



# THE FOCUS

NEWSLETTER OF THE DELAWARE ASTRONOMICAL SOCIETY

VOLUME 67 ISSUE 2

FEBRUARY 2025

## ON THE MERIDIAN

- New Moon—2/27
- Cigar Galaxy (M82) and Bode's Galaxy (M81) very visible now
- Owl Nebula (M97, NGC 3587) can be seen in binoculars
- Flame Nebula (NGC 2024). Use Deep Sky/UHC filter
- Try the Sky Tonight app. Available for IOS and [Android](#)

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## Half-way Through

What's with the red, white, and blue?

Nothing political, just President's Day.

By now we are halfway through Winter, and have been subjected to a colder and more snowy Winter that we have in the last several years. Phil the Groundhog has predicted six more weeks of this, but the upside is that Galaxy season will be here soon and will be a cool addition to the planetary sky show that's been happening over the last month. If you are a newer or less experienced member, the Tuesday night workshops will provide a window to these events in our observatory at Mt. Cuba. Be sure to take

advantage of our scopes and the built-in expertise of our experienced veterans.

As I put together the DAS newsletter, I've noticed a gratifying number of new members added to our Club every month. It seems that our outreach efforts are generating interest about who we are and what we do.

My journalistic curiosity is leading me to wonder what our newer members are looking for in their astro club and how the DAS can address their interests.

In order to tailor our events and programs to what you need, we are asking for your feedback regarding what else

we can do for you, and what we are doing well. Your response will help us as we move forward. You can send your comments to [fo-cus@delastro.org](mailto:fo-cus@delastro.org).

For our veteran members, please consider putting your hat in the ring for one of our At-Large Board positions. [See the article on Page 3.](#)

In the meantime,  
Clear Skies,  
Mark

### WELCOME, NEW MEMBERS

Dwayne Fisher  
Joe Hoddinott  
Amelia Whitman

## February Monthly Club Meeting 2/18

For thousands of years, this mysterious device (right) lay at the bottom of the ocean. Once found, it took several decades to fully realize its significance.

The *Antikythera Mechanism*



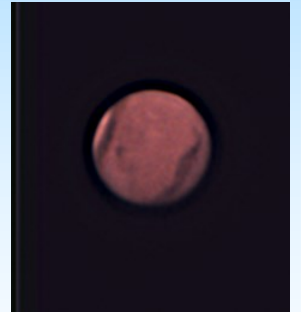
revealed that our ancestors had a deeper understanding

of the heavens and had far more sophisticated fabrication technologies than previously assumed. Come to our monthly meeting on 2/18 to find out more about this fascinating discovery.

# MESSAGE FROM THE PRESIDENT

Dear DAS Members,

This winter so far has been stormy and cold, particularly the week of our last meeting, it was in the single digits for several days that week. However, we have had good luck with astronomical observations, particularly where the planets are concerned. For the past several weeks, we have repeatedly observed Mars in the Sawin at our Astronomy Workshops in both the 12.5" and the 17.5" telescopes. We have seen various features including the polar cap, some clouds around the other pole, Syrtis Major, and Mare Sirenum which have all been clearly visible in our scopes to our eyes. In fact, on February 4th, I took some short videos through my ZWO 224 (which the club also has) through the 12.5" Sawin telescope and processed them to produce the image shown to the right. In this image, you can see the Polar cap, Mare Sirenum, Amazonis Planitia, Arcadia Chasma, and Olympus Mons (with some other Mountains). Valles Marineris is right at the edge, and is not clearly visible. (At least as far as I can tell.) We will keep trying to observe Mars as it recedes away from us, weather permitting.



I hope everyone had a chance to attend our January meeting, where we had a planetarium show by Scott Jackson and a circuit demonstration by Mike Cimorosi. Thanks very much to both presenters. It was a great meeting and the alternate format made the meeting quite unique. Unfortunately, neither presentation for this meeting would have worked well over Zoom, but if you would like to go back to watch some of our previous meetings, remember that you can access them on our club [YouTube Channel](#). This month, our Vice President and Programming Chair Jeff Lawrence will share "*Ancient Wisdom: The Antikythera Mechanism*." This should be an exciting presentation exploring the mysteries of this ancient, but intriguing, mechanism. As usual, a Zoom link will be sent before the meeting and the board meeting will be at 7 pm while the main meeting will start at 8 pm. You can attend both meetings if you like, since our board meetings are open meetings, or you can show up (or log in) a little before 8 pm to attend the main meeting.

Remember that we are still holding DAS Astronomy Workshops every Tuesday, working on projects, and doing observations. All of you are welcome to attend and if you have any questions about astronomy, need help with a telescope, need help with an astronomy project, want to observe with club telescopes, or just want to talk with your DAS friends, these meetings are a great place to do all of that. We also have monthly AP-SIG meetings and Book Club meetings, please watch for announcements on Groups.io. As we move forward into the new year we will have several outreach events. Please consider bringing a telescope out to help at one of the events, since it is a lot of fun! We are also planning on having more member star parties and deep sky sessions any time it is clear and people want to observe. Please stay tuned for details for more of these sessions or events via groups.io. I hope to see you at some of our events!

Thank you,  
Rob Lancaster  
DAS President

# Upcoming Board Election

Dear DAS Members,

As you know, our elections for positions on the DAS Board of Directors are held bi-annually, alternating between Officers and Board Members at-Large as stated in the DAS By-Laws. Since last year we had the elections for the officers, this year the elections will be held for our three Board Members at-Large. The Ballots will be emailed to all active (dues paid) DAS members on May 1st and must be completed and returned by May 31st. Those elected will assume their roles on July 1, 2025 and will serve on the DAS Board until the May 2027 elections.

At the April DAS monthly

Meeting on 2/18, I will announce the slate of candidates who have contacted me to let me know they have chosen to run for office, and will open up the floor for any nominations not yet submitted.

