THE FOCUS

NEWSLETTER OF THE DELAWARE ASTRONOMICAL SOCIETY

VOLUME 65 ISSUE 9 SEPTEMBER, 2023

ON THE MERIDIAN

- **New Moon 9/14**
- **Autumnal Equinox 9/23 2:50 am**
- **Saturn 2.7* N of Moon 9/26**
- **Jupiter 3.4* S of Moon 10/1**
- **New Moon 10/14**

INSIDE THIS ISSUE:

President's Message	2
Errata	3
Guest Columnist	4
AP SIG Reports	6
Max Q Simulation	18
Book Club News	20
AP Gallery	24
Board Meeting Agenda	36

This Month's Issue

As I write this, the late Summer flush of heat and humidity seems to have passed and the sky earlier this evening looked as promising as it has in a long time. Even better, the next few nights look good for observing—low humidity, minimal smoke, tame jet stream, and the pent-up urge for a good photon fi amx. Hope everybody can take advantage of the good conditions.

This month's issue of the FOCUS is somewhat larger than normal, and that's a good thing. There a many excellent astro photos, submitted by DAS AP veterans, and also by newer members who are learning new skills, being coached by members of our AP club.

Along with great Aps, we have a guest columnist, Jan Rush from DVAA. Jan was kind enough to share her article on Cherry Springs State Park. I'm sure there are a number of our members, including myself, who want to know what CSSP is all about. Jan has done an excellent job in providing answers to our questions. Thanks Jan.

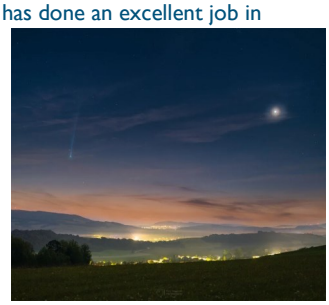


Photo of Comet Nishimura. The comet, which glowed green, was spotted over Bucks County early Tuesday morning, 9/12/23.

Do you know the term "MaxQ"? I didn't, but thanks to Mike Cimirosi's explanation, I understand what the engineers are referring to when I watch a rocket launch.

The DAS Book Club has a few activities scheduled, and we have included a review from June. Please make sure you visit the Book Club section on the DAS web site for more information.

Last, but not least, come on out for the Tuesday workshops. If you want to view the heavens with our selection of scopes, we are more than glad to share. There are a number of DAS veteran visual and APers happy to offer assistance or just have a sociable evening. We will have more outdoor activities as the weather becomes more amenable for viewing, and there will be excellent opportunities to improve your observing or AP skills. *-MJ*

September Monthly Meeting Topic(s)

The start of our 2023-2024 Season is approaching! Our first meeting will be on Tuesday, September 19th.

The topic for this meeting will be our usual **"What I Did This Summer"** series of member mini-talks. A number of members will share Summer activities with the Club at the next monthly meeting on 9/19.

Astronomy-related activities are always great, but we will hear about things that are not necessarily astronomy subjects.

As this meeting will be hybrid, we can accommodate members either in-person at Mt Cuba or remotely via Zoom.

MESSAGE FROM THE PRESIDENT

Dear DAS Members,

I hope you have had a pleasant summer. We have not had the clearest nights for observing this summer, but that has not stopped us from doing astronomical activities or from enjoying the reasonably pleasant weather. We have had several very successful well-attended astronomy workshops this summer and people have been working on all kinds of projects, including refitting home observatories, programming raspberry pis, working on setting circle projects for dobs, making telescope mirrors, learning how to do astrophotography, getting started in observing, and working on club equipment. We have started doing some great outreach events including at state parks, a retirement center, schools, and the Woodside Creamery. A few have been canceled due to the weather but, nonetheless, it has been great to get back into outreach. Friday Night Lights was forecast to be bad weather but, miraculously, it was actually pretty clear and the music and camaraderie were stellar! Our DAS Picnic this August was very well attended, and we had excellent weather and tasty food for that along with some great views of prominences in the solar telescope. Also just recently, I did the legwork to get our club Google Workspace for Nonprofits. This leap in technology will give the club lots of new technological capabilities, new storage space, new email addresses, and will even save us money. We will gradually be transitioning to its use. This fall, we are hoping to build on this momentum and engage in some exciting activities including an Intro to Astronomy Course, more outreach events, and training for the Sawin Observatory.

This month, our speaker will be several of our club members sharing about all the exciting things they did this summer. I am planning to share my experiences with my trip this summer to the heart of the Ancient Mayan civilization and the pyramids they built. I have also heard from a bunch of club members who are sharing about their exciting activities or travels. Please share the exciting things you worked on this summer and contact Jeff if you would like to be a presenter. As usual, a Zoom link will be sent before the meeting on September 20 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. If you missed any of our previous talks, or just want to watch again, you can see a recording of any of our meetings from the past year except the holiday party on the club's YouTube account.

Remember that we are still holding DAS Astronomy Workshops every Tuesday 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 that. We also have monthly AP-SIG meetings and Book Club meetings, please watch for announcements on Groups.io. We are planning the DAS Intro to Astronomy Course for Fall 2023, please stay tuned for emails about that from Jim Kerschen. We have several outreach events coming up as well. 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 this fall. 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

Woodside Creamery Outreach







September 22
6:30pm - 8:30

October 20
6:00pm - 8:30

Welcome New Members!

Karie Oneill
Tom Oneill
Colin Oneill
Deepak Bhimalli & Family
Suprima Patil & Family
Melissa Mroz
Jessie Wichouski
Song Zhou
Venu Bhushan Pandit

Member Mini-Talks

Dave Groski “My Visit to Stellafane 2023”
Rob Lancaster “My Trip to Belize”
Ron Warden “What I Did Summer of 2023”
Jarrod Bieber “My Visit to Cherry Springs”
Greg Lee – “The October 14th Eclipse”
Tiger Cosmos – “NEAF & Bell Labs”
Bill McKibben - "Flying into Oshkosh
Shannon Skinner - 'DAS Apparel'

SEPTEMBER GUEST COLUMNIST

So You Want to Stargaze at Cherry Springs?

Jan Rush, President, DVAA



Cherry Springs State Park has assumed an almost mystical quality to many skywatchers living in the Northeast. If you are a new observer, or a newcomer to our area, you might be wondering whether it's worth the 4.5 hour trip along winding country roads. The short answer is, definitely yes! But there are some tricks and nuances, which I'll try to demystify here.

