



# FOCUS



DELAWARE ASTRONOMICAL SOCIETY

Vol. 61, No. 9, November, 2019

## Next Meeting

**Tuesday, November 17**  
**Mount Cuba Astronomical Observatory**

**Board Meeting 7PM**  
**General Meeting 8PM**

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*Just in case the meeting runs long*

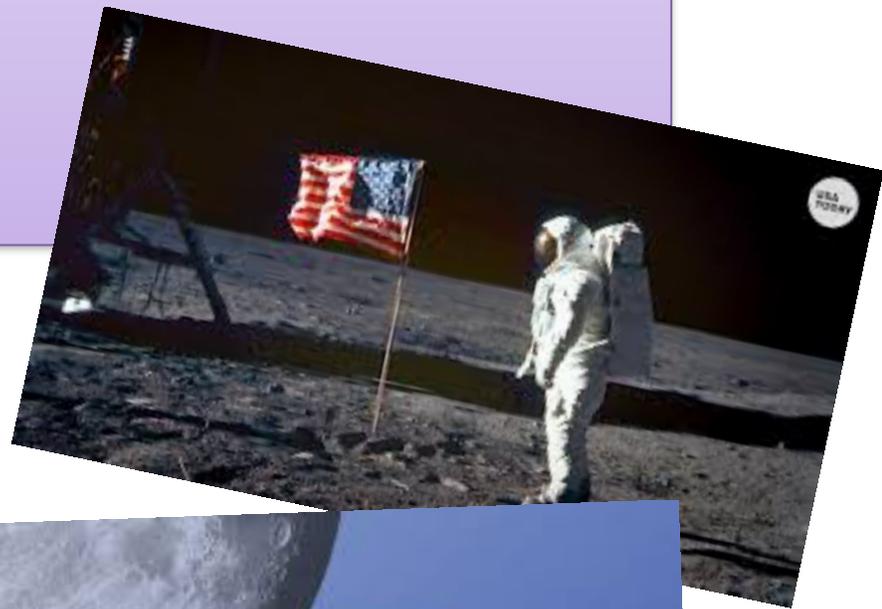
**FOCUS editor:**  
**Richard G. Spencer**  
**Publications Chair, DAS**

November meeting topic:

**NASA Lunar Science – Highlights from Apollo and lots of Robotic Spacecraft**

*Presented by John Conrad, NASA Ambassador:*

In this 50th anniversary year of Apollo 11, we'll look at the avalanche of lunar science discovery since the Space Age began. NASA's manned and unmanned spacecraft visits have been the major contributors to advancing mankind's understanding of Earth's nearest neighbor. This talk will cover the highlights of our current understanding of the Moon – from deep inside to above the crust.



# From the President

## *Rob Lancaster*



November 2019 President's Column

Dear DAS Members,

The nights are gradually getting colder and colder as the sun travels south on its yearly journey. But we take solace in the fact that the sky gets clearer and the beauties of the night sky last longer to cheer up the chilly astronomer. I hope you got a chance to get outside this month and that you have plans to get out this month as well. I think I got more images during this month's "dark window" than I have ever gotten in such a short time. I have nearly completed a mosaic with 12 panels of the veil nebula and the string of good clear nights we had this month really made it possible to fill in most of the gaps in my mosaic and to almost complete it. Each image takes more than an hour and a half of imaging. I am eagerly awaiting this month's dark window so that I can finish it. Hopefully we get more great weather!

We have had a busy month with numerous events that were very successful. We had an exciting AP SIG meeting at Rick Spencer's house where we got to see the construction of his new observatory moving forward. We have had several successful Astronomy Workshops with great attendance. At the last couple of Workshops, several of us have been working on taking photos of the DAS loaner telescopes so that we can make a better guide on the website to what gear the DAS has for loan and how to use it. We had a successful outreach event at Bellevue State Park in early November. Then, we had a beautiful view of the Transit of Mercury this past week. I was at the Museum and there was a steady stream of people, both kids and adults, coming to view the transit. And finally, we had a great Vernon lecture at the University of Delaware.

At our November DAS meeting, our local NASA ambassador John Conrad will be telling us all about the Highlights of Apollo and Robotic Spacecraft. It should be really exiting. Remember that each month we have an Astrophotography Special Interest Group meeting, a Book Club Meeting, and a full DAS meeting. Also, each Tuesday that is not a Monthly meeting, we will have the more informal Astronomy Workshops where you can pursue your interests in Astronomy. We also have an assortment of outreach activities planned where you can share your love of Astronomy. Please consider volunteering at or participating in some of these events. They really are a lot of fun and we really appreciate all you do for the club! This is our club, it is a great club, and by volunteering, we all help to make it even better.