Between now and the April 2025 meeting, you can nominate yourself or fellow member who is in good standing. All members in good standing, whose dues are paid, are eligible for the role.

Please consider running for one of these positions. If you contact me before the deadline for the April Focus (April 1), I can include you in the Focus announcement of the election.

On the DAS Board, you would get to participate in our discussions, represent the interests of your fellow members, and vote on proposals. By doing so, you can contribute to the future success of our great club.

I have been serving on the DAS Board in various capacities for about a decade now and I can tell you that it is highly rewarding. You can really make a difference in amateur astronomy and help our club to become even better than it already is.

Thank you for considering volunteering.

Robert Lancaster  
2025 DAS Elections Chair

**Consider  
volunteering for an  
At-Large position  
on the DAS board**

“The black holes of nature are the most perfect macroscopic objects there are in the universe: the only elements in their construction are our concepts of space and time.” - *Subrahmanyan Chandrasekha*

This quote from Subrahmanyan Chandrasekhar (1910 - 1995) appears in his book “*The Mathematical Theory of Black Holes*”. Chandrasekhar was an Indian-American astrophysicist and awarded the Nobel Prize for Physics in 1983 for his mathematical theory on the structure and evolution of stars

# OUTREACH AT DELAWARE MUSEUM OF NATURE AND SCIENCE

BY ANDY ROKITA

On Saturday, February 1, 2025, the DAS hosted a star party at the Delaware Museum of Nature and Science.

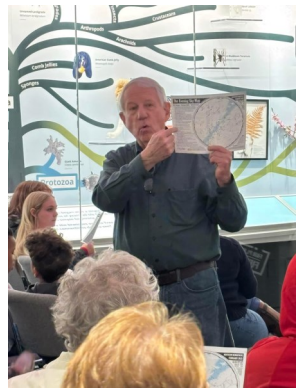


We were truly stunned by the amount of people who registered; 152 people were registered and it ended up being completely sold out.

As the Sun went down and we were setting up outside, Greg started with a talk about the night sky and how to use the sky charts that the museum was so generous to print out and distribute as the guests arrived, then Scott gave a quick planetarium presentation about the big objects in the sky that we were going to demonstrate, especially the planets and the crescent moon.

cent moon.

Outside, we set up several telescopes and one pair of binoculars; the binoculars were a HUGE hit when they were on the moon and Venus since they were very close together; many oohs and ahhs and kids were saying how cool they were; thank you Joe for setting



Greg Lee explains a sky map to attendees



Scott Jackson talking about what the attendees would see outside

them up; we also had the telescopes on Jupiter, Mars, and the Pleiades. Quite a few of the guests were asking about the DAS and what we do; we were happy to educate them and invite them to stop by a workshop should they have questions. We also ensured that we discussed Mount Cuba's public and family nights and encouraged the guests to register for an event to learn more. Very special thanks to Cathy Perrotto and the amazing staff at the museum for ensuring a fun and educational night for all; I think we were a little intimidated at first with the large volume of people but everything went swimmingly and all were able to enjoy a fun night under the stars!



## DAS Sharing the Sights



# AP-SIG Meeting Report for January 2025

by Bill Hanagan, AP-SIG Founder

Elephant Trunk detail by Mark Mitchell

At 1 PM on Saturday, January 25, the AP-SIG met on-line via Zoom. We began by acquiring the group photo below.

We continued with the Presentation of Astrophotos. I lead off with my recent image of the Coma Cluster of Galaxies. I followed up with several images of the Tulip Nebula which I used to explain Narrowband Imaging and Color Mapping. Several of those images appear elsewhere in this issue of the FOCUS. Dana Wright presented a narrowband SHO version of the Heart of the Heart nebula and an SHO version of NGC 6914. Rob Lancaster showed a video of Mars being occulted by the Moon. Ben Frederick showed several color mappings of the Rosette nebula image he is working on and a finished version of the Wizard nebulae. Lou Varvarezis showed us his version of Mars based on data acquired on December 7 by Agapios Elia at the Troodos observatory, along with a video of how the planetary image data was acquired. Bogdan Pazera showed us a version of Saturn edge-on, as well as an RGB version of the Crab Nebula (M1). Bogdan also brought up a technical problem he is having and asked for suggestions on how to improve the pointing accuracy of a Celestron AVX when used with a narrow field of view for planetary imaging. One approach is to first polar align and star-align the mount using a wide-field camera. The next meeting of the AP-SIG is tentatively scheduled for Saturday, February 22.





# Astrophotos by AP- SIG & DAS Members

## The Coma Cluster of Galaxies—by Bill Hanagan

This galaxy cluster includes more than 1,000 identified galaxies, several hundred of which are visible in this image when you zoom in and pan around. While most of these are elliptical and lenticular galaxies with few details, there are still quite a few spiral galaxies around the periphery of the Coma Cluster (my favorites are near the left edge). The two brightest galaxies at the center of the image are “Supergiant Elliptical” galaxies. The one up and to the left of center is Coma B (NGC 4889) and the one down and to right from