Cherry Springs State Park is one of the darkest spots in our region, rated at Bortle 2 on the familiar dark-sky scale. In a typical Bortle 2 sky, the summer Milky Way is highly structured to the unaided eye, clouds in the sky are visible only as dark holes in a starry background, and several Messier globular clusters appear as naked-eye objects. If you struggle to discern constellations in your backyard due to light pollution, at Cherry Springs you will have the opposite problem: with so many stars it can be difficult at first to identify familiar ones. However, if you are trying to learn your way around the sky it's so much easier at a dark site because even the dim stars of most constellations are visible. In suburban skies, all you will ever see of the Little Dipper is the North Star (Polaris) plus the two stars of the bowl which are farthest from Polaris. At Cherry Springs, all seven stars of the Little Dipper are visible and it looks, indeed, like a dipper. Even more exciting, many Messier objects will be visible in binoculars or to the naked eye, which also makes them much easier to find with a small telescope.

For the first two years after I bought a telescope, it was a struggle from my backyard to locate much except the planets and the moon. That all changed with my first trip to Cherry Springs, which magically opened up the sky to my small telescope. When you can see the Andromeda Galaxy with your naked eyes, you can be sure that you will be able to observe it with your telescope!

The first few times I visited Cherry Springs State Park, I registered for one of the two annual formal star parties, called the "Cherry Springs Star Party," hosted by the Astronomical Society of Harrisburg, and the "Black Forest Star Party," hosted by the Central Pennsylvania Observers. These two annual events require advance registration many months in advance, and there are no refunds in case of bad weather. It's fun to be in the company of so many observers from all over the region, and there is a vendor tent selling lots of astronomy gadgets. For the newbie, this vendor tent is also a source of expertise regarding which gadgets might actually make your observing sessions easier and more productive. Sometimes there is a swap meet where you can pick up used gear. There are also interesting talks, although they are delivered in an uncomfortable pavilion with less than optimal viewing conditions and poor acoustics. Your fellow campers will likely be rich sources of astronomy expertise. Although the formal star parties start on either Thursday or Friday and run through the weekend, people usually begin to arrive on the campground the prior Sunday, and many of the best camping spots (with good horizons and close to electricity) will be gone by Wednesday even before the star party begins. Registrations for this year's Cherry Springs Star Party (June 15-18) were completely sold out by March 22 — probably a new record! It's fun to be in the midst of this madness at least once. If you decide to brave it, arrive early (no later than Wednesday, if the weather is good), and bring a very long extension cord in case you are far from an electrical source. Be sure to introduce yourself to fellow campers, as you may be able to help each other. (Be especially friendly with anyone with a big scope, and hopefully they will share the views).

Even though it's fun to attend one of these popular organized star parties, the best viewing at Cherry Springs tends to be at *other* times when the field isn't so crowded. Any clear night without a moon is a great choice for a visit to the park. From May until September, during new moon and for a few days before and after, there will be plenty of people camping on the Astronomy Field to keep you company, with good availability of camping sites. There are no presentations or food vendors, but since everything is informal you can check the weather beforehand and wait until the last minute to head out the door. Once there, you will owe $15 per night if you camp on the Astronomy Field, but it's worth the price! You can also apply for a "Galaxy Pass" which covers you on the observing field for all season, although 2023 passes are already sold out (don't worry, there will still be plenty of room on the Astronomy Field even without a pass).

Since there will be no equipment vendors to bail you out, it helps to have redundant equipment with you such as more than one power source, viewfinder, and dew management system.

If you decide to camp at Cherry Springs State Park, you will have two main choices of location: the Astronomy Field, which does not permit white lights or driving after dark, or the general camping ground across the road which allows white light. Most am-

So You Want to Stargaze at Cherry Springs? (continued)

ateur astronomers choose to camp on the Astronomy Field. There are electrical pedestals located throughout the field, and rest rooms with flush toilets which are lit with red light. A barrier blocks access to the field at twilight, which also shields the field from passing car headlights. Once you are set up on the Astronomy Field and darkness descends, you cannot drive your vehicle off the field until dawn. You also cannot do any activity which generates even a brief flash of white light, such as locking your car or entering your trunk (be forewarned!)



Photo credit: Nate Prentice

Most people camp overnight in tents or RVs in order to stay all night and take advantage all periods when the sky is clear, but there are other possibilities. If you don't care to camp, you can park your car in a lot across the street from the Astronomy Field and walk to your car when you have finished observing. Then you are free to drive to a motel or other lodgings. Sometimes I have set up a tiny tent on the field, and when I'm ready to leave the park I stash my telescope and other gear in the tent, then walk to my car in the parking lot and drive away. If you are nervous about leaving your gear, you can pack up the most expensive stuff and carry or wheel it to your car and leave the rest at your campsite.

The closest lodging is the Frosty Hollow Bed and Breakfast, which is 7.5 miles from the park. The rooms are reasonably priced and the breakfast is great. They understand astronomers so don't mind people coming in at odd hours. If there aren't any rooms at the Frosty Hollow, the next best choice is a hotel/motel in Coudersport (13 miles) or Galeton (12 miles). This might not seem like very far, but dodging wildlife on a pitch black winding country road at 3am is not for the faint of heart. That said, I've done it many times, and lived to tell the tale. The only lodging where I have personal experience is the Millstream Inn in Coudersport, which advertises itself as a "71-room modern hotel" (not too far from the truth). The Inn usually has rooms available even at short notice. The Potter-Tioga County website lists other lodging options, and there are several offerings on VRBO, but check the driving distances carefully before you book. Doing your observing in the backyard of a rented cabin might work, but you wouldn't have the advantage of friendly astronomers to share the views, and you won't know what the local lighting situation will be —there could be a neighbor with a bright light.

Three aspects of observing at Cherry Springs State Park deserve special note. First, observers on the Astronomy Field are *very* serious about completely avoiding white light, since a very brief exposure can ruin your dark adaptation for 30 minutes or so. Even a brief flash of your headlights as you lock your vehicle is forbidden! Today's vehicles tend to have computer controlled lights that you can't turn off, so before you go to Cherry Springs develop a plan for light management. That might involve yards of red sticky tape and headlight shading. My plan included removing all bulbs in the doors, trunk, and dome, and replacing them with red lights.

Secondly, Cherry Springs is prone to have heavy dew, so it's advisable to consider bringing dew management equipment even if you have never needed it before. In addition to your telescope, eyepieces and finderscopes can get dewy, so have replacements or a hair dryer available so you aren't forced to abort your observing session prematurely.