Thank you,

Rob Lancaster  
DAS President



#### 11/19/19 DAS Board Meeting Agenda

1. Review of Minutes from Last Meeting—Bill McKibben
2. Treasurer's Report—Bob Trebilcock
3. DAS Equipment Photos and Web page project—Rob Lancaster
4. New Donation: Meade LX200 GPS and plans for retrieval—Rob Lancaster
5. Beginner Programs, Mark Jacobini's ideas for a Beginners SIG and a Focus Column
6. DAS Intro to Amateur Astronomy Course

## Poetry Corner

*Contributed by Shæila Vincent*

### Star Swirls

Robinson Jeffers

1887-1962

The polar ice-caps are melting, the mountain glaciers  
Drip into rivers; all feed the ocean;

Tides ebb and flow, but every year a little bit higher.  
They will drown New York, they will drown London.

And this place, where I have planted tree and built a stone  
house,  
Will be under sea. The poor trees will perish,  
And little fish will flicker in and out the windows. I built it well,  
Thick walls and Portland cement and gray granite,  
The tower at least will hold against the sea's buffeting ; it will  
become  
Geological, fossil and permanent.

What a pleasure it is to mix one's mind with geological  
Time, or with astronomical relax it.

There is nothing like astronomy to pull the stuff out of man.  
His stupid dreams and red-rooster importance : let him count  
the star-swirls.

*This certain is a thought-provoking bit of  
poetry. It combines visions of global warming  
and apocalyptic foreboding with the  
admonition to ponder the heavens to remove  
oneself from Earthly concerns.*

—RGS

## November Scientist Birthday

Edmund Halley

Nov. 8, 1656, Haggerston—Jan. 14, 1742, Greenwich

We all know Halley as the guy with the comet named after him. So was he just some dude with a telescope who saw a comet before everyone else?

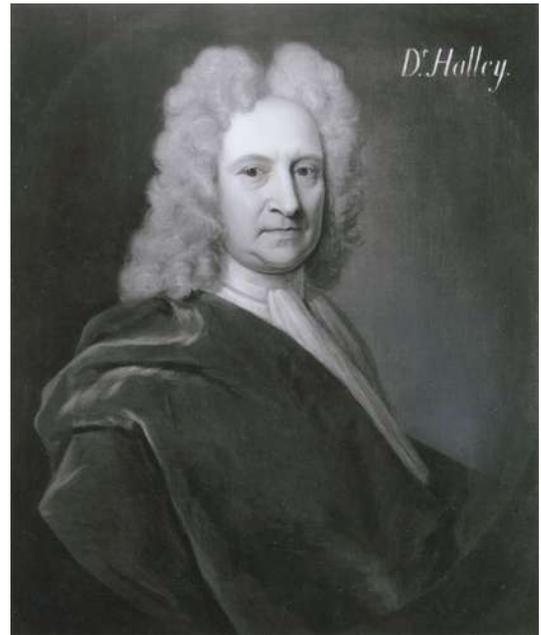


Image of Halley's Comet, 1986, from Cloudy Nights, by someone named "Marty0750". Marty0750 writes: 12 March 1986 ~4am at Mount Barker, South Australia

Olympus OM1, 50mm f 1.8, 4 minutes on hand-guided homemade barndoor tracker.

Ilford HP4 (400 ASA) Developed in ID-11 forced to 800 ASA.

*Note: Film camera*

I saw Halley's Comet in 1986, using just my eyeballs and some ancient binoculars, from Duxbury Beach near Boston, in the dead of night. As I recall, there were many other observers.

—RGS

So who was Halley? He was the 2nd Astronomer Royal, after Flamsteed.  
*Note: the current Astronomer Royal is Sir Marin Rees, a cosmologist at Cambridge University.*

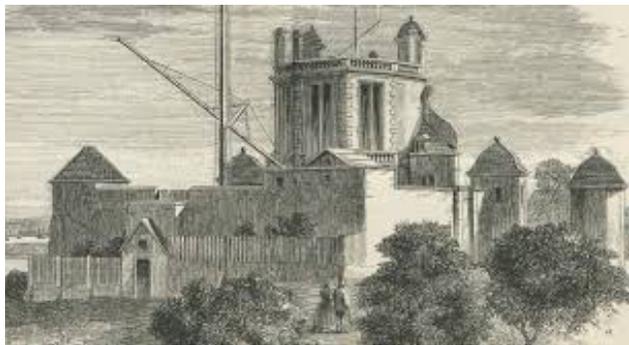
Halley studied:

- The transit of Mercury across the sun
- Sunspots
- Planetary motion
- Astronomical instrumentation
- Meteorology
- Stellar magnitudes
- Geomagnetism

and...

