



FOCUS

Vol. 62, No. 4, APRIL, 2017



DELAWARE ASTRONOMICAL SOCIETY

Next Meeting – Tuesday, April 18th, 2017 at 8:00pm

**Topic: “What is the Universe Expanding Into?
And other perfectly reasonable questions”**

Speaker: Drexel Univ.’s Dave Goldberg –

At the Mt. Cuba Astronomical Observatory

FROM THE PRESIDENT--Rob Lancaster

DAS Members,

As we head into spring and the weather warms, we say goodbye to the beauty and deep sky objects of the wintertime Milky Way. Orion and his friends will soon bask in the warm and brilliant glare of the sun, invisible for several months. But on the bright (or darker?!) side, Galaxy Season is beginning! In the evening hours with the warmer spring nights, we can more comfortably come out to explore the plethora of galaxies behind Leo’s tail. Exciting groups of galaxies populate this region of the sky including the galaxies in Coma Berenices, Canes Venatici and of course in Virgo. This is one of the few areas of the sky where you can go galaxy hopping rather than star hopping. So take a walk up Markarian’s Chain or poke around the Virgo Cluster this spring.

Likewise in our club, an exciting season of action is beginning, a season of outreach events to share your hobby with others and a season of club projects to enhance our observing experience. Our spring and summer outreach calendar is filling rapidly and we could use all the volunteers we can get. We just had our first Woodside Creamery event on April the 8th and there were several other outreach events for various groups just this week. Please, if you are available and able to help at one of these events, we could use your assistance, with or without a scope. Our outreach events are some of the most important things we do as a club. Just watch the club calendar and the Yahoo Group for details and please respond to the event organizer when an email asking for volunteers is sent. We also have a number of ongoing club projects you could join and assist with. As you know we have been setting up the new club scope and Mt. Cuba domes. Some great volunteers came out this winter with the construction work. Now we need volunteers to test the equipment and make recommendations. There is also an ongoing group of projects to perform upgrades to the Sawin observatory. We have been working (Continued on Page 4)

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Each issue of FOCUS is full of useful hyperlinks. Just click on any graphic or telltale blue web address and your browser should take you to additional linked web resources.

Observing with the Delaware Astronomical Society...

March AP-SIG Meeting Held at MCAO Bill Hanagan

The Astro-Photography Special Interest Group (AP-SIG) meeting was held at Mount Cuba on March 25th. A total of 10 AP-SIG members and 2 visitors attended, including Jim Barkley, Matt Bobrowsky, Nico Carver, Rick Davis, Erin Farmer, Bill Hanagan, Rob Lancaster, Diana Metzger, Mark Phillips, Eric Stricko, Bob Trebilcock, and Dana Wright.

Our special topic for the meeting was **How to Photograph the Upcoming Total Solar Eclipse**, presented by Nico Carver. Nico gave us a number of good tips and ideas to think about when preparing to photograph the "Great American Eclipse" (<https://www.greatamericaneclipse.com/>) that's coming on August 21, 2017. For anyone who missed Nico's presentation, he's planning to give a condensed version of it at the June DAS meeting.

During the March meeting, we also reviewed astrophotos shown by several AP-SIG members including Dana Wright and myself. Dana's image of M51 appeared in the March issue of the FOCUS. I presented an image of M33 (the Pinwheel Galaxy in Triangulum) to which I had applied a few of the new PixInsight processes that I talked about during the AP-SIG Workshop on Deep-Sky Image Processing back in January and February. The resulting image of M33 appears elsewhere in this issue of the FOCUS, along with a discussion of how it was produced. (**See on Page 5.**)



<https://www.greatamericaneclipse.com/phenomena/>

"PUBLIC NIGHTS" at the Mt. CUBA OBSERVATORY...

MCAO PUBLIC NIGHTS Greg Weaver



The Mt. Cuba Observatory Public Nights continue year round! In addition to learning about many aspects of the heavens, you'll have a chance to visit and view our all-digital full-dome planetarium. You can pick up a schedule when you next come to a meeting or get the latest updated version off the website at: <http://MountCuba.org>. Programs are presented on Monday nights at 8pm. Please check the website for full details and

updates on programs planned. Interested individuals or groups can apply by letter or call 654-6407 (preferably between the hours of 9 and 11 am, Monday through Friday) to the Observatory to obtain reservations for these "Public Nights".

Public Nights schedule Mondays at 8pm for 2016:

Date	Speaker	Topic
24 Apr	Paul Stratton	Our Solar System
8 May	James Dalessio	TBD
12 May (Friday-8:30pm)	Greg Weaver	Family Night
22 May	Hank Bouchelle	The Sun from Pluto
5 June	Jeff Lawrence	@ 8:30pm Common Misconceptions About the Moon
16 June (Friday-8:30pm)	Greg Weaver	Family Night

Upcoming Events and Activities Extended

Check out the website at <http://www.delastro.org/> for ALL of the upcoming events and activities. There's PLENTY going on, so be sure you're informed and don't miss something that would interest you and your relation to the Heavens above!

SAWIN OBSERVATORY REMINDER AND DAS LOANER TELESCOPES AND EQUIPMENT *Bill Hanagan*

The DAS owns and maintains The Sawin Observatory on the grounds of the Mt. Cuba Astronomical Observatory. The Sawin Observatory houses the club's equatorially mounted 12.5" reflecting telescope. The Sawin is also currently home base for our 17.5" split-tube Dobsonian telescope.

DAS members can obtain a key for access to the Sawin Observatory by being checked out on these telescopes and the use of the observatory. Naturally, all DAS members are invited to look through these telescopes during our Member Star Parties (MSPs) at the Sawin. DAS members who are interested in becoming key holders of the Sawin Observatory should contact Greg Lee to receive training in the use of the facility and the telescopes. See more information on Page 24.

LOANER TELESCOPES and EQUIPMENT

80 mm Celestron Refractor (on loan from Bill McKibben)

The club currently has on loan from our Secretary, Bill McKibben, an 80 mm Celestron Refractor with a Nextar GOTO mount. Contact Bill McKibben if you would like to give this scope a try.

6" Orion Dobsonian Telescope

We have a 6" Orion Sky-Quest XT6 Dobsonian reflector, complete with eyepiece set, available for loan to members. You can keep the telescope out on loan for a month or more. However, we use this telescope heavily for outreach star parties at the Woodside Farm Creamery, so if you have it on loan from April through October you may be asked to bring it out to one or more of these events.