And third, the weather at the park is very difficult to predict. People often claim that the park has it's own "microclimate." If possible, plan to stay for more than one night, to increase the odds you will get some good observing time. And plan for the temperature to be much colder than you expect.

So grab your scope or binoculars, and visit the darkest spot in our region. Then drop me a line at president@dvaa.org to let me know how it went!



AP-SIG Meeting Reports for June, July, and August 2023

by Bill Hanagan, AP-SIG Founder

Elephant Trunk detail by Mark Mitchell

June 23, 2023 AP-SIG Meeting Report

On Friday, June 23, the AP-SIG met on-site at Mark Mitchell's home and on Zoom (with a break for dinner). We began with the Special Topic Presentation titled Bringing out the Dimmest Details, by Nico Carver.

At the start of his talk, Nico showed several of the best astro-photos he produced in the years since he joined the AP-SIG and began doing astrophotography. In that time, Nico has produced several impressive deep-sky images using the following equipment.

1) A variety of telescopes and camera lenses, including a Stellarvue SVQ-86 f/5.4 Petzval astrograph, a Brandon 92 mm f/7 augmented with a corrector, and Canon EOS L series lenses;
2) a cooled monochrome CMOS deep-sky camera (an ASI-1600MM) and filter wheel equipped with Ha and OIII narrowband filters, or a Canon EOS DSLR;
3) a piggy-back mounted Orion 50 mm guidescope,
4) a QHY5L-II CMOS guide camera,
5) an Orion Atlas EQ-G or a Skywatcher EQ-6R Pro telescope mount; and
6) a Lenovo Windows laptop adjacent to his telescope running either Sequence Generator Pro (SGP), or Backyard EOS.

Whether they were produced using telescopes or telephoto lenses, Nico's best photos have almost always been produced by guiding his sub-exposures using PHD2 running under Windows.

During the second part of his talk, Nico demonstrated Siril, a relatively new program for processing deep-sky images. The data set that Nico chose for the demonstration was acquired using the following gear.

1) A “full frame” *EOS Ra ($2,500) mirrorless camera;
2) a Canon RF 85mm f/1.2L USM Lens ($2900); and
3) an *AstroTrac TT320X-AG ($1150), a sturdy tracker intended for use with camera lenses and small telescopes.

*The EOS Ra and the AstroTrac TT320X-AG are no longer made.

The extremely short 85 mm focal length of the lens and the “full-frame” size of the sensor gives this combination an enormous field of view of 23.9 degrees x 16.1 degrees. Placed edge to edge, the image of the full moon at perigee would fit into this field of view 1,175 times! None of the Messier objects and very few other deep-sky objects even come close to filling this field of view. M31, the largest of the Messiers, fits nicely in a much smaller 4 x 1 degree field of view. Enormous fields of view like this are useful primarily for capturing large swaths of the sky, such as the Milky Way, as opposed to individual deep-sky objects.

The short focal length of the 85 mm lens also means that the EOS Ra’s 5.36 micron pixels cover a 13.0x13.0 arc-second area of the sky, an area 169 times larger than the 1x1 arc-second area normally used to capture seeing-limited detail when imaging typical deep-sky objects. The mass-sacrifice of fine detail caused by the enormous pixel scale of this camera and lens combination is a likely explanation for why Nico chose not to guide this particular set of exposures.

Extremely wide fields of view often show strong light pollution gradients and, as expected, the large swath of sky covered by this camera and lens combination led to the capture of a very strong light pollution gradient. During his demonstration, Nico showed us how to use Siril to remove that light pollution gradient, revealing a dusty expanse of the nighttime sky which, while not particularly colorful, had a surreal beauty all its own.

After Nico's talk, the on-site participants were treated to a dinner of subs and sodas by our hosts Mark and Karen Mitchell. Thanks, Mark and Karen!

Following dinner, we resumed the meeting with the Presentation of Astrophotos.

Hari Doraisamy started off with a super-wide view of Markarian's Chain acquired with a DSLR and short-focus camera lens. I showed Lou Varvarezis's image of the Elephant's Trunk Nebula on Lou's behalf, since Lou was unable to attend. Jarrod Bieber showed us two images that he produced based on data acquired remotely using a telescope on the Canary Islands that is sometimes available to users of the Southeastern Association for Research in Astronomy (SARA). I believe one of the images was of M13. Bill McKibben showed images of the Bubble and Pelican nebulas as well as M13, all of which he produced using the DAS 12" f/4 scope. I brought up the rear this time with my own images of Supernova SN2023ixf and M101, several of which appeared in the June edition of the FOCUS. I also showed several narrowband versions of the Lion Nebula (SH2-132) based on multiple color mappings. One or more of these images of the Lion Nebula appear in the AP-SIG Astrophotos section of this edition of the FOCUS.

We finished up with our usual Q&A on Equipment and Techniques, during which Mark Mitchell showed some image artifacts from two ZWO planetary cameras. The artifacts appear as changes in the level for groups of rows and sometimes also columns. The affected rows and columns vary from image to image. Mark asked what might be causing those artifacts. The most likely explanation is that the bias level applied to the sensor actually changes during readout, making some rows and columns darker than normal. Similar artifacts have previously been reported to occur when the entire image cannot be read out in a single, uninterrupted data transfer. Some newer ZWO cameras include "DDR3-DRAM" memory buffers as a fix for this.

Before departing, we paused to capture the group photo of on-site attendees below. Seen from left to right are Ron Worden, Nico Carver, Jeff Lawrence, Jarrod Bieber, Dana Wright, Bill McKibben, Hari Doraisamy, Jeff Miller, our host Mark Mitchell, and Rick Spencer. Yours truly is behind the camera, though Rick managed to snap the shot of me at the right (with my image of the Lion Nebula on the TV behind me.





We ran into a number of technical problems with this first simultaneous Zoom session including dropped connections and audio feedback from having more than one on-site laptop with a live microphone. However, the main presentation by Nico and several of the astro-photo presentations made it through to the Zoom participants.

We had 5 additional participants on Zoom, but I was unable to get a group photo of them. They included Bob Trebilcock, Mary Webb, Matt Barbato, Ricardo Gomez, and Tiger Cosmos (based on the email responses to my meeting announcement). Lou Varvarezis contributed his latest photo of the Elephant's Trunk nebula for our enjoyment, but he was unable to attend in person or via Zoom.