*Comets*

He also published Newton's *Philosophiae Naturalis Principia Mathematica*



**Royal Greenwich  
Observatory, at the time of  
Halley, and now.**

# Astrophotography Contributions by DAS Members



From Mark Mitchell



Mark L. Mitchell ©2019

IC 5146 | The Cocoon Nebula in Cygnus  
SV70T + Atik 460ex + 19Ha, 11R, 19G, 15B all 300s

## From Mark Jacobini

10 day old waxing gibbous moon peeking through the rainbow. There is also a faint second rainbow in the upper right of the picture.

Camera: Samsung SM-G935V smartphone

Aperture: f1.7

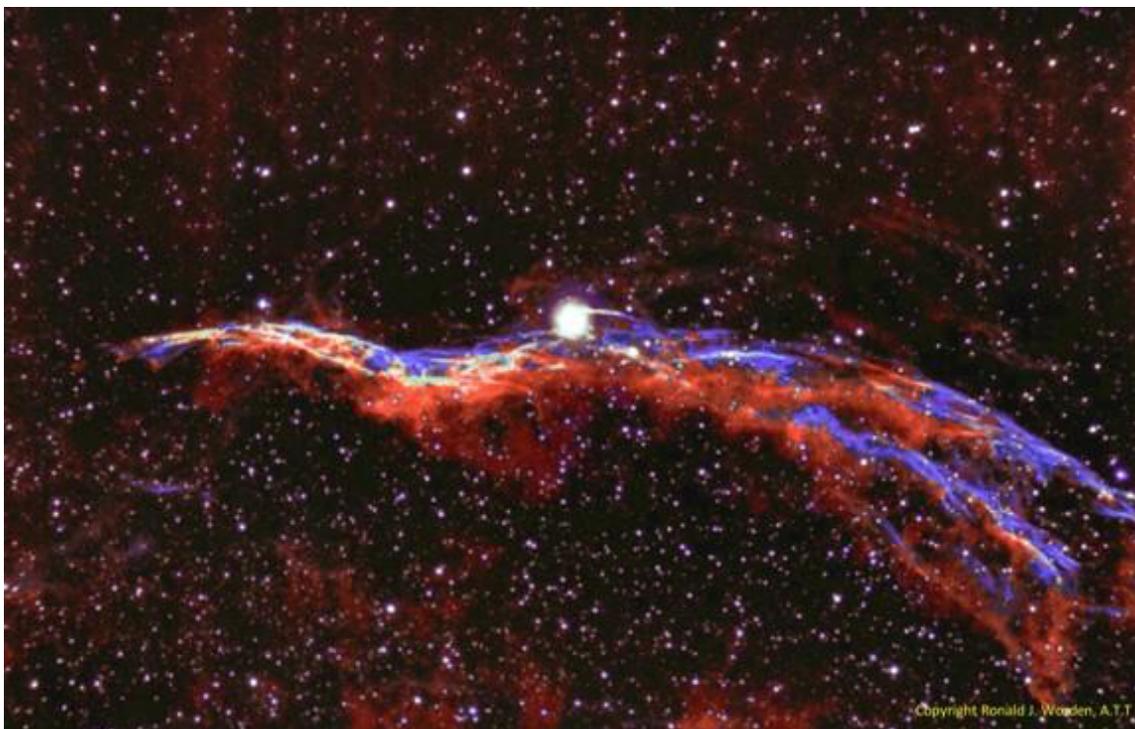
F/l: 4.2 mm

ISO 50

Exposure time 1/403 s

6/13/2019 8:02 pm





Ron notes: NGC 6960(Caldwell 34) Also known as the Western Veil Nebula and the Witches Broom is a cloud of heated and ionized gas and dust in the constellation Cygnus

Date: 09/21/2019

Location: Snobie Observatory/Lincoln Control Center.

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

Telescope: ED102CF Refractor + .8x Focal Reducer F/5.6 , FL 571mm, Guide Scope 60mm Prime Luci Labs