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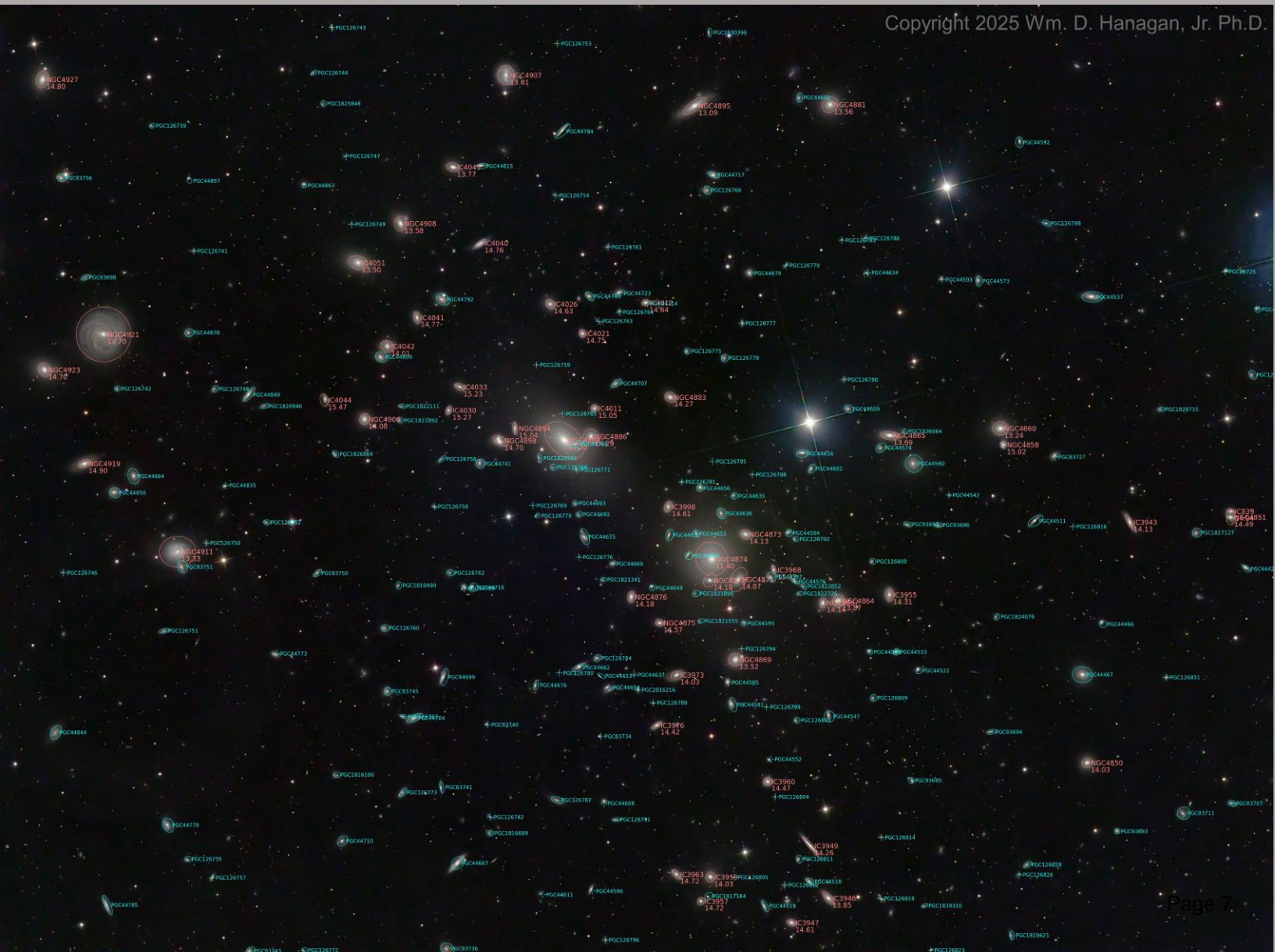




center is Coma A (NGC 4874). The supermassive black hole at the center of Coma B has 6 to 37 billion solar masses with an event horizon twice the diameter of Pluto's orbit.

Coma B is one of the largest galaxies known and about 317 million light years (LY) (99 megaparsecs) from Earth. It has an “effective diameter” of ~250,000 LY that extends 1/5 of the way to the center of Coma A in the image. The “effective diameter” is the diameter from within which half of the light of the galaxy emanates. Beyond this effective diameter, Coma B is comprised of a diffuse cloud of stars that extends almost to the center of Coma A in the image. Coma A is 9 million light years farther out, so the two galaxies are “close but not exactly colliding”. The entire cluster has a diameter of 20 million light years.

A partially annotated version of the image appears below. Only 300 of the galaxies in the field of view are labeled. The 55 largest galaxies in the image are labeled in red and come from the older NGC and IC catalogs, which naturally include the largest and brightest galaxies as seen from Earth. Another 245 smaller and fainter galaxies are labeled according to the newer Principal Galaxies Catalog (PGC) designation. I encourage you to zoom in on and pan around in both images for that “Space walk” feeling and to see the many unlabeled galaxies within.



## Data Acquisition for the Coma Cluster

- Data acquisition was done at the Spencer Observatory.
- Scope: 10" Takahashi CCA-250 in NATIVE mode, at 1250 mm and f/5 (unobstructed equivalent = f/6.11).
- Mount: Astro-Physics 1100GTO with CP4.
- Imaging Camera: Monochrome QSI-683wsg8, w OAG, @ -20C.
- Guide Cam: SX Ultrastar (monochrome).
- Computer: Self-built Windows 10 Small Form Factor (SFF) desktop optimized for observatory use.
- Windows Software: ASCOM, APCC Pro, Stellarium, Sequence Generator Pro (SGP), and PHD2.
- Sub-exposures: 5 minutes x 19 Red, 17 Green, 17 Blue, and 62 Luminance, all binned 1x1.
- Total light frame integration time: 9 hours 35 minutes.

## PixInsight Image Processing for the Coma Cluster

- A 2X DrizzleIntegration workflow was used to double the number of pixels in both dimensions of the image.
  - This gives a very slight increase in resolution.
  - More importantly, this prevents pixels from becoming visible after deconvolution with BlurXTerminator.
- ImageCalibration, CosmeticCorrection, SubframeSelector, StarAlignment, ImageIntegration, DrizzleIntegration, & Crop were used to produce Red, Green, Blue, and Luminance Masters in the usual way.
- ChannelCombination was used to produce the initial linear RGB image for further processing.
- Spectrophotometric color calibration (SPCC) was applied to the RGB Master to obtain an accurate color balance.
- BlurXTerminator was applied separately to the RGB and Lum Masters to sharpen the image through deconvolution.
- NoiseXTerminator was used to reduce random noise.
- HistogramTransformation was applied to the RGB image in a color-neutral fashion to prepare it for Luminance substitution.
- To create the LRGB Master, the Luminance Master was first stretched to match the RGB image's extracted luminance, and then substituted into the RGB image using LRGBCombination.
- CurvesTransformation was applied to the LRGB Master in a color-neutral fashion to accentuate the visibility of fainter galaxies. No boost to image saturation was applied.