July 29, 2023 AP-SIG Meeting Report

We started the meeting at 7 PM on the grounds of the Mount Cuba Astronomical Observatory (MCAO) with a tour of the DAS Resources for Astro-Imaging in the Sawin Observatory and the south POD. Rob Lancaster and Jeff Lawrence gave the tour, showing us the 12” f/4 Newtonian in the Sawin and giving us a run-down on the support equipment mounted on it. Rob also discussed the Stellarvue refractor and EQ6-R telescope mount in the south POD. We paused briefly for the group photo of the on-site participants, below. Appearing from left to right are Bob Trebilcock, Jeff Miller, Bill Hanagan, Tiger Cosmos, Ron Worden, Jeff Lawrence, Rob Lancaster, and Jarrod Bieber.



The on-site meeting continued indoors with “Pizza by Elizabeth’s” and chocolate cake pops provided by our host, Rob Lancaster. Thanks Rob!

At 8:30 PM, we moved to the classroom and began the Zoom part of the meeting. I grabbed the group shot of the Zoom participants (below) before proceeding.



We continued with the usual Presentation of Astrophotos, which I kicked off by showing my latest LRGB version of the second largest Messier galaxy, M33. I followed that up with an HOO narrowband version of M33, which highlights the many large and bright “extra-galactic” emission nebulae in M33. I also showed an HOO narrowband version of Thor’s Helmet. My images can be found in the AP-SIG Astrophotos section of this issue of the FOCUS.

Jarrod Bieber continued, showing us some panels from a mosaic of M31 that he was assembling from image data acquired recently at Cherry Springs State Park in PA. Jeff Miller followed up, showing us some Aurora photos taken in Iceland by his son. Rob Lancaster showed images of the Bubble nebula, the Dumbbell Nebula (M27), and SH2-112.

Following the Presentation of Astrophotos, we continued with the Q&A session on Equipment and Techniques, during which Rob Lancaster provided more details on the DAS Resources for Astro-Imaging that he spoke about during his tour at the beginning of the meeting.

Jarrod Bieber also asked about inconsistent guiding results. In guiding, it's important to recognize that the graph displayed by PHD2 and other guiding programs shows residual tracking errors that are dependent on mount performance and atmospheric seeing, which can vary from session to session. Mount performance can vary due to differences in gear mesh, the quality of the polar alignment, the balance or imbalance of the RA and DEC axes, focuser droop, wind, cable drag, tripod stability, and more. The guiding program's parameters are not likely to be the main problem IF you run the program's optimization routine and make changes cautiously.

Jarrod also asked about a bright, fan-shaped artifact which appears to be an internal reflection from a magnitude 4.5 star just out of the field.

August 26, 2023 AP-SIG Meeting Report

We met on-site at Bob and Beth Trebilcock's at 6:00 PM and began the meeting with a tour of Bob's "Roll-Off Structure" observatory, which can be seen below in the closed position.



While the structure is heavy enough not to be picked up by the wind under normal circumstances, it only requires a modest push with one hand to move it into the open or closed position.



In the photo above, note the waterproofing material attached to the walls and the inside ceiling. This provides insulation as well as an extra layer of protection against water intrusion. The cupola on top has a fan, but Bob notes that convective ventilation alone keeps the interior cool. Opening and closing this style of observatory is not as easily automated as a roll-off-roof observatory because of the doors. This style of observatory is nearly ideal for a large Dob provided the deck is sunk to ground level.

Many more details about the construction of Bob's observatory can be found in the September, 2022 issue of the FOCUS (inside the July 2022 AP-SIG Meeting Report) and in earlier editions of the FOCUS.

We paused briefly for the group shot of on-site participants below. Appearing from left to right we have our host Bob Trebilcock, Ron Worden, Glenn Pusey, Jeff Miller, and Ryan Gilbert. Yours truly is out of view behind the camera.



After the tour, we headed indoors for a dinner of Meatball Sandwiches and Cookies provided by our hosts Bob and Beth Trebilcock. Thanks Bob and Beth!

After dinner, we started the Zoom component of the meeting. I began by giving the Special Topic Presentation titled How to Photograph the April 8, 2024 Total Solar Eclipse.

During my presentation, I talked about many aspects of photographing the upcoming April 8, 2024 Total Solar Eclipse.

I won't repeat all of that here. Instead, I'll focus on a few key points.

During a Total Solar Eclipse, the brief minutes during totality are the most spectacular. I recommend that you plan to give 100% of your attention to observing totality visually. You especially DO NOT want to be mired in making adjustments to camera controls or experimenting with exposure times while the precious few minutes of totality rush by.

There is a quote I like that is particularly relevant here:

" . . . great excitement accompanies totality and there is little time to think."

—Fred Espenak (aka Mr. Eclipse)

In order to photograph the eclipse while your attention is completely devoted to experiencing totality, you should ideally have your imaging scope and camera equipment set up and operating under computer control, starting no later than 20 seconds before totality, when the solar filter should come off your imaging scope, until 20 seconds after totality, when the solar filter must go back on your imaging scope.

I and several other AP-SIG members succeeded at doing this during the August 20, 2017 Total Solar Eclipse by using a specialized "sequencing" program for eclipse photography. The program I used was "SETnC", which runs under Windows 7-11. SETnC has been kept up to date and I plan to use it again to photograph the April 8, 2024 Total Solar Eclipse.

One other very important point is this. <u>You should do at least one "Full Dress Rehearsal" before the day of the eclipse</u>! This is crucial. Eclipse day should proceed smoothly by the numbers like a well-rehearsed play. You can't do that very well without actually *rehearsing*.

The photo below shows my setup for the 2017 Total Solar Eclipse on the observing field south of Carbondale, IL before totality. DAS member Rick Spencer joined us later after finding his Kansas City site wouldn't work.



On the following page are two more eclipse shots from 2017 which will hopefully whet your interest in the April 8, 2024 Total Solar Eclipse. The first image is a composite which shows the "western" edge of the Sun with prominences and the chromosphere visible as C3 approached. The second is a composite showing the corona after enhancing the contrast using the using Larson-Sekanina Process in PixInsight.

After the Special Topic Presentation, we moved on to the Presentation of Astrophotos. Hari Doraisamy presented an image of the Milky Way above his home near Philadelphia, proving once again that light pollution need not stop you from taking deep sky photos.

Copyright 2017 Dr. Wm. D. Hanagan, Jr.



During the Q&A on Equipment and Techniques at the end of the meeting, Lou Varvarezis asked about a poor USB connection he has experiencing between two ZWO cameras. A couple of likely courses of action were recommended before the meeting was adjourned.