Meade 8" LX-10 Telescope

We also have an 8" Meade LX-10 Schmidt Cassegrain Telescope (SCT) available for loan. This telescope is equipped with an equatorial wedge and is driven in Right-Ascension only. If you have any thoughts about buying a telescope, especially an SCT, you are strongly advised to take this one out on loan so you can learn the advantages and disadvantages of this design.

Barlowed Laser Collimator Toolset

Also available for loan to DAS members is Howie Glatter's version of the Barlowed Laser Collimator. This is actually made up of a set of three very nice tools: 1) a 1.25" Glatter laser collimator (which is useful on its own for collimating the secondary mirror); 2) a 1.25" "TuBlug", which converts the straight beam laser collimator into a "Barlowed" laser collimator, complete with a target screen that's visible from the back end of your Newtonian telescope; and 3) an Orion 2" to 1.25" centering adapter for use with 2" focusers.

Along with the center donut or triangle on your Newtonian primary mirror, a Barlowed laser collimator is a very accurate and incredibly easy way to collimate your Newtonian or Dobsonian telescope. It may sound complicated, but using the Barlowed laser collimator is incredibly quick and easy compared to earlier generations of collimation tools. As one person noted "It's one of the handiest and most useful tools the club has ever offered for loan to the membership!" Obviously, no one DAS member can keep these collimation tools out on loan forever, but borrowing this set of tools is a great way to become familiar with the new "Barlowed Laser Collimator" approach to collimation without having to buy the tool set sight unseen.

If you're interested in borrowing any of the club's loaner telescopes or other items, please contact Bill Hanagan, Jeff Lawrence, or Greg Lee at one of our monthly meetings.

DAS FORUM / E-MAIL SITE ON YAHOO

This is a restricted e-mail service for use by DAS members for DAS purposes. To use this site, go to <http://groups.yahoo.com>; search for Delaware Astronomical Society; and click on the link that comes up. To join, you must have a Yahoo ID and password; if you don't, you can register at this time by following Yahoo's instructions. You will then be allowed to "Join the group" upon clicking in that box. You must then register for the DAS group and add your profile by clicking on "add new profile" and completing the form

When adding or editing your profile, you will need to enter your actual name in the "Real Name" box so you can be identified as a DAS member so Don Shedrick can approve your application to join the DAS group, and everyone will know to whom they are communicating.

Finally, specify your desired email address for delivery of messages. Note: You may choose to not have your name and email address displayed to any-one other than DAS members who are members of the Yahoo DAS email group.

For more detailed instructions, go to the DAS website under *DAS Resource Links*.

Photo by DAS Member Frank Colosimo

Messier 46



Messier 46 (also known as M46 or NGC 2437) is an open cluster in the constellation of Puppis. It lies around 5,500 light-years away. There are about 500 stars in the cluster. The planetary nebula NGC 2438 is visible in the image but does not show the same movement as the cluster so is not part of it.

Date: Mar 4 2017

Location: Blue Mountain Vista Observatories, New Ringgold PA

Optics: Starizona Hyperion f/8 12.5 inch, FL 2540 mm

Mount: Paramount ME

Camera: Sbig STL-11000

Guiding: Self-guided

Exposure: RGB: R:6x5 min, G:7x5 min, B:9x5 min for a total of 1.9 hrs.

Processing: Image acquisition using Maxim DL and CCD Autopilot. The Lum and RGB color images were created in Maxim with final processing in Photoshop.

FROM THE PRESIDENT—Rob Lancaster (Continued from Page 1)

on structural, electrical, telescope, and furniture upgrades. Please come check out some of the improvements we have made over the last year and test out some of the equipment. Also, if you are able to help with any of these projects, please do not hesitate to contact one of the club officers and join a project!

Thank you and Happy Spring,

Rob Lancaster
DAS President



M33, Pinwheel Galaxy in Triangulum

by Bill Hanagan

My first image of M33, the Pinwheel Galaxy in Triangulum, appears below. This was produced using the club's GSO 12" f/4 Imaging Newtonian and HDX-110 mount in combination with my Canon EOS6D "full frame" DSLR and Paracorr coma corrector, along with a Windows 7 laptop running Backyard EOS for focusing, framing, and image acquisition. This combination of camera, coma corrector, and telescope give what I consider to be a nearly ideal pixel scale for deep-sky imaging, 0.97 arc-seconds per pixel. The data used to produce this image was obtained back when the telescope was still located in the Sawin Observatory.



A cropped view of the central part of the image appears below.

To create this image, a series of 75 one-minute "light frames" were obtained at 1600 ISO without guiding and later calibrated using 30 flat frames, 30 dark frames, and 50 bias frames. Because of large tracking errors that resulted from not using guiding, only about half of the light frames, 48 in total, were usable and were aligned and stacked to produce this result. PixInsight was used for image calibration, star alignment, stacking, and image enhancement, including HistogramTransformation, MultiscaleMedianTransform (for noise reduction), ACDNR, CurvesTransformation, and BackgroundNeutralization.



I've experimented with using a short-focus guide-scope (SBIG "eFinder" with a 100mm focal length) piggy-back mounted on the HDX-110 with an SBIG ST402ME cooled CCD camera as a guide camera to try to improve tracking accuracy. Unfortunately, the extremely short focal length of the eFinder, which is little more than a small lens, appears to be limiting the guiding accuracy to about 6 arc-seconds when using PHD2, offering little significant improvement over the claimed periodic error of the HDX-110 mount. Using the eFinder with a different imaging scope and mount on a different night also produced the same mediocre 6 arc-second level of guiding error. I asked Rob Lancaster about his tracking accuracy using a short focus finder scope that was refitted to work as a guide-scope and he said he also gets

about 6 arc-seconds for his guiding error. 6 arc-seconds is not an acceptable lower limit on guiding error. The guiding error should actually be more like 1 arc-second (or less) on nights when the seeing is good.

An off-axis guider (OAG) would be a better choice for guiding and I'm looking forward to using this approach with the 12" f/4 in the future not only to take advantage of the longer focal length and aperture of the imaging scope to gain greater sensitivity during guiding, but also because this approach eliminates the problem of different amounts of flexure occurring in the guide scope versus the imaging scope. Flexure includes such things as mounting structure deformation, focuser sag, optical tube deformation gravity, movement of optics within their cells, and the bending of secondary mirror supports, etc. Many of these sources of flexure are not well controlled in either guide-scopes or imaging scopes, particularly in low cost equipment.

Delaware Astronomical Society

Board of Directors Meeting
Meeting Date: March 21, 2017

Meeting was called to order at: 7:10 PM

Meeting Minutes:

Vote was taken to approve the February 2017 board meeting minutes.