# The Tulip Nebula (SH2-101) in RGB, HOO and SHO, Including a Bow Shock Associated with Cygnus X-1—by Bill Hanagan

The RGB, HOO, and SHO images appear in order below, with notes.



## Advantages and Disadvantages of Using RGB Filters for Imaging Emission Nebulas

Advantage 1: Accurate star colors can be achieved easily with proper color calibration.

Disadvantage 1: Stars often overpower the nebulosity in the image.

Disadvantage 2: Insisting on accurate color means that the red from H-alpha is guaranteed to dominate the nebula, burying nebula details that could have been revealed by OIII emission.

Disadvantage 3: RGB (broadband) filters pass lots of light pollution and moonlight even though the atomic emission produced by nebulas occurs primarily at 3 very narrow lines: H-alpha (656.3 nm), OIII (500.7 nm), and SII (674.2 nm).

## Broadband and Narrowband Filters for Emission Nebulas

“Broadband” RGB filters collect light over relatively wide wavelength ranges, each of which transmits a significant portion of the visible spectrum. For example, the color *interference* filters used to produce the RGB image above have “bandpasses” of 60 nm (R), 70 nm (G), and 100 nm (B), covering 3/4 of the visible spectrum. The unused portion of the 300 nm wide visual spectrum is left out intentionally to block the strongest light pollution emission lines of sodium and mercury. Other light pollution still gets through. These filters are ideal for broadband objects like galaxies, but are unnecessarily broad for imaging emission nebulas whose light is concentrated in 3 narrow atomic emission lines.

One shot color (OSC) cameras have “Broadband” RGB *dye* filters over the pixels of their sensors. The dyes used are chosen for terrestrial photography, not astro-photography, so they don't block any of the light pollution lines of sodium or mercury. Dyes make imperfect color filters whose bandpasses are generally twice those of interference filters, with a lot of overlap, unwanted peaks, and gradual cutoffs that even extend into the infrared.

Narrowband (NB) filters are interference filters made with bandpasses that are ~20X narrower than color interference filters (e.g. 3 nm) and ~40X narrower than dye filters. Their narrow bandpass gives narrowband filters a very large advantage in signal-to-noise ratio (S/N), but only when imaging emission nebulas. This S/N advantage can be used to achieve equivalent image quality in less total imaging time, or to acquire image data on bright moonlit nights that you would normally skip.

Narrowband imaging is usually done using a monochrome camera with a filter wheel and separate narrowband filters for the hydrogen, oxygen, and sulfur emission lines.

OSC cameras require at least 4X the exposure time to capture H-alpha and SII emission with the same S/N achieved by monochrome cameras because only 1 out of every 4 pixels in an OSC camera has a red dye filter that has decent transmittance at these emission lines. OIII fares better because 2 out of 4 pixels in OSC cameras have green filters that have decent transmittance at the blue-green OIII emission.





## **HOO Advantages and Disadvantages (See the image on the previous page.)**

Advantage 1: Narrowband is much less affected by light pollution and moonlight.

Advantage 2: Narrowband reduces the brightness of stars and reduces the extent to which they can dominate the image.

Advantage 3: HOO yields star colors that seem more accurate than any other narrowband mapping because the H-alpha line is red and is mapped to the red channel, while the OIII line is blue-green and is mapped to both the green and blue channels.

Disadvantage 1: Relative to other narrowband color mappings, HOO shows less color variation because it is bicolor rather than tricolor, so color varies along a linear gradient from blue to white to red. There is no yellow in this type of bicolor image.

Disadvantage 2: Relative to other narrowband color mappings, HOO leaves out SII emission entirely. This hinders the ability to reveal variations across the nebula.

## **SHO Advantages and Disadvantages (See the image on the next page.)**

Advantage 1: Narrowband is much less affected by light pollution and moonlight.

Advantage 2: Narrowband reduces the brightness of stars and reduces the extent to which they can dominate the image.

Advantage 3: SHO reveals more of the variations occurring across the nebula.

Disadvantage 1: The green channel, which contains the H-alpha data, must be significantly understretched to arrive at a good balance between red, gold, and blue across the nebula. This reduces the S/N, but can be addressed when necessary by substituting H-alpha for the luminance extracted from the base SHO image.