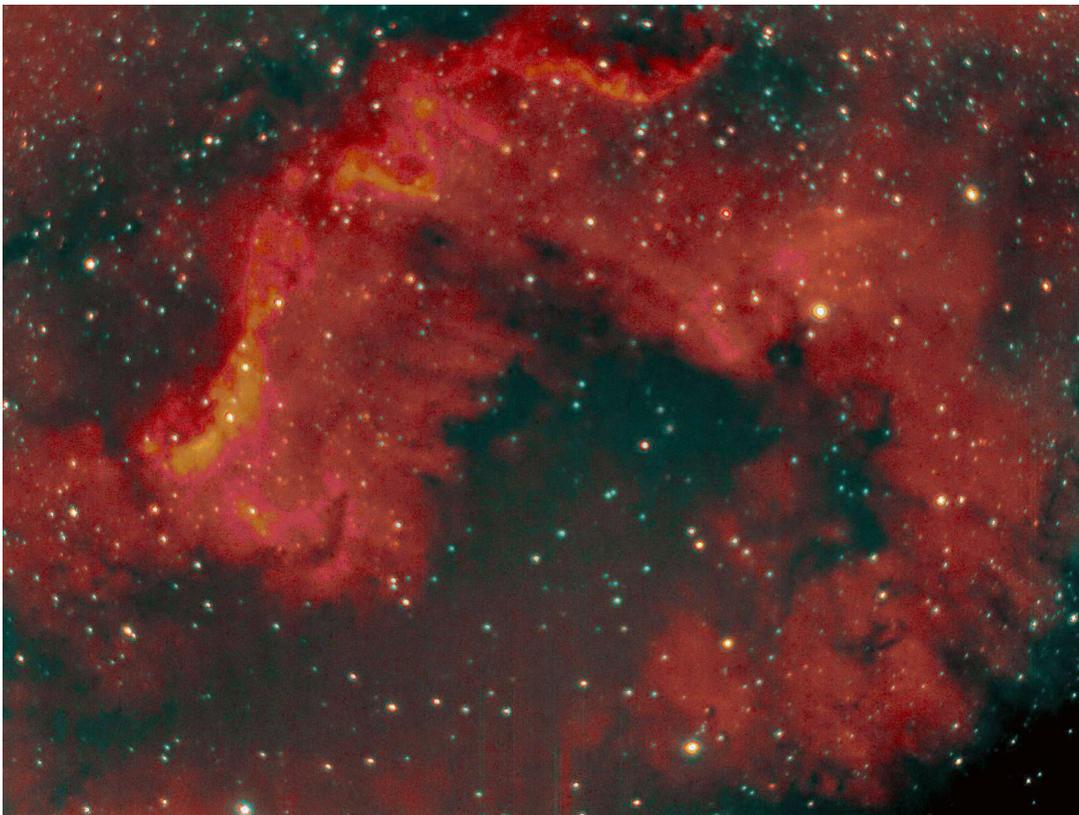
Mount: Losmandy G11 Guided with Dithering

Cameras: SBIG ST2000XM + ZWO174 autoguider(+1 arcsec)

Temperature: 65°F cooled to -5°C

Filters: Sii,Ha,Oiii,Hb

Exposure: 33LFs-300sec subs(2.75hrs) (8Sii,6Ha,13O



NGC7000(Caldwell 20, Sharpless 117) is an emission nebula in the constellation Cygnus

**Technical Information:**

Target : NGC7000 (Caldwell 20, Sharpless 117)

Constellation: Cygnus

Right Ascension: 20h 59m 17.1s

Declination: +44° 31' 44"

Distance: ~1600ly

Apparent magnitude: 4.0

Apparent size: 120x100 arcmin

Date: 10/1/2019

Location: Snobie Observatory/Lincoln Control Center.

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

Telescope: ED102CF Refractor + .8x Focal Reducer F/5.6 , FL 571mm,

Guide Scope 60mm Prime Luci Labs

Mount: Losmandy G11 Guided with Dithering

Cameras: SBIG ST2000XM + ZWO174 autoguider(+1 arcsec)

Temperature: 65°F cooled to -5°C

Filters: Sii,Ha,Oiii,Hb

Exposure: 17LFs-300sec subs(1.42hrs) (6Sii,6Ha,3Oiii,2Hb)Combined Sii & Ha and put in the Red channel, Combined Oiii &Hb and put in Green channel, Combined Oiii &Hb and put in Blue channel.

Software: PixInsight

Frame: 54.4 x 71.2 arcmin

Calibration: Master Dark from 10 dark frames

Observer: Ron Worden



Target : IC5070, The Pelican Nebula  
Constellation: Cygnus  
Right Ascension: 20h 50m 48.0s  
Declination: +44° 20' 60.0"  
Distance: ~1800ly; Apparent magnitude: 8.0  
Apparent size: 60x50 arcmin  
Date: 10/2/2019 Location: Bear, Delaware W75° 40' 43.04" N39° 34' 39.7"  
Telescope: ED102CF Refractor + .8x Focal Reducer F/5.6 , FL 571mm, Guide Scope 60mm Prime Luci  
Mount: Losmandy G11 Guided with Dithering  
Cameras: SBIG ST2000XM + ZWO174 autoguider(+/-1 arcsec), Temperature: 55°F cooled to -10°C  
Filters: L,Sii,Ha,Oiii,Hb  
Exposure: 22LFs-300sec subs(1.83hrs) (5L,6Sii,3Ha,3Oiii,5Hb) L put in Luminance channel,  
Combined Sii & Ha and put in the Red channel, Combined Oiii &Hb and put in Green channel,  
Combined Oiii &Hb and put in Blue channel.  
Software: PixInsight; Frame: 54.4 x 71.2 arcmin  
Calibration: Master Dark from 10 dark frames  
Observer: Ron Worden