Treasure's report highlights:

- \$300 was paid to Ashland Nature center for the dinner meeting along with the \$5.00 liquor license fee.
- A Televue extension tube was purchased and reimbursed as approved last month.
- A donation of \$48.60 was made to the DAS by a group of members who had contributed to the purchase of a refrigerator, but had funds left over.

Treasurer's Report: PDF of the Treasurer's Report can be found on the DAS Website

Dinner Meeting:

- The Ashland Nature Center has been confirmed and paid as detailed above.
- Our speaker will be Shawn D. Domagal-Goldman from the NASA Goddard Space Flight Center.
- Shawn's topic will be "The Next 30 Years in the Search for Life on Planets Around Other Stars".
- We need an Awards Chair to manage the Luther Porter and Amateur Astronomer of the year awards. An announcement will be made in the general meeting requesting a volunteer.

Observatory:

- The new 12" scope and mount are in a dome on the pad outside of the Sawin, but not yet aligned.
- The E-Track has been ordered and Jack expects to pick it up soon.
- With special thanks to Tom Harding, the Sawin counterweights were machined and recoated.
- The Byer's drive has been received for the Sawin and is waiting for a bracket to be made to be installed.

General business:

- Our proposed speaker for the June meeting was not available, so we are going to have mini talks focused on the solar eclipse that is coming in August. Jeff will put out a request for presenters.
- Lynn and Wayne King will be holding an event at Brandywine Creek State Park for the eclipse. The sun is expected to be roughly 75% eclipsed in this area. They will have an Internet video feed available for viewing totality and in the event of bad weather.
- Rob and Jeff are working to finalize the roles and responsibilities for board members. They welcome input from the board members to help clarify the details and fill any gaps.
- We have discussed getting a rolling toolbox for the Sawin to replace the old tables and cabinet along the north wall. Last month we agreed to look at the Home Depot model 75811 AHR toolbox and continue discussion this month. Pete Huesmann has offered to donate a rolling toolbox to the DAS at no cost, but he does not know what size or condition it is in. A vote was taken to approve \$600 for the purchase of the model 75811 AHR toolbox with drawer liners pending review of the offer from Pete. Pete expects to see the tool box and send pictures the weekend following the board meeting. A vote to approve will authorize the purchase of the Home Depot model if the offer from Pete does not meet our needs.
- The idea of acquiring one or more additional loaner telescopes was raised. We will plan to discuss this topic in next month's meeting. *(Continued on Following Page)*

Board of Directors Meeting 3/21/2017 *(Continued from Preceding Page)*

General business:

- Our proposed speaker for the June meeting was not available, so we are going to have mini talks focused on the solar eclipse that is coming in August. Jeff will put out a request for presenters.
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- The idea of acquiring one or more additional loaner telescopes was raised. We will plan to discuss this topic in next month's meeting.

Votes / resolutions:

For / Against / Abstain Resolution

Approved 9 / 0 / 0 Vote to approve the February 2017 board meeting minutes.

Approved 10 / 0 / 0 Vote to approve \$600 for purchase of model 75811 AHR toolbox with drawer liners pending review of the offer from Pete Huesmann.

Board Meeting was adjourned at 7:57 PM

Tele Vue Paracorr John Goodwin

Oh boy, hoping this email is not as controversial as the presentation at the last meeting. Really trying to avoid that... So bear with me.

If there is a stout chance that this would get approved at the next meeting, may be good to try to leverage sale prices. Not trying to grease the skids here, but rather try to make DAS dollars go further. I just checked on CN classifieds, these do come up for sale, but not very frequently and 380 looks like a very fair price.

I've been hearing about a possible paracorr purchase for a while now. It appears that a good portion of the board may want it.

With Neaf coming up and with Televue eyepieces (not sure about paracorr) normally 20% off at neaf, and this thing on sale (used), would hate to wait until the April meeting to discuss at the cost of ~95 dollars more.

Only saying if the purchase of this is highly likely, may want to consider an email decision. Or possibly an interim step, poll the board, should we have an email vote and is there a likelihood that you would vote to approve. I reviewed the standing rules and this purchase appears to fall under the guidelines.

With respect to the interim step only (not a vote). My position is that I would be supportive of an email vote, I would support the purchase of a paracorr type 2 at \$400 maximum new or used (note new retail price is \$475).

DAS Board Members At Large Elections Nico Carver, Election Chair

The terms for the three DAS Board Members At Large are expiring this year. Elections will take place in May via the usual electronic voting method of the past several elections. Board Members At Large hold voting positions on the DAS Board of Directors and, essentially, represent the interests of the general membership in all matters brought before the Board for discussion. The terms are for two years and begin on July 1 of odd numbered years.

To date, the following DAS members have been nominated and have agreed to stand for election:

Dave Groski
Bill Hanagan
Terry Lisansky
Bob Trebilcock

These candidates will be announced at the April meeting at which time nominations will also be permitted to come from the floor. Nominations from any member in good standing will be accepted for the slate. Members can nominate themselves. Please, email me at nico@udel.edu or call me at 302-353-2448 with your nominations or your questions.

Photo by DAS Member Nico Carver **The Jellyfish Nebula (IC443)**

Gear: Orion Atlas mount, Skywatcher 80mm doublet refractor, ZWO ASI1600MM-Cool Camera (new), 5nm Ha and OIII narrowband filters (new)

Data: Captured over five nights in February/March from Newark, DE.

Acquisition: All subexposures were taken at -20 degrees Celsius.
Ha: 54 x 5 min., OIII: 20 X 5 min., Approx. 6 hours integration.
30 darks, no flats/bias.

Processing: PixInsight: Subframe Selector, Manual Calibration and stacking, Crop, Automatic and Dynamic Background Extraction, MultiscaleLinearTransform for noise reduction, MaskedStretch and Histogram Transformation to go from Linear to Nonlinear data, Pixelmath to combine the Ha and OIII into an RGB image, Curves for tweaking black level and saturation. Photoshop: removed artificial diffraction pattern on Propus, final tweaks to curves/contrast/color.

Notes: This is my first narrowband image with a new monochromatic camera. It is also my first image where I successfully gathered data over several nights. In processing, I settled on a fairly "natural" color palette, with the reds in the image representing the H-alpha signal and the blues in the image representing the doubly ionized oxygen (OIII) signal.