Max Q with Scaling
(An Analog Computer Aerospace-Themed Simulation)

By Mike Cimorosi

Introduction

During a typical vertical launch, a rocket experiences dynamic pressure, which is a direct consequence of drag. As it turns out, this pressure is directly proportional to the product of two critical factors: the square of the speed of the rocket and atmospheric density. As the speed of the rocket increases, its altitude increases, and the atmospheric density decreases. Therefore, at some point the dynamic pressure reaches a maximum value (aka Max Q). After this milestone value is reached at a specific altitude, the rocket may then safely have its orientation changed to accommodate orbital insertion. The breadboard analog computer circuit designed to determine and display Max Q is shown in figure 1. For comparison purposes, analytical and analog computer results are displayed in figures 2 and 3.

An equation (derivation provided upon request), describing the dynamic pressure on the rocket may be expressed as

$$q = 1.567 \times 10^4 \, ye^{(-y/10.4)}$$

- q = dynamic pressure (in Newtons per square meter or Pascals)
- y = altitude (in kilometers)

For electronic circuit considerations, dividing this equation by 1.567×10^4 yields the simpler reduced scaled version,

$$q_s = ye^{(-y/10.4)}$$

Results

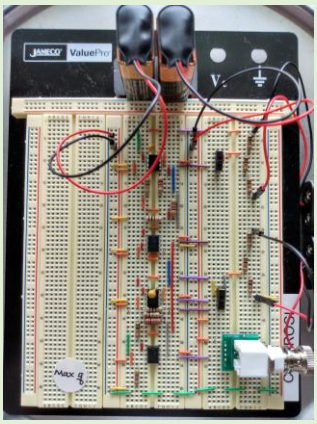


Figure 1: Breadboard analog computer circuit

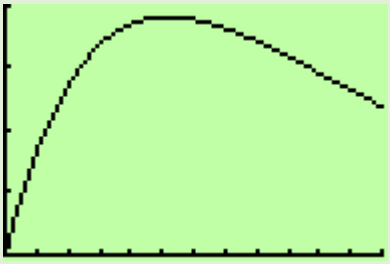


Figure 2: Graphical display of analytical solution
Horizontal scale: Space between each division = 2 km.
Vertical scale: Space between each division = 1 scaled Pa.
(0,0) at lower left corner

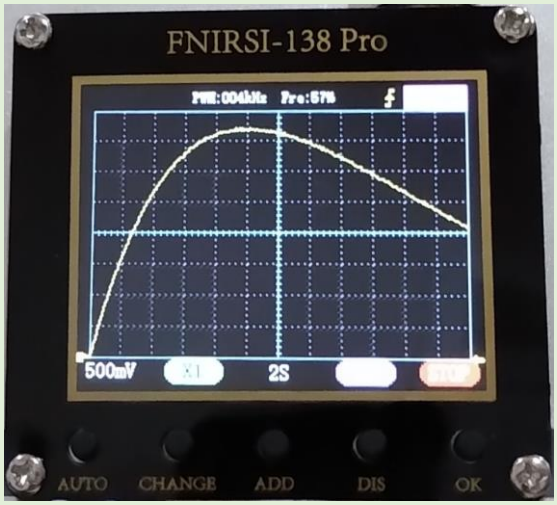


Figure 3: Oscilloscope display of analog computer solution
Horizontal scale: Space between each division = 2 km.
Vertical scale: Space between each division = 1 scaled Pa.
(0,0) at lower left corner

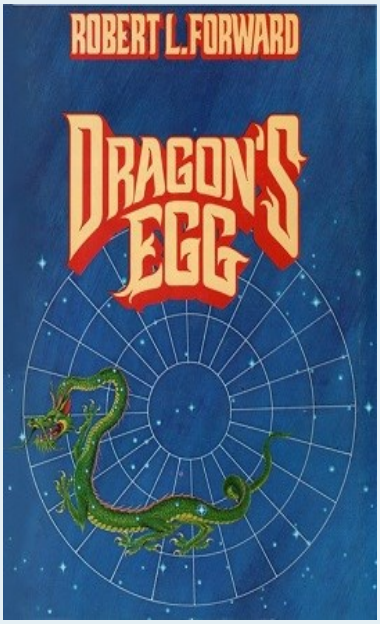
Comments

- Considering that the analog computer was constructed from components with a tolerance range from 1% to 10%, the solutions compare rather well.
- Note that according to each display, Max Q occurs near 10.4 kilometers!

DAS BOOK CLUB NEWS

Dragon's Egg
by Robert Forward

Review by Marie Breton



This summer, The DAS Book club continued the trend of reading and reviewing a Sci-Fi book in July. This year's choice was Robert Forward's book *Dragon's Egg*. The author described the work as a textbook on neutron star physics disguised as a novel. Laughing, since neutron physics is not my thing, I'd say it's not for the faint of heart (i.e., with only a layperson's understanding of physics), but I made the best of it and enjoyed the story for several reasons.

Book Overview: Dragon's Egg is a hard science fiction novel that tells the story of an intelligent alien species, the Cheela, who live on the surface of a neutron star. (This idea was inspired by work done by astronomer Frank Drake in 1973, suggesting that intelligent life could inhabit neutron stars. Physical models indicated that the Cheela would be about the size of sesame seeds.)

The story follows the Cheela's evolution as they develop sophisticated technology and culture at an incredibly accelerated rate due to the intense gravity and pressure on their planet, which, in turn, leads to exceedingly fast and energetic particle interactions.

Meanwhile, a human mission observing the planet from a spacecraft communicates with the Cheela and tries to understand their unique biology and society. The novel explores themes of the nature of intelligence, communication, differing perceptions of the passage of time, and the potential for life in extreme environments.

The book club meeting began with a brief recap of the novel: Half a million years ago, a supernova in the constellation Draco (the dragon) gives birth to a neutron star known as Dragon's Egg, because of its location near the tail of Draco. It eventually cools down enough to allow life to evolve. Due to the extremely high rates of particle interactions, the Cheela evolve about a million times faster than did life on Earth. As a result, it is not long before the Cheela have advanced technology and culture. They face various challenges such as volcanic eruptions and a barbarian attack from a rival Cheela group.

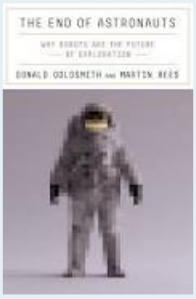
Dragon's Egg—cont'd

Relation to real life: A man taking credit for a significant scientific discovery made by a woman…. Marie and Matt had just finished a tour of the Nobel Prize Museum in Stockholm when they started the book. One of the Nobel laureates was Anthony Hewish, who received the prize for the discovery of radio pulsars made by his PhD student Jocelyn Bell. In *Dragon's Egg*, there is the character Jacqueline Carnot, a PhD student who discovers the Cheela's neutron star, for which her advisor receives accolades.