# From Rob Lancaster

**Object: Orion Nebula (M42)**

**SBIG Camera, 6" f/4 Newtonian, Losmandy G11 mount.**

**Stack of 6 Red, 6 Green, and 6 Blue five min images**

**Site: Driveway at home**

**Acquisition Software: KStars with a raspberry pi**

**Processing Software: PixInsight**



**Contribution #2 from Rob Lancaster**

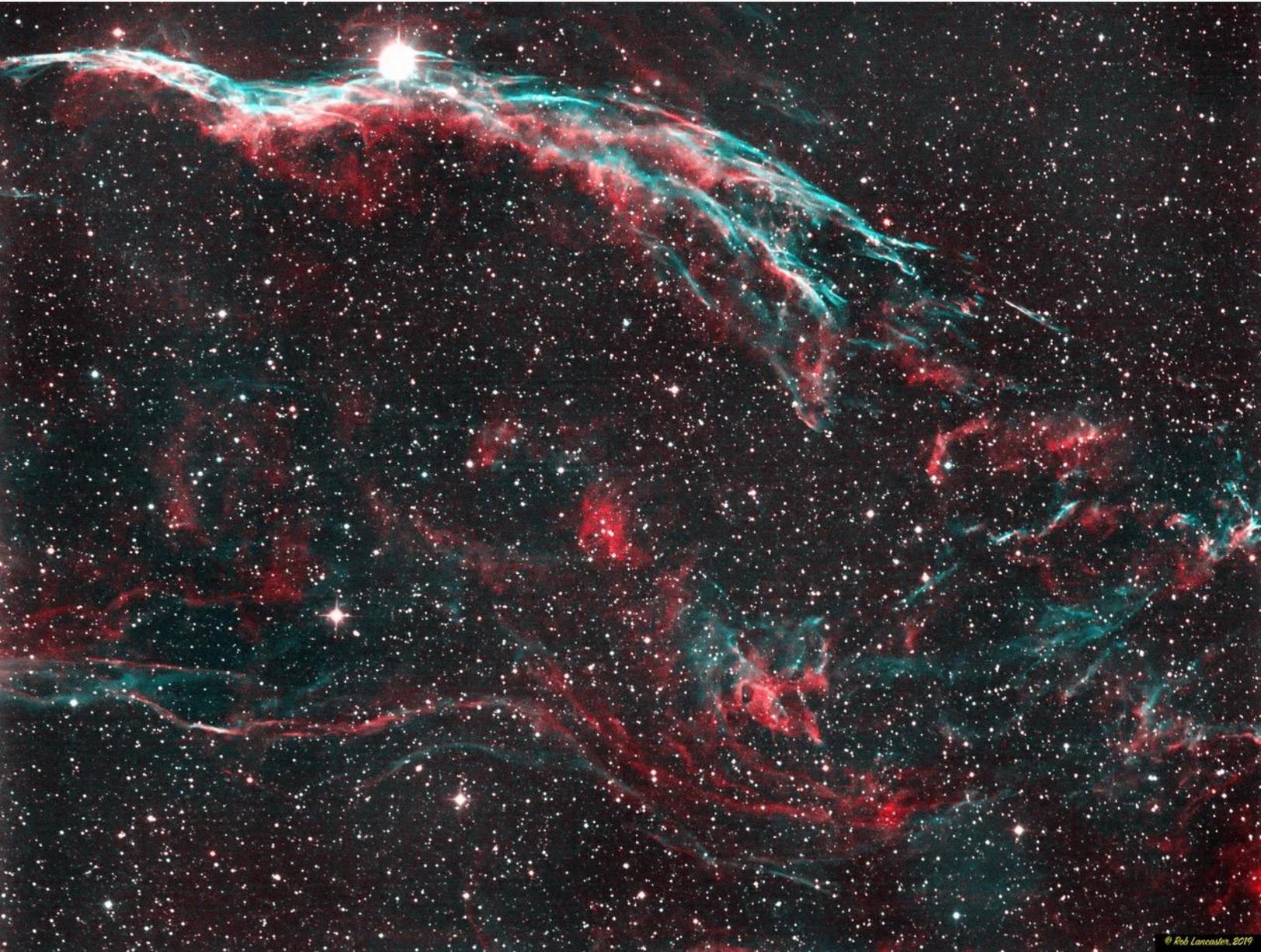
**Object: Veil Nebula**

**SBIG Camera, 6" f/4 Newtonian, Losmandy G11 mount.**

**Stack of 18 Ha and 18 OIII five min images**

**Site: Driveway at home**

**Acquisition Software: KStars with a raspberry pi**



# The October AP-SIG Meeting Report and Plans for the Upcoming November AP-SIG Meeting by Bill Hanagan, AP-SIG Founder

Elephant Trunk detail by  
Mark Mitchell

## October 2019 AP-SIG Meeting Report

The October 26 AP-SIG meeting was held at Rick Spencer's home northwest of Elkton MD. We started out in Rick's backyard in the early evening while it was still light enough to see the results of the concrete work for Rick's new 2-pier observatory.

Before heading inside, we stopped for the group photo, which appears below. From left to right are Ron Worden, Mark Mitchell, Bob Trebilcock, Ryan Gilbert, Rob Lancaster, Rick Spencer (our host), Rick's wife Nancy, Bill Hanagan, and Dave Hockenberry. Photos showing the concrete work appear a little later.



Next, we headed to Rick's garage to talk about his scopes, including his latest acquisition, a Takahashi CCA-250 fitted to an Astro-Physics 1100GTO mount, which will soon be up and running in his new observatory. I described Rick's CCA-250 in the June 2019 issue of the FOCUS, so here I'll focus on the Auxiliary Mounting Plate (AMP) that Dana Wright and I made for it.

In the photo below, you can see the CCA-250 and its AMP. Normally, I design these mounting plates with a couple of bends in them to wrap around the OTA to minimize the potential for collisions with nearby equipment, but for Rick's scope we decided to keep the plate flat because bending it would interfere with the Takahashi finder scope mountings and because Rick didn't anticipate using the telescope in tight quarters.

This particular AMP holds a USB hub, a 12V power distribution hub, and a Telrad. The Tripp-Lite Industrial USB hub has worked flawlessly even at 15F and connects the controlling Windows PC to the imaging and guide cameras as well as the scope's ASCOM focuser and any



other USB peripheral that needs to be mounted on the scope. The USB hub connects to the computer through a single USB cable that runs off of the OTA and through the A-P 1100 GTO mount to floor level. Similarly, the 12V hub provides power to all of the same devices and is itself powered by a single 12V cable that runs down through the mount to a 12VDC power supply. Both the USB hub and the 12VDC hub have extra ports to accommodate additional equipment in the future.