Here are the dates for the Woodside Creamery events for this season:

**COME and ENJOY
Some of the BEST
Ice Cream in all
of DELAWARE!!
And get a look at
the Stars Above Too!**

All evening events to be held on Fridays,
with a rain / cloud date for Saturday

May 5	7:00- 8:00
June 9	7:30 – 9:00
Saturday, July 15	2:00 – 4:00 (solar) – no rain date
August 18	7:00 – 9:00
September 29	6:00 – 8:00
October 27	6:00 - 8:00

Sawin Observatory News

Jack and Amy Goodwin

Fellow DASonianians,

Wanted to make all of you aware that there is a new addition in the Sawin observatory. We identified that the tables on the North side of the observatory were, well, you can fill in the blank adjective... In the board meetings of recent we down-selected options and arrived at what we hope will be a fantastic addition to the observatory. The club purchased a 52 inch long rolling tool chest (half height it does not have the top chest). I have used these in the past and they are great as you have a workbench/table directly above your storage area. Anyway, the tool chest is now installed in the Sawin, and it easily held all of the items that stored in the existing tables / storage containers.

Want to thank all that made this possible. The DAS board for approving, the Tuesday night gang for assembling it, the guy in the Home Depot parking lot that helped me get this monstrous 285 lb too box into my vehicle, and last by not least Sir Isaac Newton for helping me unload it from my car!

So there are many things going on at the observatory lately. The Tuesday night astronomy workshop is a great time, we did some observing last night with the clubs 12.5 in an 17 in scopes. We saw a few goodies 51, 81, 82, orion (with the E star), Jupiter, etc. also we had a great time looking at the moon.

For some it was their first time looking through Bruiser's eyepiece, a Televue 10mm Ethos that Amy and I have permanently loaned to DAS as most of you have heard about. If you haven't looked through a 100 deg eyepiece, it is very nice, and now you have the opportunity to experience it at DAS/MCAO.

Also Amy, and the DAS book club met last night. They had a great time too!

So ask yourself, does this sound like more fun than what you did last night? If so, come on out on Tuesday nights! The scheduling is easy, we meet every day that falls between Monday and Wednesday at 7pm. (A.k.a Tuesdays at 7)

Tele Vue 10mm Ethos 2" / 1.25" Eyepiece with 100 Degree Field of View



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EVERYTHING to do with
Man's Exploration
of the Universe!

On Discussions in the Yahoo Group. . .

Dear DAS Members,

As you probably already know, Mike Turco's talk on the "Effect of the Sun on Earth's Climate" sparked a good deal of scientific discussion both the night of his talk and over the past week. I would like to thank Mike for giving his talk the other night; I do know that can be quite a challenge and can take a lot of courage, especially if you believe your perspective is not a popular one as Mike explained at the beginning of his talk. I don't think I can remember any talk that was given at a DAS meeting that has stimulated this much scientific discussion. So thank you very much for that Mike! I would also like to thank the other members for sharing their opinions, evidence, and information over the past week or so. I think all of this has gotten us all thinking, reading, and talking about a key scientific issue.

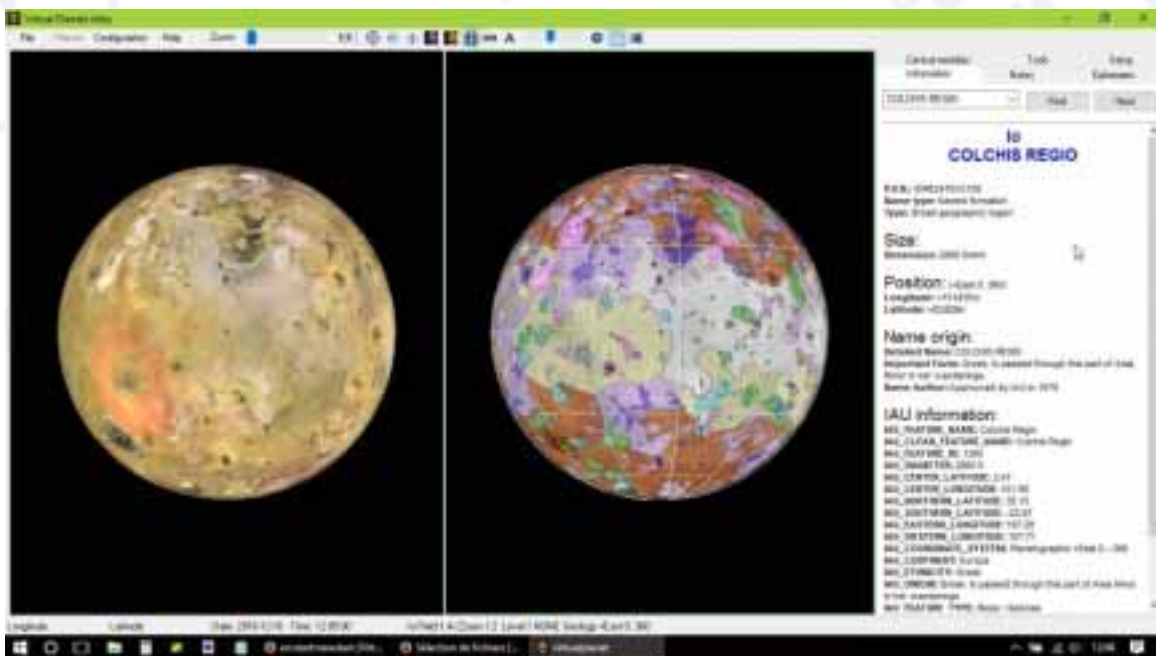
But, one thing we must be mindful of is that the yahoo group is not really the best venue for in depth scientific discussions or debates. It is primarily a vehicle for getting the word out to the club about important astronomical information, planning events, sharing new discoveries in science, and other various announcements. Back and forth discussions are also often beneficial as well, especially with regards to event planning or star party announcements. But, we must remember that emails sent to the yahoo group go to the entire group and if we start getting into debates in the yahoo group, or if people send emails to the entire Yahoo Group that are really meant as responses to individuals, then people who are not participating in the discussions might stop paying attention to emails from the yahoo group. This is something we definitely don't want to see.

So please, if you want to continue the debate, please do so via personal email, phone conversations, or in person. I certainly want to encourage people to discuss science. But please don't have an extended scientific discussion or debate over the Yahoo Group. I would encourage you all to come out to a Tuesday night Astronomy Workshop meeting and discuss all you like, or maybe you could do so while staring up at the stars at a star party pondering the mysteries of the cosmos.

Thank you very much and lets hope for more clear skies like on last Wednesday when a significant percentage of the club was enjoying the Sawin Observatory!

