join, as follows:

Month Joined	Cost	Renewal Due
Jan-Feb	\$30	This November
March-May	\$20	This November
June-Aug	\$10	This November
Sept-Dec.	\$30	Next November

NEW MEMBERSHIP FORM

Item	Cost	Sub-total
Membership	\$30/20/10	
Astronomy Magazine	\$34	
	total:	



Name _____
Email Address _____
Street Address _____
Phone Number _____ State _____
City _____ Zip _____
How did you hear about
DAS? _____

For questions, contact Robert Trebilcock, DAS Treasurer at (610) 558-1637 (leave message) or by email New Members

Please see the [How to Join page](#) on our website for methods to become a dues-paying member. If you have any questions call any of the member representatives listed.

If you're just joining us for the first time, THANK YOU VERY MUCH, and WELCOME to the DAS! It's GREAT to have you with us!—Rob L.

to Trebilcock@aol.com

DAS Contacts

Please call or email us with any questions or for more information!

Officers:

President: Rob Lancaster, rlancaste AT gmail DOT com

Vice-President: Jeff Lawrence, (302) 668-8277, jeff AT delastro DOT org

Secretary: Bill McKibben, billmck21921 AT gmail DOT com

Treasurer: Bob Trebilcock, trebilcock AT aol DOT com

Board Members at Large:

Bill Hanagan, (302) 239-0949, hanaganw AT verizon DOT net

Amy Hornberger, aehornberger AT gmail DOT com

Dave Groski, groski AT udel DOT edu

Standing Committee Chairs:

Observatory: Chris Horrocks

Education: Ted Trevorow, (302) 593-7949, edt750 AT verizon DOT com

Library: Maria Lavalle and Sue Bebon

Observing: Greg Lee, (302)252-7806, greglee288 AT gmail DOT com

Publications: Rick Spencer, rgspencer AT ymail DOT com

Other Positions:

Amateur Telescope Making Special Interest Group: Bill Hanagan, hanaganw AT verizon DOT net

Astronomical League Coordinator: K Lynn King, klynnking AT verizon DOT net

Astro-Photography Special Interest Group (AP-SIG): Bill Hanagan, hanaganw AT verizon DOT net

Awards Chair: Amy Hornberger, aehornberger AT gmail DOT com

DAS Book Club Leader: Amy Hornberger, aehornberger AT gmail DOT com

Elections Chair: Sidney Ocampo, gegocampo AT yahoo DOT com

Programs Chair: Jeff Lawrence, jeff AT delastro DOT org

Webmaster: Rob Lancaster, rlancaste AT gmail DOT com