The Cheela were fascinating, and there was some discussion about what we thought the Cheela looked like: octopus-like or perhaps amoeba-like, smaller than a grain of rice; and how in the heck did they navigate and move in such a strong gravity environment… in some ways so very primitive, but in the end we come to realize how advanced they really are. For example, when they venture into space, part of the Cheela's life support involves bringing along a source of intense gravity (like that in which they evolved), which they accomplish by having their spacecraft equipped with mini black holes. Once in space, they can rendezvous with the human spacecraft.

Club members who wish to suggest a Sci-Fi book for July 2024, please submit suggestions to dasbookclub@gmail.com. We usually pick books about six months in advance so members can obtain/borrow sometimes limited copies

---



The End of Astronauts

By Donald Goldsmith with Martin Rees

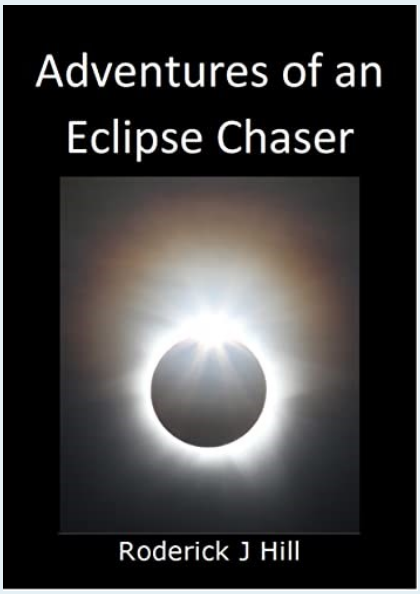
Reviewed by Edith Coleman

The book with the rather foreboding title *The End of Astronauts* was the topic of the DAS Book Club meeting by Zoom on June 29., 2023. The author, Donald Goldsmith, co-written with Martin Rees, was on hand to discuss it and answer questions. A Ph. D. from Berkeley and recipient of numerous awards and citations (somewhere along the way Dr. Goldsmith acquired a law degree), Dr. Goldsmith was well equipped to enlighten the group. Chris Trunk led a lively discussion on space exploration and on searching for adventure in general, contrasting with staying home and sending cyborgs and other robotic figures to do the work. Some of the reasons mentioned for traveling into space were financial, love of adventure, a feeling of the need to explore the unknown, expand the range of knowledge—all the while not disturbing the environment. Other points touched upon were the psycological aspects of traveling great distances away from the home planet, national pride, and some legal aspects such as resolving conflicts and establishing ownership. Past exploits such as early aviation, 15th and 16th century world explorers, forays into uninhabited lands, and the book *The Right Stuff* were cited. The conclusion was that Dr. Goldsmith generated some thought-provoking ideas, leading the group on its own journey of deliberating the many considerations of interstellar travel and exploration.

SEPTEMBER BOOK CLUB SELECTION

ADVENTURES OF AN ECLIPSE CHASER

BY RODERICK HILL



The DAS Book Club selection for September 2023 is *Adventures of an Eclipse Chaser* by Dr. Roderick Hill. We will be joined on September 28, 2023 by Dr. Hill and his wife Monica who will share a PowerPoint presentation about their adventures followed by our discussion

Dr. Hill's eclipse adventures started at age 15 with a view of a partial eclipse in 1964 in his high school's parking lot. However, it took another 35 years for him to see another partial eclipse in 1999. By then the eclipse bug had bit and Rod has since seen a total of nine total eclipses from 2002 to 2021, from serene venues to politically unstable and environmentally inhospitable climates. Rod writes, "Each expedition has been unique and exciting in its own right and each has provided memories for a lifetime."

Rod also describes his evolution from an amateur eclipse photographer to a practiced and experienced videographer. If you are looking for tips to improve your April 8, 2024 eclipse viewing experience, please feel free to attend.

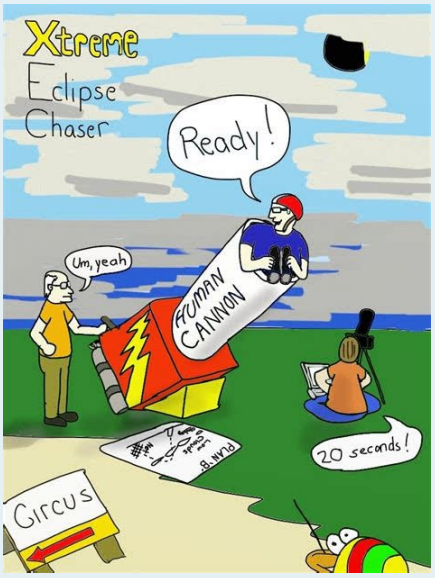
Eclipse Chaser—cont'd



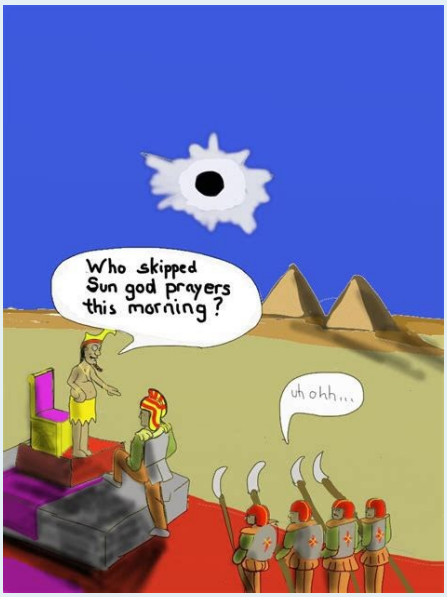
Dr. Hill is a Councilor for the Astronomical Society of South Australia (ASSA) and is a former Chief Research Scientist and Group Executive at CSIRO.

Please join us to discuss this important book with the Delaware Astronomical Society Book Club on September 28, 2023 at 7:00 pm EST *via* Zoom. Jim Barkley, the Book Club's Zoom Coordinator, will email the Zoom link in advance of the meeting. Your guests are welcome to attend DAS Book Club meetings. Jim Kerschen will lead the discussion. -- *JK*

Eclipse Humor







Astrophotos by AP-SIG & DAS Members

The Lion Nebula (SH2-132) Using a Modified HSO Mapping—by Bill Hanagan

My first version of the Lion Nebula appears below. The HSO mapping is modified by the addition of an extra 0.7xOIII added to the



Copyright 2023 Wm. D. Hanagan, Jr. Ph.D.

green channel to better balance the color across the nebula and highlight the features of the nebula.