Rob Lancaster
DAS President

Virtual Planets Atlas (Fred DeLucia)



Nice free program that can be used to cull information for talks at general meetings or outreach events.

<http://www.ap-i.net/avp/en/start>

Behold, Hubble Telescope's latest close-up photo of Jupiter. WOW!



04/18/17 DAS Board Meeting Agenda

1. *Review of Minutes from Last Meeting—Bill McKibben*
2. *Treasurer's Report—Diana Metzger*
3. *Procedure for club purchases*
4. *Progress reports from current projects*
5. *New loaner scopes for beginners.*
6. *Focuser and Paracorr for club scopes*
7. *Sawin security upgrade*



The Most Amazing Space Stories of the Week!



Two of the raised treads on the left middle wheel of NASA's Curiosity rover on Mars suffered breaks in early 2017. One of the breaks is visible as a partially detached section at the top of the wheel, seen here by Curiosity's arm-mounted Mars Hand Lens Imager.
Credit: NASA/JPL-Caltech/MSSS

Transition begins

U.S. President Donald Trump signed a bill authorizing a \$19.5 billion budget for NASA in 2017, setting its priorities for the year. Vice President Mike Pence also announced that he would head a re-established National Space Council, which will advise the president on space issues. [Full Story: President Trump Signs NASA Authorization Bill] <http://www.space.com/36154-president-trump-signs-nasa-authorization-bill.html>

Dragon came back

SpaceX's Dragon spacecraft splashed down in the Pacific Ocean, bringing more than 2 tons of science experiments and gear back from the International Space Station. Officials retrieved the spacecraft and had time-sensitive scientific samples in the lab within 48 hours. [Full Story: SpaceX Dragon Capsule Returns to Earth with Ocean Splashdown] <http://www.space.com/36123-spacex-dragon-makes-ocean-splashdown-crs-10.html>

No laughing matter

The mysterious dark matter seems to make up a large percentage of the matter in the universe, but — perplexingly — early galaxies seem to not have very much of it. [Full Story: Lack of 'Dark Matter' in Early Galaxies Perplexes Astronomers] <http://www.space.com/36149-lack-of-dark-matter-early-galaxies-perplexing.html>

Colorful cocoon

Three observant satellites, called Swarm, have mapped the complex magnetic field of Earth's crust and outer mantle, known as its lithosphere. The signal is tiny, but illuminating about the Earth's history. (And one city in Africa has a mysteriously sharp and strong magnetic spike.) [Full Story: Earth's Magnetic Cocoon Mapped in Extreme Detail] <http://www.space.com/36183-satellites-map-lithosphere-magnetic-field.html>

The Most Amazing Space Stories of the Week! (Continued from Preceding Page)

Maybe no flow

Mars' famous dark streaks, thought to be caused by briny flows of water, may come from bone-dry landslides instead, new work suggests. [Full Story: Mars' Dark Streaks May Be Caused by Dry Landslides, Not Water]

But then again: Massive Martian Slopes May Harbor Ice <http://www.space.com/36162-mars-dark-streaks-dry-avalanches.html>

Going way back

A radio telescope that could probe the dawn of the universe's first stars and galaxies received a new grant, boosting its potential size from 240 huge antenna dishes to 350 — letting it look even further back in time. [Full Story: Telescope Eyeing Universe's First Stars Gets (Another) Big Boost] <http://www.space.com/36118-hera-radio-telescope-will-study-first-stars.html>

Out there

Two astronauts completed a spacewalk Friday (March 24) to help prepare the International Space Station for future commercial spacecraft to dock and bring crew. It is the first of three spacewalks in a row, the third of which will be the station's 200th spacewalk. [Full Story: Space Station Astronauts Poised to Tackle Three-Spacewalk Streak] <http://www.space.com/36176-astronauts-prepare-for-three-spacewalk-streak.html>

Astronomy Picture of the Day



Explanation: This group is popular in the northern spring. Famous as the Leo Triplet, the three magnificent galaxies gather in one field of view. Crowd pleasers when imaged with even modest telescopes, they can be introduced individually as NGC 3628 (left), M66 (bottom right), and M65 (top). All three are large spiral galaxies but they tend to look dissimilar because their galactic disks are tilted at different angles to our line of sight. NGC 3628 is seen edge-on, with obscuring dust lanes cutting across the plane of the galaxy, while the disks of M66 and M65 are both inclined enough to show off their spiral structure. Gravitational interactions between galaxies in the group have also left telltale signs, including the warped and inflated disk of NGC 3628 and the drawn out spiral arms of M66. This gorgeous view of the region spans about one degree (two full moons) on the sky. The field covers over 500 thousand light-years at the trio's estimated distance of 30 million light-years.

Dinner Meeting May 16, 2017

You do not want to miss the May 16 Dinner Meeting at the beautiful Ashland Nature Center! Jeff and his parents will be preparing a Mexican specialty, chicken (or vegetarian) mole. Mole is a delicacy of Mexico traditionally containing chili peppers, nuts, seeds, fruits, seasonings, herbs and chocolate. The seasoning is complex and delicious.

Salad, bread and butter, and dessert are included. Water and soda are available, and tea and coffee. Beer and wine available with free will donation.

The NASA speaker is Shawn D. Domagal-Goldman, who is speaking about "The Next 30 Years in the Search for Life on Other planets Around Other Stars".

Social hour begins at 6 PM, with dinner at 7 and the program at 830.

You can sign up via Paypal, or send a check to

Diana Metzger
604 Baldwin Lane
Wilmington, DE 19803

or give me \$20 at the next meeting.

Please specify chicken or vegetarian mole.

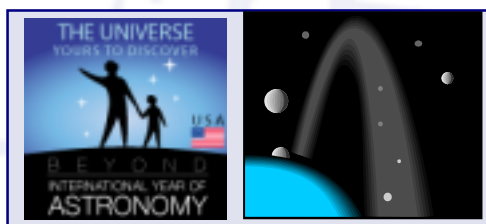
Thank you, and I hope to see you there!

Diana Metzger

Click here (<http://www.delastro.org/16-event-reports/168-dinnermeeting-2017>) for more information and to register.

Click to
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EVERYTHING to do with
Man's Exploration
of the Universe!**



DAS 2017 Dinner Meeting May 16th



Ashland Nature Center



The 2017 Dinner Meeting will be again held at the beautiful Ashland Nature Center. A map can be found [here](#). Information on how to register and more details will follow soon.