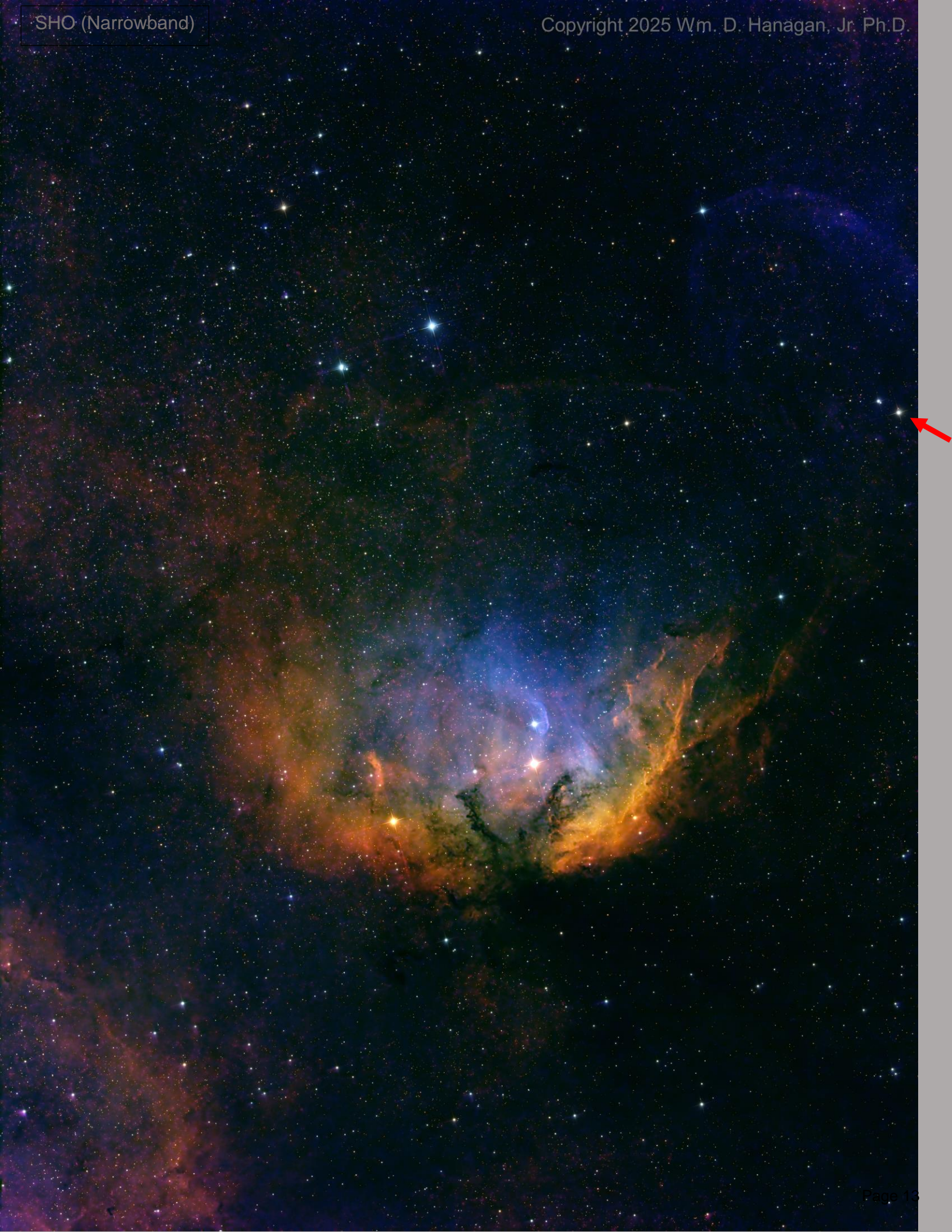
## **The Bow Shock and Companion Star of Cygnus X-1, the First Widely Accepted Black Hole**

In the upper right corner of the SHO image, just touching the bright blue star in that corner, there is a large, dark purple parabola said to be a bow shock produced by Cygnus X-1. It's barely visible in the HOO image and not visible in the RGB image. Cygnus X-1 and its companion star, HD226868, are at the end of the red arrowhead on the right side of the SHO image. The bow shock is reportedly the result of gas expanding into the interstellar medium under the driving force of a relativistic jet emanating from the accretion disk of Cygnus X-1, but the mechanism is apparently still in doubt according to this link.

<https://academic.oup.com/mnras/article/446/4/3579/2892401>

Cygnus X-1 has been estimated to have between 5 and 21 solar masses and is only 7,200 light years away in the Milky Way galaxy. Regardless of its exact mass, Cygnus X-1 is definitely on the small side compared to the super-massive black holes found at the centers of galaxies, which are sometimes estimated to have several billion solar masses.







## **Data Acquisition for the Tulip Nebula (SH2-101)**

- The data were acquired at Rick Spencer's observatory.
- Scope: 10" Takahashi CCA-250 in NATIVE mode at 1250 mm and f/5 (unobstructed equivalent f/6.11)
- Mount: Astro-Physics 1100GTO with CP4.
- Imaging Camera: QSI-683wsg8, w OAG, @ -20C.
- Guide Cam: SX Ultrastar (monochrome).
- Computer: Self-built Windows 10 Small Form Factor (SFF) desktop optimized for observatory use.
- Windows Software: ASCOM, APCC Pro, Stellarium, Sequence Generator Pro (SGP), and PHD2.
- Sub-exposures: 10 minutes x 56 Ha, 58 OIII, and 61 SII, plus 5 minutes x 12 Red, 15 Green, and 15 Blue, all binned 1x1.
- Total RGB: 3 hours 30 min.; Total Narrowband: 29 hours 10 min.

## **PixInsight Image Processing for the Tulip Nebula**

- A 2X DrizzleIntegration workflow was used to double the number of pixels in each dimension.
- ImageCalibration, CosmeticCorrection, SubframeSelector, StarAlignment, ImageIntegration, DrizzleIntegration, & Crop were used to produce Red, Green, Blue, H-alpha, OIII, and SII Masters.
- ChannelCombination was used to produce the RGB, HOO, SHO, and HSO Masters.
- The image solver script was used to plate solve the RGB Master.
- SpectroPhotometricColorCalibration (SPCC) was used to color calibrate the RGB and HOO Masters so that those particular images could have accurate color balance.
- BlurXTerminator and NoiseXTerminator were used for deconvolution and noise reduction on all images.
- StarXTerminator was used to split a copy of the RGB image into no-stars and stars-only images.
- HistogramTransformation was used in a color-neutral fashion to stretch the RGB and HOO images. It was also used to balance the color of the SHO image.



# NGC-2175

By Ron Worden

From the Snobie Observatory at the Lincoln Control Center in Bear, DE.  
NGC-2175 (the Monkey Head Nebula) is an open cluster within an emission nebula (sometimes called NGC-2174) in the constellation Orion.