The blue-green areas of the image show where OIII emission is quite strong. White areas show where OIII is strong, but competing with a strong H-alpha signal. The yellow-orange areas along the edges of dust columns near the bright center of the nebula are where SII emission is at its strongest. H-alpha is of course strong everywhere in the nebula, but shows up as Red in areas where OIII is particularly weak. H-alpha (Red) is intentionally scaled back to better reveal the variations within the nebula. Otherwise, the entire image would be Red with no color contrast to highlight the features of the nebula. Be sure to Zoom in and look around!

It's a little hard to figure out how this is a Lion, but here goes. Two extensions of the nebula on the left that protrude a short distance downward to the lower edge of the image can be thought of as the front legs. One of the rear legs can be seen crossing the vertical centerline of the image and spreading diagonally downward to the lower edge. The tail of the lion is a reddish gray branch arcing up from the center to the top right edge of the image. The "tail" of this lion actually extends quite a bit beyond the field of view. I don't recognize any features as being representative of the head except that you might think of the outer periphery away from the bright center of the nebula as being the lion's mane.

A zoomed-in version of the image, which contains the most interesting features of the nebula, appears below. A lot of effort went into producing this image so you could get a "spacewalk" feel from it and you can Zoom even on this enlargement to see more detail!



The straight-edged area that looks like a sunbeam stretching from the center up to the right is OIII emission, but has an unusual shape. OIII in emission nebulae is usually seen as either a diffuse glow or as a spherical, bulbous shape suggestive of gas clouds expanding from one or more stellar explosions. The straight-edged appearance of OIII in the center of the image suggests that Oxygen is present in the area as a diffuse cloud, but is excited only along a beam-like path. It seems likely that the source of excitation for the Oxygen in this area is partially masked by dense dust clouds in the same way that clouds that partially mask the Sun produce distinct sunbeams.

SH2-132 Image Acquisition Details

- Data acquisition was a joint effort with Rick Spencer.
- Scope: 10” Takahashi CCA-250 with 0.72x reducer, at 890 mm and f/3.6 (unobstructed equivalent f/4.63)
- 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 37 Ha, 40 OIII, and 33 SII, all binned 1x1.
- Total light frame integration time: 18 hours 20 min.

PixInsight Image Processing for the Lion Nebula—Preparation of Masters

- 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.
- Blink, ImageCalibration, CosmeticCorrection, StarAlignment, ImageIntegration, DrizzleIntegration, & Crop were used to produce Ha, SII, and OIII Masters in the usual way.
- BlurXTerminator and NoiseXTerminator were applied to individual Master frames before color mapping.

PixInsight Image Processing for the Lion Nebula (HSoO Mapping and More)

- HSO Color Mapping was carried out using the following PixelMath formulas: Red = Ha; Green = (SII + 0.7xOIII); Blue = OIII
- StarXTerminator was applied, discarding stars.
- HistogramTransformation and CurvesTransformation produced the initial and final stretches and color adjustment.
- Reduced HOO Stars were added to the image using PixelMath.
- The HOO image is not shown here.

The Pinwheel or Triangulum Galaxy (M33) Shown in LRGB (with no Ha Boost) and in HOO—by Bill Hanagan

My LRGB version of M33 appears below. Several Hydrogen emission regions are easily seen as pink or red splotches dotting the diffuse spiral arms of the galaxy. The background areas near the edges of the image are not true background areas. The faintest reaches of this galaxy actually extend to the edges of the image. The gradual reduction in the glow as you move close to the edge is a gradual falloff in the light coming from the galaxy, not vignetting.

While M33 is not as highly organized as other so-called “grand design” galaxies like M51 and M101, M33 has a much greater angular size and a very large number of comparatively bright extra-galactic