6:00pm - Social Hour **Price Per Person STILL ONLY \$20**

7:00pm - Dinner served

8:30pm - Awards presentations and guest speaker



Our 2017 Guest Speaker is

Shawn D. Domagal-Goldman From The NASA Goddard Space Flight Center
Topic: "The Next 30 Years in the Search for Life on Planets Around Other Stars"

Click <https://science.gsfc.nasa.gov/sed/bio/shawn.goldman> for information about Shawn D. Domagal-Goldman

The Menu:

Bread & butter

Salad

Chicken or Vegetarian Mole served with rice and a vegetable

**** note - mole traditionally contains peanuts, but for allergy reasons this will not**

Strawberry Shortcake

Water & soda

Beer & wine by free will donation

Hot tea & coffee

The easiest way to register, is via PayPal at <http://www.delastro.org/16-event-reports/168-dinnermeeting-2017>. Please select your main course choice. Note, if you are registering more than one person, please add all meal choices to the cart prior to checking out.

If you would prefer, you can mail a check along with a note indicating your meal choices to:
Diana Metzger, DAS Treasurer, 604 Baldwin Lane, Wilmington DE 19803



New Telescope in the POD Observatory

All,

The new 12" reflecting telescope on the modern Orion go-to mount is now placed in one of the new observatory POD's adjacent to the Sawin. It is also precisely polar aligned to make the go-to function as easy as possible.

A simple 1-star alignment is all that is needed to get you to lock onto to any object in the sky. With the polar alignment, the 1-star alignment is easy, The mount will point the scope very close to the alignment star of choice, often in the field-of-view with a wide-field eyepiece. You should be slewing to your first observing object of choice within 5 minutes of powering it up.

Please note that neither POD is in its final location. Mt Cuba is still finalizing the decision as to where to place the POD's and preparing whatever necessary construction for pads on which to place them.

The PODS are currently temporarily placed on the concrete slab next to the Sawin. We wanted to take advantage of having the one POD fully built and weather-proofed to test fit the new scope and mount in it.

So we encourage you to check it out. See what you think of that scope in the POD. If there are any suggestions or improvements that could be made, it is best for us to address them now before the PODS are permanently installed.

We will be preparing a cheat sheet for how to set up and shut down the scope so we can begin to train people on its use. Feel free to come out during one of the Tuesday Workshop sessions - even if it is cloudy you can still have a look at the scope in the POD. If you notice a clear night and wish to come out for observing, contact one of the officers, and we may be able to arrange for someone who knows the operation of the scope to meet you. After this winter of terrible weather, I am sure we are all eager to take advantage of a clear night!

This modern scope and mount allows one to easily find objects with hardly any knowledge of the sky. It gives a great view as the tracking will keep the object centered for a steady view, even with high magnification.

Further, this setup allows for great astrophotos. With a shorter (less than 2 minutes) exposures in a simple, un-guided setup you can image the moon, planets or brighter deep-sky objects. You just need to attach your camera to the scope, find your object, and snap away! Truly breathtaking photos of some of the dimmer objects can be achieved with the more complicated setup of guiding. I recommend either attending on of the AstroPhotography Special Interest Group (AP SIG) meetings or talking with either Bill Hanagan or Rob Lancaster for more details about this.

Best,

- Rob, Jeff, Diana, & Bill
DAS Officers



Think of the many benefits of being a member of the Delaware Astronomical Society!

We have telescopes including eyepieces and collimating equipment for your use. All you need to do is ask an officer or other board member to arrange for you to become certified on the telescope you want to use. If you have a suitable camera, you can start taking your own photos of lovely celestial objects. If you know nothing about astrophotography, no problem, we have people eager to teach you how to do it. There is a special interest group in astrophotography that meets monthly.

If you want to build a telescope of your own, we have members who are expert and who are willing to show you how to do it. We have books in our library that explain the concepts.

If you are a beginner, you will have help in Greg Lee's "What's Up in the Sky, so that you will know where to look for interesting objects that month. We have beginner topics each month offered early in the program, so that school age and morning people can get some good information and still be home for their preferred bedtime. We have a Great Courses astronomy course with 96 30-minute lectures in our library that will get you up to speed in basic concepts. We have a Great Courses series on observing. There is a library with many topics on astronomy.

If you want help with finding objects in the sky, come to our star parties, formal and informal, to get some help with using your telescope, collimating and aligning with your finder scope.

If you have a problem with your equipment, come out on Tuesday nights to find members who can help you problem solve. Let us know in advance what you would like to work on or which problems need solved, or what interesting things you would like to try.

If you like to party, come out on those Tuesday nights; sometimes we have informal cookouts and observing. We also have picnics coupled with solar observing at other times.

If you love to work, come to our work days. In future we will be doing concrete work around the Sawin observatory, making an attractive area around the sundial, and painting the Sawin. Work will be done to upgrade the electrical system in the Sawin.

If you want to be more involved, let one of the Board Members know! We need people with diverse interests!

There is something for everyone in the DAS, so be sure to send in \$30 for dues soon to help improve the amenities of the club even more.

Checks to:

Diana Metzger
604 Baldwin Lane
Wilmington, DE 19803 or **Cash at the meeting to Diana**

Or you can pay with PayPal using the link below; you don't have to have an account with PayPal, just a credit card.

https://www.paypal.com/cgi-bin/webscr?cmd=_s-xclick&hosted_button_id=NDGKG4CWCX8GU

***WELCOME a New Member
to the DAS!***

***We're GLAD to have
You on Board!***

*Please welcome
new member
Jane Snyder
to the Club.*

DAS Now has a Discount Subscription Rate for *Amateur Astronomy Magazine*

Amateur Astronomy Magazine: DAS members must print, fill out and mail the form found in the "Files" section of our Yahoo email list website.

The magazine is issued quarterly. <http://www.amateurastronomy.com/index.htm>.

The April AP-SIG Meeting is Scheduled for April 14 at Dana and Barbara Wright's by Bill Hanagan

The next AP-SIG meeting will be held on-site this Friday, April 14 at Dana and Barbara Wright's home at 4 Springer Way, Landenberg PA 19350. Directions from Newark appear at the end of this message. The meeting will start at 7:15 PM in the backyard while we still have some daylight left. Dana will give us a demonstration and review of his new roll-off roof observatory and discuss the components of his imaging rig. The current weather forecast for Friday night is for mostly clear skies and a temperature around 58F.

Anyone interested in doing astro-photography or learning more about it, from the merely curious to beginners, to experts, is welcome! Please email me off-list at hanaganw@verizon.net to let me know if you plan to attend. It helps to know how many people will attend when it comes to preparing snacks and planning seating arrangements. Directions to the Wright's home appear at the end of this message.