After showing us his scopes, Rick treated the group to an assortment of pizzas for dinner. After dinner, I gave the special topic presentation on the subject of telescope Collimation. I also reviewed my concrete plan for Rick's observatory and showed my photos from several days of concrete work. We also had our usual Q&A session and presentation of astrophotos, with several members presenting some excellent photos, some of which will doubtless appear in the Astro-photo section elsewhere in this issue of the FOCUS.

Below, I've included a few of my photos from the concrete work for Rick's observatory for anyone who is interested in the process of building an observatory. Note that there is quite a bit more to the story than I can convey here and there are many different

approaches to building an observatory foundation you might choose depending on your particular requirements and the size of observatory you want to build.

The photo below shows a small excavator being used to dig out the 36" deep perimeter footing of the concrete pad for Rick's new observatory. While this machine isn't very large, it moves dirt many times faster than several busy workmen! It got the job done very quickly and later proved indispensable for digging a trench for the electrical conduit running to the observatory.



Thanks to the perimeter footing, frost heave won't break up the pad or shift the position of the observatory relative to the roll-off roof gantry, which will sit on its own 36" deep concrete footings.

The perimeter footing extends below the frost line, so the footing itself won't be lifted and broken by water freezing underneath it, a process known as frost heave. The central area of the concrete pad is much thinner and well above the frost line, but it is protected from frost heave by the fact that the water underneath it drains away into the sub-soil and is not replenished, because the perimeter footing blocks surface water from flowing into the area under the pad. Also, the water table at this site is always at least 50' below ground level, even in the wettest of years.

The perimeter footing also prevents any erosion of soil from below the concrete pad. This is a desirable feature in this situation because the observatory is being built on a modest slope, with a fall of 11" from one side to the other.

In this photo, the foreman checks the depth of the footer channel. The square footage of the observatory required Rick to work through the Cecil county permitting process, which Rick says has not been much of a problem. The building inspector checked the depth of the footers prior to the concrete pour and approved the work without causing any sort of holdup.