## Technical Information:

Target : NGC2175

Constellation: Orion

Right Ascension: 08h 09m 39

Declination: +20° 29' 15"

Distance: ~6350ly

Apparent magnitude: 6.8

Date: 01/29/2025

Location: Snobie Observatory/  
Lincoln Control Center.

Bear, Delaware W75° 40'

43.04" N39° 34' 39.7"

Telescope: Sharpstar SCA260

260mm f/5 "Super" Ashperical

Cassegrain Astrograph FL

1300mm

Mount: Losmandy G11 Guided

with Dithering

Cameras: ZWO ASI071MCPPro)

Temperature: 44°F Ambient  
cooled to 0°F

Filters: OneShotColor

Exposure: 25LF-300sec .sub  
frames (2.08hrs)

Software: PixInsight/  
PaintShopPro6

Frame: 54.4 x 71.2 arcmin

Calibration: Master Dark from  
10 dark frames



Copyright Ron Worden



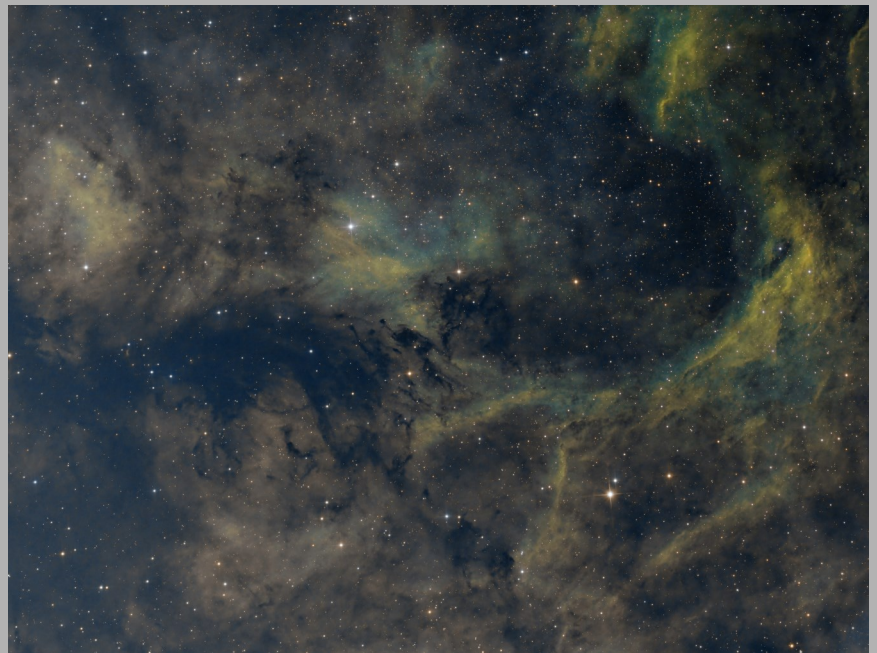
# IC 1805 and NGC 6914

By Dana Wright



← IC1805 is an emission nebula in the constellation Cassiopeia. It is about 7500 light years away. Processed in Pixinsight.

NGC 6914 is reflection nebula in the constellation Cygnus. It is about 6000 light years away. Processed in Pixinsight





# SeeStar Gallery



IC443 - the Jelly Fish emission nebula (Orion). This may be a supernova remnant from 30,000-50,000 years ago and is 5,000 ly away.

Jeff Miller

NGC 2174/ NGC 2175 - an open cluster in the Monkey Head emission nebula (Gemini). It's about 6,400 ly away



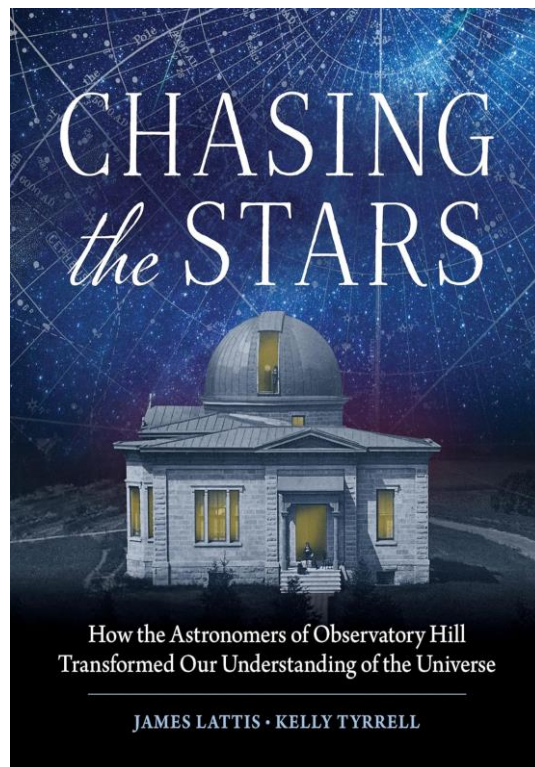
Jeff Miller



# 2025 Book Club Calendar

We are pleased to share the [Delaware Astronomical Society\(DAS\) Book Club](#) Calendar for 2025. All Astronomical League members and their guests are invited to attend DAS Book Club meetings. We meet via Zoom. Questions? Please email [librarian@delastro.org](mailto:librarian@delastro.org)

**Thursday, February 27, 2025**



*Chasing the Stars: How the Astronomers of Observatory Hill Transformed Our Understanding of the Universe*  
by James Lattis and Kelly Tyrrell





James Lattis PhD, Director of [UW Space Place](#), and [Kelly Tyrrell](#) will be joining us from Wisconsin to give a presentation about the storied history of the Washburn Observatory and their book.