We'll also have our usual presentation of images and Q&A session on imaging techniques, so be sure to bring your astrophotos along on a USB memory stick. The group is very good at helping beginners to improve their images, so don't be shy about showing your less-than-perfect photos to get some advice on how to produce better astro-photos. There is also likely to be some follow up discussion of how to photograph the upcoming solar eclipse. If time allows, I'll also give a special topic presentation on Off-Axis Guiding. Compared to the use of a small, separate guide scope, Off-Axis guiding offers a much higher level of sensitivity to tracking errors and eliminates blurring due to flexure of telescope structures, focuses sag, and mirror flop.

The subsequent (May) meeting of the AP-SIG is tentatively scheduled for May 19 / 20 at MCAO and the Sawin Observatory. Please mark these dates on your calendar! The special topic for the meeting will be a discussion of the most popular alternative to PixInsight for Deep-Sky Image Processing, the use of "DeepSkyStacker" followed by Photoshop, to be presented by AP-SIG member Mark Mitchell. And, if both the weather and seeing conditions are favorable, we may do some planetary imaging of Jupiter.

Direction to Dana and Barbara Wright's _____

From Newark DE, take 896 (New London Rd.) northwest to the PA line, continuing for 3 tenths of a mile.

Turn right onto Morgan Hollow Way.

Take the first right turn onto Laetitia Lane.

Take the first right turn onto Springer Way.

Proceed a short distance to the second driveway on the right at 4 Springer Way.

Park on the street or pull into the driveway and then immediately onto the grass to the left.

If you have any question please feel free to call Dana Wright at [610-563-6070](tel:610-563-6070).

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. The ATM SIG meets 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've made several Newtonian telescope mirrors from scratch and completed some that members brought in as works in progress, including one that was started in the mid-60's! We've also made new telescope tubes, made secondary mirror holders, tested numerous telescope objectives, manufactured spiders, and made many solar filters for telescopes and binoculars. We recently completed the refiguring of the DAS 17.5" Newtonian mirror.

Anyone interested in joining the ATM SIG should email their name, address, and phone number to me at hanaganw@verizon.net.



FOCUS uses plenty of photos
in banners & elsewhere each issue, and
we want to use YOURS...not Hubble's!!

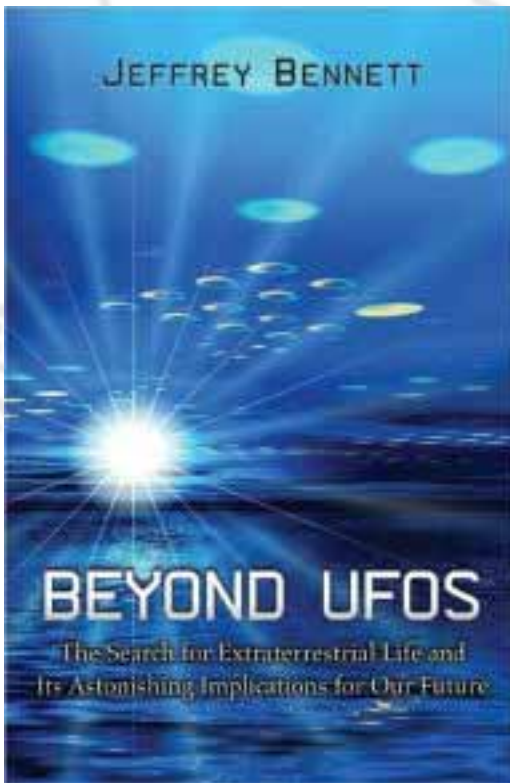
Photos need NOT be current.

**So how about you?? HAVE ANY
OLD or NEW ASTROPHOTOS??**
PLEASE email to **FOCUS** editor

(or tell us where they can be found on the web if your photos reside there!)

Did You Know... DAS Has a Book Club?!

Amy Hornberger



The second meeting of the DAS Book Club took place on Tuesday, April 4 at Mount Cuba. We discussed *The Glass Universe: How the Ladies of the Harvard Observatory Took the Measure of the Stars*, which is the latest book by Dava Sobel. Robert Stack and Mary Webb shared their wonderful documentary about Annie Jump Cannon (who worked at the Harvard Observatory) with the rest of participants at the meeting. It was very informative and much appreciated.

Last month, at the premier meeting of the Book Club, we discussed *Hidden Figures*, the book on which the recent Academy Award-nominated movie was based. Our goal is to read a mix of "star-studded" fiction and non-fiction titles (because they're about astronomy, ha ha). Our current selection is *Beyond UFOs: The Search for Extraterrestrial Life and Its Astonishing Implications for Our Future*, which should dovetail nicely with the topic of Shawn Domagal-Goldman's talk at the DAS Dinner Meeting next month.

Our next meeting is scheduled for Tuesday, May 2 at around 7:00 pm. We welcome all interested DAS members to join us.

2017 Marks the Astro-Photography SIG's **15th Anniversary!! WOW!!**



The Astro-Photography Special Interest Group (AP SIG):

One of the GREAT Benefits of Belonging to the Delaware Astronomical Society. So Join or Re-Join and get involved In the Hobby's Most Advanced Element in Astronomy Today. And get a Look at what the Heavens REALLY look like --Something that can only be Found in Modern Astro-Photography!

And the DAS Has The Equipment and Expertise Needed for YOU to Get Started in Astro-Photography!

Celebrating 15 Years!

Upcoming Monthly Meetings

April 18, 2017 7:00 pm - 9:30 pm

DAS Monthly Meeting Topic: Prof. Dave Goldberg ; Board meeting at 7PM, all are welcome; General Meeting at 8PM.

May 16, 2017

DAS Monthly Meeting -- Annual Dinner Meeting - Guest Speaker: Shawn Domagal-Goldman

June 20, 2017 7:00 pm - 9:30 pm

DAS Monthly Meetin Topic: TBD; Board meeting at 7PM, all are welcome; General Meeting at 8PM. .

Sawin Certification Program

The Sawin is the major centerpiece of DAS. In the past it was in use much more often and by a number of members on every clear Friday night. It has been largely underutilized for a number of reasons. One reason, I believe, is that newer members or members who do not own a telescope might feel intimidated by the equipment and the observatory's layout. We hope to address this by instituting the Sawin Certification Program. With the new upgrades installed, its use will be more inviting and user friendly to both new and experienced members. Certified Key Holders of the Sawin have access to its use at any time without supervision



The Program will consist of a minimum of 2 sessions, scheduled at the Sawin, to obtain the necessary knowledge and experience in using the Sawin equipment. These sessions will be supervised by a current Sawin Key Holder.