This photo shows the 4 wheel "Power Buggy" used by the contractor to move the concrete from the truck in Rick's driveway to the observatory site roughly 150' away. The driver

moved full loads of concrete with remarkable speed without noticeable spillage. The entire pour required roughly 25-30 trips for the Power Buggy and ~ 17 cubic yards of concrete.



In this photo, two concrete workers can be seen inserting bent steel forms called “chairs” below the rebar, which insures that the rebar will be embedded and protected from



corrosion within the concrete. The rebar gives the concrete a large increase in tensile strength, which helps keep it together even if the soil beneath becomes partially eroded or just settles in spots where the soil was disturbed during construction.

The white form tubes for the two piers can also be seen in this photo with grey conduits for the power and data cables. The opposite

end of each conduit comes up at the edge of the concrete pad where it will rise inside the stud walls to be built later. 1” conduits were installed for AC power runs and 1.5” conduits were installed for running data cables. The pier form tubes were wrapped in closed cell foam for vibration isolation shortly after this photo was taken, but it should have been done much sooner, before the gravel was spread out over the soil. Conduit installation should also have been done before the gravel was spread out over the soil.

In this photo, Rick stands by with the J-bolt plates for the piers while the concrete workers fill the pier form tubes with concrete.



Here, the foreman steps into the wet concrete to smooth the area around the J-bolt plates. This is even trickier than it looks. Anyone walking in the concrete at this point must be constantly aware of the placement of the elevated re-bar and the ~ 42" deep falloff around the perimeter.



Before the concrete is smoothed with a trowel, it is first leveled with a "screed", a long straight board moved frequently along its length and gradually shifted from one side of the pad to the opposite side. For a long screed like the one at the left of this photo, you need one person on each end of the screed. After leveling, a concrete trowel or float is used to push aggregate further down and to further smooth the surface.

Note the AC power conduit rising through the center of the J-bolt plates. The 8" square steel piers (Omega1 Piers made by Backyard Observatories) match this J-bolt pattern and have open bottom plates that allow AC wiring to be run inside the steel piers.

Here, a concrete float is being used for additional smoothing. The front-to-back tilt of the float can be controlled by rotating the handle so that whether the float is being pushed or pulled, the leading edge can always be a little high so it won't dig into the concrete.



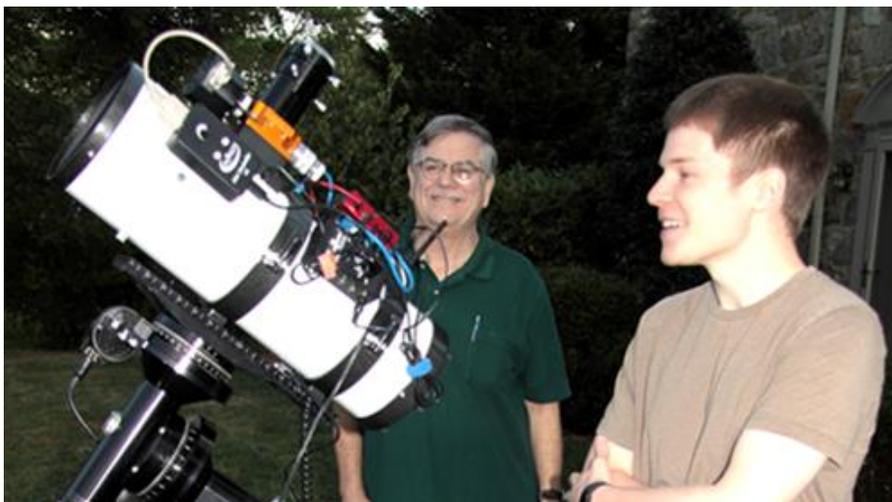
## Plans for the November 22 / 23 AP-SIG Meeting by Bill Hanagan

The November meeting will be held on-site at Dave Hockenberry's home in in Glen Mills, PA. 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.

We'll start out by taking a look at Dave's roll-off building observatory and imaging equipment. For the special topic presentation, Dave will discuss the use of an ASCOM precision instrument rotator for remotely framing deep-sky targets. I'll also be talking about my recent visit with Rick Spencer to see Chris Abissi's "Dark Horse Observatory", another observatory which was built by [Backyard Observatories](#).

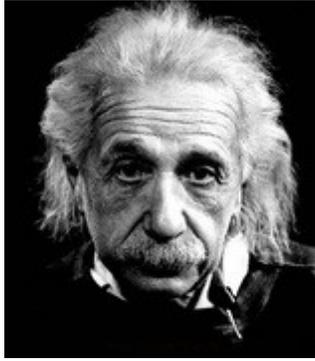
As usual, we'll also take a look at everyone's most recent photos. When you come, be sure to bring a USB memory stick with your astrophotos and any related project materials that you would like to show the group. Even if some of your photos have imperfections, it's a good idea to bring them with you to promote the discussion of image acquisition and processing techniques. If you are not an AP-SIG member you can always come to the meeting to see what goes on and sign up later.