Our guests will include science journalist and historian of science, [Trudy Bell](#). Trudy is writing a book about 19th-century U.S. astronomical observatories and instruments; [John W. Briggs](#), astronomer, science historian, instrumentation engineer, and founder of the FOAH Observatory and the [Astronomical Lyceum](#), and Phil Shoemaker PhD and authority on Ormsby M. Mitchel and the Cincinnati Observatory.

Members of the [Madison Astronomical Society](#) will join us in this, the 90th year since the Society was founded in 1935.

Members of the [Antique Telescope Society](#) are invited to join us for our discussion.



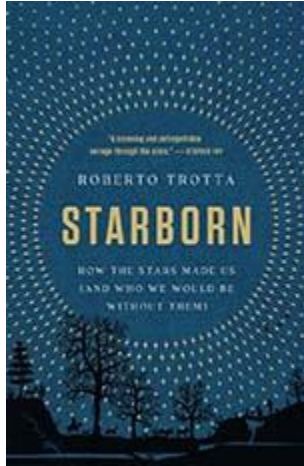
And music to accompany your reading and for Valentine's Day

*"[It's Dark on Observatory Hill](#) written for the Irving Berlin Publishing Company in 1934 by lyricist and former student, Johnny Burke, and composer, Harold Spina."*

## Sunday, March 30, 2025

3 PM ET

Via ZOOM



### ***Starborn: How the Stars Made Us (and Who We Would Be Without Them)***

by Roberto Trotta

Dr. Robert Trotta will join us from Italy for our meeting.

Greg McNiff, DAS and AAS member, will lead our discussion.

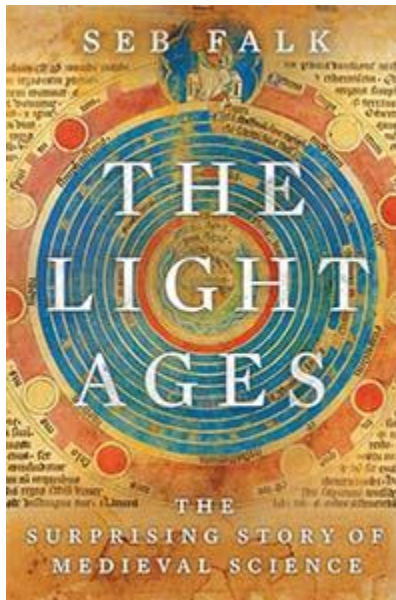
Members of the Amateur Astronomers of New York will be joining us for our discussion.

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## Thursday, April 24, 2025

5 PM ET

Via ZOOM



### ***The Light Ages: The Surprising Story of Medieval Science***

by Seb Falk

Winner of the American Astronomical Society's Donald E. Osterbrock Book Award for 2025

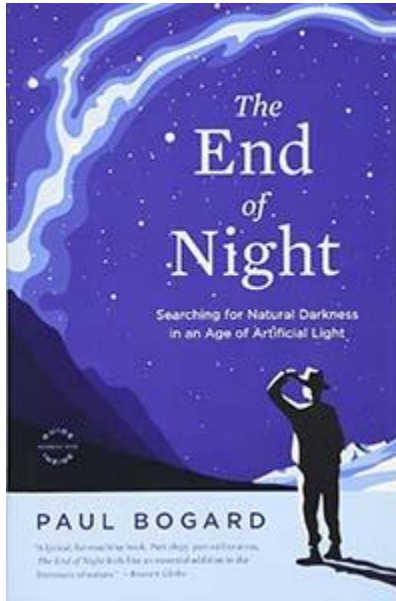
Seb Falk will join us via Zoom from England for the meeting.

Greg McNiff, DAS and AAS-NY board member, will lead the meeting.



# Thursday, May 29, 2025

7PM Et  
Via Zoom



***The End of Night: Searching for Natural Darkness in an Age of Artificial Light***  
by Paul Bogard

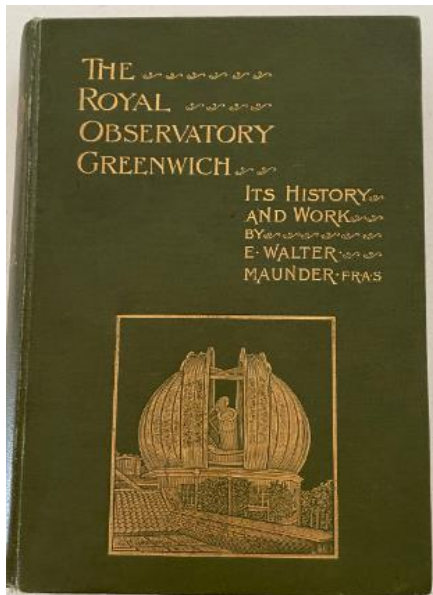
Paul Bogard will join us for our meeting.

Professor Diane Turnshek, DAS Book Club Member and Special Lecturer from Carnegie Mellon University, will lead our discussion

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# Thursday, June 26, 2025

Time TBA



Via Zoom

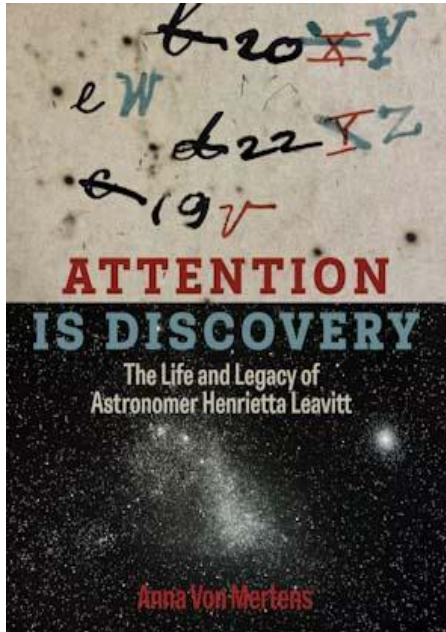
***The Royal Observatory, Greenwich: A Glance At Its History And Work***  
by E. Walter Maunder

Celebration of the 350th anniversary of the founding of Greenwich Observatory with the members of the Flamsteed Astronomy Society in Greenwich is being planned.