The first session, likely set for a weekend in the daylight (even if it's cloudy), will familiarize learners with the layout of the Sawin and overall operation, including opening the roof, uncovering and covering the telescopes, handling eyepieces and pointing the telescopes, etc.

If the supervising Sawin Key Holder determines that progression during the first session is acceptable, then the second session will be scheduled for a clear sky night session to address night time use of the equipment.

The Sawin Certification Program is for DAS members only who are in good standing and 16 years of age or older. Participants in the program who are under 18 years of age must be accompanied by a parent or guardian.

For information or sign-up, please contact Rob Lancaster, DAS President at RLancaste@gmail.com.

ASTRONOMICAL LEAGUE MEMBERSHIP

- The DAS offers an optional membership in the Astronomical League (AL) at a discounted rate.
- AL membership dues are \$7.50 per year and are due on June 1 for all members.
- Prorated discounts for new memberships starting mid-year are as follows:

April 16 - July 15: \$7.50 per member

July 16 - Oct 15: \$5.62 per member

Oct 16 - Jan 15: \$3.75 per member

Jan 16 - April 15: \$1.87 per member

For questions regarding Astronomical League, its observing programs and to sign off on completed observing programs before being submitted to the Astronomical League, contact Lynn King at klynking@verizon.net.

Members should make their check out to DAS and mail it to the Treasurer whose information is below:

Diana Metzger, Treasurer, 604 Baldwin Lane, Wilmington, DE 19803

Call for DAS AstroImages for Display in Mt. Cuba Lobby

MCAO is asking for any DAS members to submit their astroimages for display in the Observatory. It would like to display the club member's talents and update some of the images currently on display in the lobby of the Observatory.

Images will be displayed for up to a year and replaced as new images are submitted. Full credits to the imager will be included. Please include all technical information with the image (date, telescope and camera used, exposure time, image processing software, etc.). You may email digital images to the Mt. Cuba website. Photos may be sent to the Observatory or brought to a DAS meeting.

The Observatory looks forward to displaying your beautiful images! Contact Greg at mtcuba@physics.udel.edu.



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INFORMATION ON DAS MEMBERSHIPS AND MAGAZINE SUBSCRIPTIONS

DAS MEMBERSHIP

- DAS membership dues are \$30.00 per year and due on November 1 for all members.
- There is no need to renew membership until the treasurer contacts you during the membership renewal drive starting in mid-October.
- New members joining at various times of the year may be eligible for a prorated dues amount.
 - \$20 when joining March-May
 - \$10 when joining June-August
 - \$30 for joining September-October through November 1 of the following year.

SKY & TELESCOPE MAGAZINE

- The DAS offers subscriptions to *Sky & Telescope* at a discounted rate of \$32.95 per year.
- Call S&T magazine at 800-253-0245 and mention the club's name to receive the discount

ASTRONOMY MAGAZINE

- The DAS offers subscriptions to Astronomy magazine at a discounted rate of \$34.00 per year.
- Subscriptions to Astronomy will be processed by the club for the first subscription year only.
- Your subscription expiration date should be displayed on the mailing label on your magazine.
- Renewals can be handled by all club members on the Astronomy.com website using the following steps:
 - a. go to www.astronomy.com
 - b. select the 'customer service' link in the upper right corner
 - c. select the 'renew your subscriptions' link
 - d. enter your customer number (found on the mailing label), postal code, and the renewal code of 'RCLUB040' and click 'continue'
 - e. follow the remaining steps from there.

NEW MEMBERSHIP FORM

- Please review the membership and magazine information above carefully.
- PLEASE fill out the membership form below completely.

NEW MEMBERSHIP FORM

Please be sure to review the **Membership** and **Magazine** information above **carefully**.

Please make checks payable to DAS and forward to:

Diana Metzger, Treasurer, 604 Baldwin Lane, Wilmington, DE 19803



Membership	\$30.00/20.00/10.00	<input type="text"/>
Astronomy Magazine	\$34.00	<input type="text"/>
Total:		<input type="text"/>

Name _____ Email Address _____

Street Address _____ Phone Number _____

City _____ State _____ Zip _____

Notes _____

For questions or concerns, contact Diana Metzger, DAS Treasurer at (302) 290-2108 dmetzgermd@gmail.com

DAS CONTACTS Please Call Any of Us With Your Concerns or Problems

Board Members

Officers:

President: Rob Lancaster -- RLancaste@gmail.com -- also Webmaster

Vice-President: Jeff Lawrence -- Jeff@DelAstro.org -- (302) 668-8277 -- also, Program Chair

Secretary: Bill McKibben -- BillMcK21921@comcast.net

Treasurer: Diana Metzger -- (302) 290-2108 -- DMetzgerMD@gmail.com

Board Members at Large:

Terry Lisansky -- Terry@terry.cx

Glenn Bentley -- (610) 869-0706 -- GBentley@chesco.org

Bill Hanagan -- (302) 239-0949 -- hanaganw@verizon.net -- Astro-Photography Special Interest Group (AP SIG) --
Amateur Telescope Making Special Interest Group (ATM SIG)

Standing Chairs:

Publications: Joe Neuberger -- JRNeuberger@gmail.com -- (410) 398-7394 -- also *FOCUS* Newsletter, articles & Photo Contributions & Submissions

Observatory: Jack Goodwin -- (610) 457-2945 -- Jack_Goodwin@yahoo.com

Education: Ted Trevarrow -- (302) 593-7949 -- edt750@verizon.net

Library: Maria Lavalley and Sue Bebon Astronomical League Coordinator--K Lynn King -- klynking@verizon.net

Observing Chair: Greg Lee

Elections Chair: Currently Vacant --also Awards Chair and By-Laws



See Preceding Page for New Membership Form

If you have any questions call any of the member representatives listed. Otherwise, just check the appropriate boxes and complete the form on the preceding page. Print it or cut it off and send it with your check to Diana Metzger at her address on the form. The magazine prices are group rates to DAS members.

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!

I have an apology to make to Mike Turco, who gave last month's meeting

**The Last
Word. . .**



**FOCUS Editor
Joe Neuberger**

Presentation on Climate change. He DID contact me some months ago

regarding submitting an article on climate change for the FOCUS. I re-

plied that I would publish it only if it agreed that climate change was largely

*due to the actions of man. **This was the first time that I had ever censored***

*the subject for an article and it was **WRONG** of me to do so. So Mike,*

please accept my apologies for that censorship which had no place in the FOCUS.

I pledge that it will not be repeated.