At right, Dave Hockenberry takes a light-hearted look through Rick's ES-127 refractor on a Celestron one-armed fork mounted.



**Oops!** In the October 2019 AP-SIG Meeting Report, the last name of the gentleman on the left was incorrect, though it has since been corrected! His true name is Tom Harding!

# 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**

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,  
Chris Horrocks  
DAS Observatory Chair

## 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](mailto: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 the Hubble Space Telescope *using methods fully endorsed by the ATM SIG.*

From the Desk of: Robert Trebilcock, DAS Treasurer

Delaware Astronomical Society 2020 annual membership dues were due November 1.

Dues remain \$30 for the 2020 calendar year.

There are several payment options:

1) You can bring cash, check or money order for \$30 made out to DAS to the Tuesday meeting November 19. I will be available at the meeting to collect any payments.

2) You can use your PayPal account to send payment to [DASmtcuba@gmail.com](mailto:DASmtcuba@gmail.com)

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

[https://www.paypal.com/cgi-bin/webscr?cmd=\\_s-xclick&hosted\\_button\\_id=NDGKG4CWCX8GU](https://www.paypal.com/cgi-bin/webscr?cmd=_s-xclick&hosted_button_id=NDGKG4CWCX8GU)

4) You can mail payment to:

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

If you know that you don't want to rejoin, let me know, and I will stop sending reminders, but we *really, really* want you to continue with DAS!

If finances are a barrier to rejoining, let me know confidentially, and we will try to find a solution.

If you have any questions you can contact me at [trebilcock@aol.com](mailto:trebilcock@aol.com).

Robert Trebilcock  
DAS Treasurer

## *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. You will have access to an array of telescopes for loan or for use in the Sawin Observatory at Mt. Cuba. The most recent purchases are a solar scope, and the Orion HDX110, which can be used for observing or for astrophotography, depending on your interests. 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 and we have added mini talks to the monthly meetings on basic astronomy concepts geared to beginner astronomers.

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. You can also borrow a club loaner scope or just come and enjoy the sharing of views through several scopes.

If you have a problem with your equipment, we meet informally every Tuesday night to share discoveries of new equipment, solve problems, chat and observe. 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 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.*



*Medieval astronomers favored clubs—you should too!*

# How to Join the DAS Groups.io Group

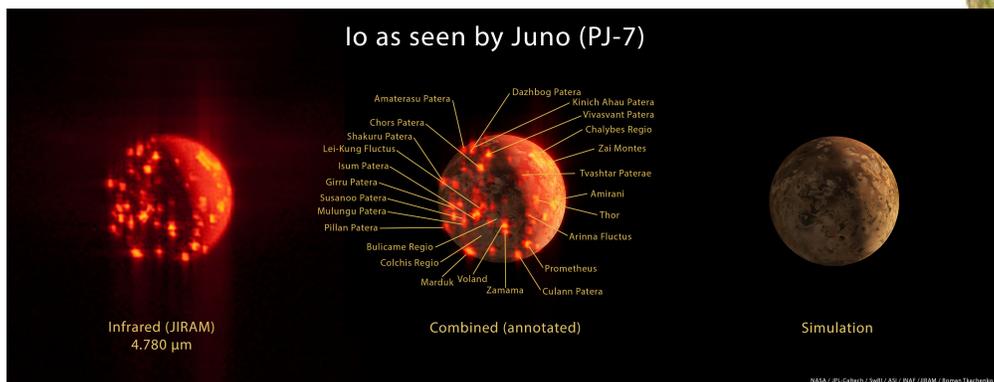
## DAS FORUM / E-MAIL SITE ON GROUPS.IO

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>



**Io, the highly volcanic innermost moon of Jupiter, after which the .io groups were named (I presume)  
—RGS**

# 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	\$30/20/1	
Astronomy Magazine	\$34	
	total:	



Name \_\_\_\_\_  
Email Address \_\_\_\_\_  
Street Address \_\_\_\_\_  
Phone Number \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_  
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, jef.law76 AT gmail.com

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

Tom Harding, hardintw AT aol DOT com

Dave Groski, groski AT udel DOT edu

## Standing Committee Chairs:

Observatory: Chris Horrocks

Education: *Vacant--are you interested?*

Library: Maria Lavallo 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, klynning 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, jef.law76 AT gmail.com

Webmaster: Rob Lancaster, rlancaste AT gmail DOT com