# Thursday, July 31, 2025

7 PM ET

Via ZOOM



## ***Attention Is Discovery: The Life and Legacy of Astronomer Henrietta Leavitt***

by Anna Von Mertens

A portrait of trailblazing astronomer Henrietta Leavitt and an illustrated exploration of the power of attention in scientific observation, artistic creation, and the making of meaning.

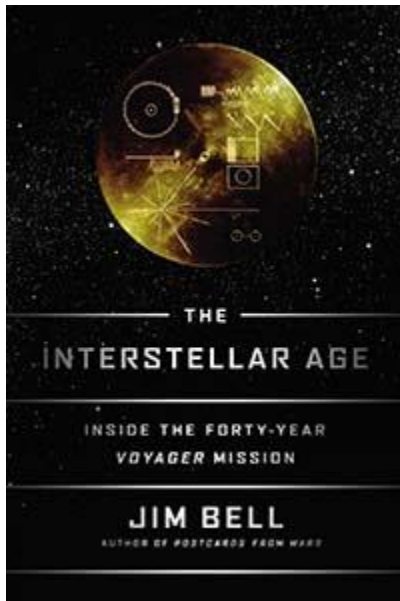
Anna Van Mertens will be joining us for our discussion.

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# Thursday, August 28, 2025

7 PM ET

Via ZOOM



## ***The Interstellar Age: Inside the Forty-Year Voyager Mission***

by Jim Bell

Jim Bell will join us for our meeting.

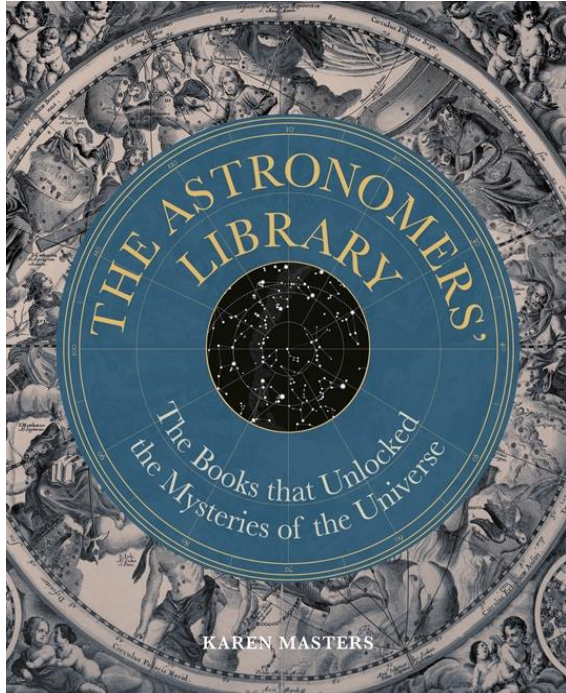
DAS Member, Dave Hunter, will lead the discussion.



# Thursday, September 25, 2025

7PM

Via Zoom



## ***The Astronomers' Library***

by Karen Masters PhD of Haverford College

Professor Masters will join us for our meeting.

Sarah Horowitz, Rare Book Curator at Haverford College, will join us to discuss the college's collection of rare astronomy books

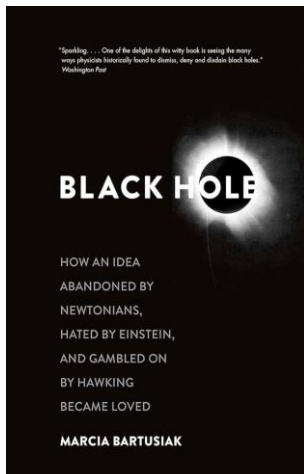
Astronomy students from Haverford, Bryn Mawr, and Swarthmore Colleges will be invited to join us.

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# Thursday, October 30, 2025

7 PM ET

Via Zoom



## ***Black Hole: How an Idea Abandoned by Newtonians, Hated by Einstein, and Gambled On by Hawking Became Loved***

By Marcia Bartusiak

Marcia Bartusiak will join us for our meeting.

David Ives Brown, Rittenhouse Astronomical Society member, will lead our meeting.

## Thursday, November 20, 2025



### ***Keep Watching the Skies! The Story of Operation Moonwatch & The Dawn Of The Space Age***

by W. Patrick McCray PhD

UCSB History of Technology and Science Professor W. Patrick McCray will join us for our discussion.

David Ives Brown, DAS Book Club and Rittenhouse Society member, will discuss his Moonwatch telescope-made by the US Navy for the Smithsonian's program.

The Moonwatch Program was the catalyst for the founding of the Delaware Astronomical Society.

The meeting will be led by Dave Groski, DAS At Large Board Member and Chairman of the Board of the MT Cuba Observatory.

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## Thursday, December 18, 2025

7 PM ET

Via ZOOM



### ***Rayed Arcs and the 'Rory Bory Aylis': Primary World Aurorae and Tolkien's 'Father Christmas Letters***

By Kristine Larsen

Dr. Kristine Larsen, an astronomer who teaches at Central Connecticut State University, serves as the editor of the Astronomical League's *Reflector*. She regularly presents and writes about the works of J.R.R. Tolkien.



# BOARD MEETING 2/18

- Review of Minutes from Last Meeting – Bill McKibben
- Treasurer’s Report – Bob Trebilcock
- 2025 DAS Election - Rob Lancaster
- Planning for 70th Anniversary - Rob Lancaster
- Updates on other projects

## DAS CONTACTS

### OFFICERS:

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**Treasurer:** Bob Trebilcock, [trebilcock AT aol DOT com](mailto:trebilcock@aol.com)

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### **STANDING COMMITTEE CHAIRS:**

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### **OTHER POSITIONS:**

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