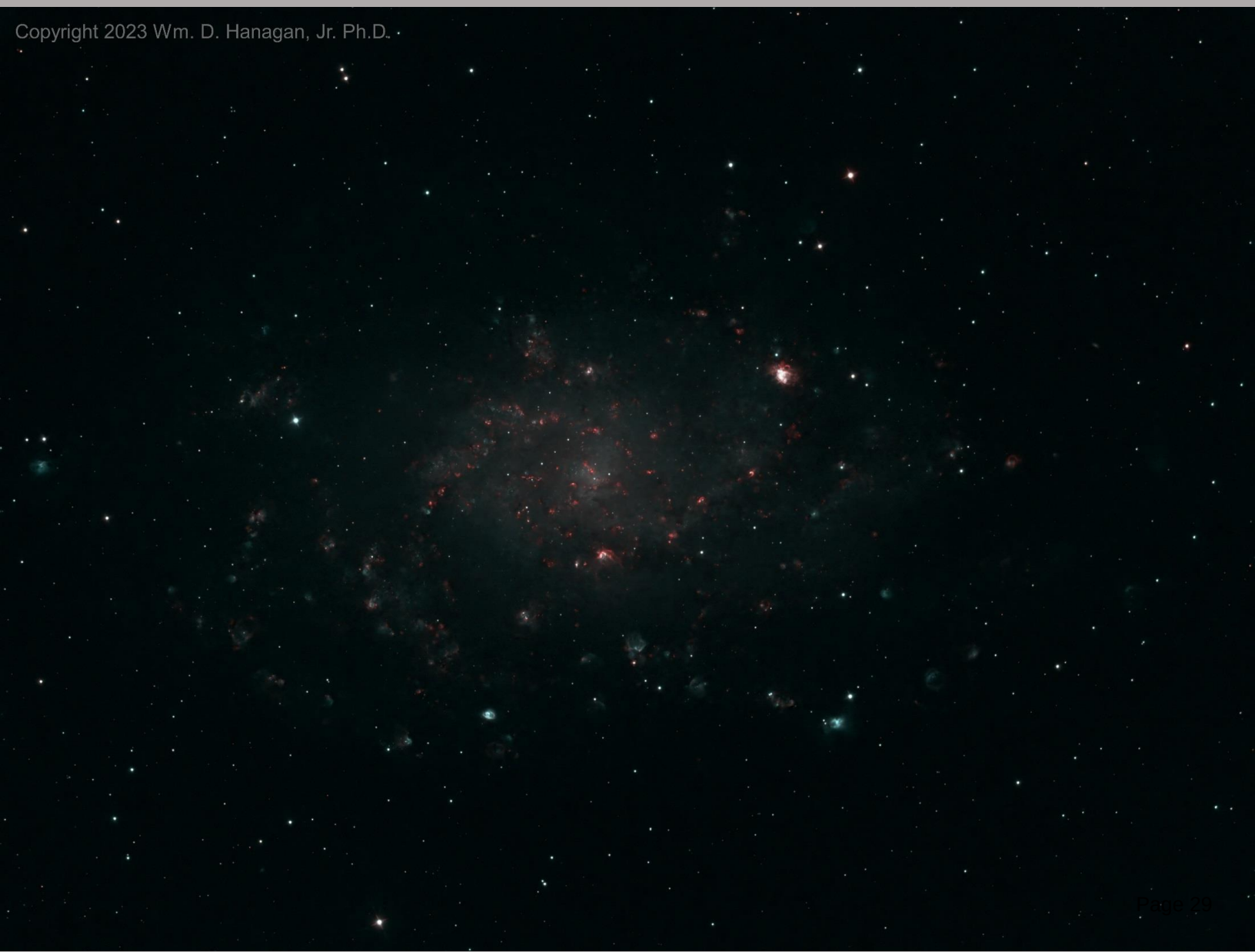


Copyright 2023 Wm. D. Hanagan, Jr. Ph.D.

nebulae! Why do I use the term extra-galactic here? Because the nebulae you see in this image are NOT in our own galaxy!

I also produced a second HOO version of M33 using H-alpha and OIII data which appears below. I balanced the color in this HOO image by making the residual star glow near the center of the galaxy a neutral gray/white. This is appropriate because the overall color of large star fields is known to be neutral. This is a much darker image than the first because the starlight from M33 has been largely expunged by the narrowband filters. Yet, several of the nebulae are so bright they can't be stretched any further without being over-saturated and blown out.

I find three aspects of this image particularly interesting.



First, quite a few of M33's nebulae have strong OIII emission! Note in particular the bright blue-green OIII emission region near the left edge of the image and the two bright regions in the bottom half of the image. If you look back at the LRGB version and zoom in you can see that all three of these OIII regions and several others are visible in the original LRGB image, but are easily mistaken in the first image for regions that are heavily populated with young blue stars.

Second, the nebulae with the strongest OIII signal levels seem to be clustered around the periphery of the galaxy, while the H-alpha dominated nebulae are more concentrated near the center of the galaxy. Be sure to Zoom in and look around because these little nebulae have some detail and you won't see nearly as many of them if you don't zoom in.

Third, many of the nebulae in this image contain large loops reminiscent of Barnard's loop. Large loop-shaped nebulae are often supernova remnants. There are no fewer than 85 known supernova remnants in M33 and if you look closely, it's likely that you'll be able to find quite a few of them in this image!

M33 Image Acquisition Details

- Data acquisition was a joint effort with Rick Spencer.
- Scope: 10" Takahashi CCA-250 with 0.72x reducer, at 890 mm and f/3.6 (unobstructed equivalent f/4.63)
- Mount: Astro-Physics 1100GTO with CP4 (no absolute enc.).
- Imaging Cam: CCD cooled to -20C (QSI-683wsg8 w OAG).
- Guide Camera: SX Ultrastar (monochrome).
- Control Computer: Self-built Windows 10 Small Form Factor desktop designed to minimize dust and prevent drip intrusion.
- Windows Software: ASCOM drivers, APCC Pro, Stellarium, Sequence Generator Pro (SGP), and PHD2.

- Sub-exposures: 5 min. x 36 L, 14 B, 15 G, & 15 R, plus 10 min. x 15 Ha and 16 OIII.
- Total integration time: 13 hours 5 minutes.

PixInsight Image Processing for M33

- 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.
- This also prevents pixels from becoming visible after deconvolution with BlurXTerminator.
- Blink, ImageCalibration, CosmeticCorrection, StarAlignment, ImageIntegration, DrizzleIntegration, & Crop were used to produce Luminance, Red, Green, Blue, H-alpha, and OIII Masters.
- ChannelCombination was used to produce an RGB Master.
- DBE was used to remove very slight gradients from the RGB and Luminance Masters.
- BlurXTerminator and NoiseXTerminator were applied to each of the Masters.
- HistogramTransformation followed by LRGBCombination was used to merge the Luminance and RGB images.
- The H-alpha and OIII Masters were used to produce the HOO image of M33.
- HistogramTransformation and CurvesTransformation were used for the final stretches on all images.

Planetary Nebula Sh2-71

By Mark Mitchell



Since planetary nebula are sort of slow motion explosions occurring on spherical objects, we might suppose that they should be symmetrical, but we see that they often are not. Sh2-71 is a planetary nebula in the constellation Aquila at a distance of about 3200 ly with unusually complex morphology comprising multiple pairs of bipolar lobes oriented along different axes and with likely different ages. The identity of the star(s) of origin is controversial. The central white star in this image has been called an eclipsing binary pair. It is a candidate, but some favor a smaller adjacent star that is not visible here. The small image above is from the Gemini observatory on Mauna Kea. The most recent paper on Sh2-71 that I've found is from 2015 and is relatively accessible: https://academic.oup.com/mnras/article/451/1/870/1377055

Sh2-71 | Aquila

ED127 ... Atik 460ex ... 6h 15m HOO + RGB

M31 FROM CHERRY SPRINGS

by Jarrod Bieber



Captured at Cherry Springs State Park, July 22,2023.

HARDWARE

SkyWatcher 80mm ED refractor

ZWO ASI 1600mm camera

Celestron AVX mount

ACQUISITION DETAILS: (CAPTURED AS A 2-PANEL MOSAIC)

29 x 90s Red

27 x 90s Green

29 x 90s Blue

20 Darks

35 Bias

25 each of Red, Green & Blue flats

85 light frames total for ~2.1 hours of combined integration

Image acquisition software - Sequence Generator Pro, PHD2

Polar Alignment - SharpCap

All image processing was done in PixInsight

IC 5070 in the Hubble Palette

By Sebastian Krauthauser



Acquisition details:
60 x 300s (5 hours) Astronomik H-alpha 6nm, captured 2023-07-22

120 x 300s (10 hours) Astronomik O-III 6nm, captured 2023-08-08 and 2023-08-18

60 x 300s (5 hours) Astronomik S-II 6nm, captured 2023-08-19

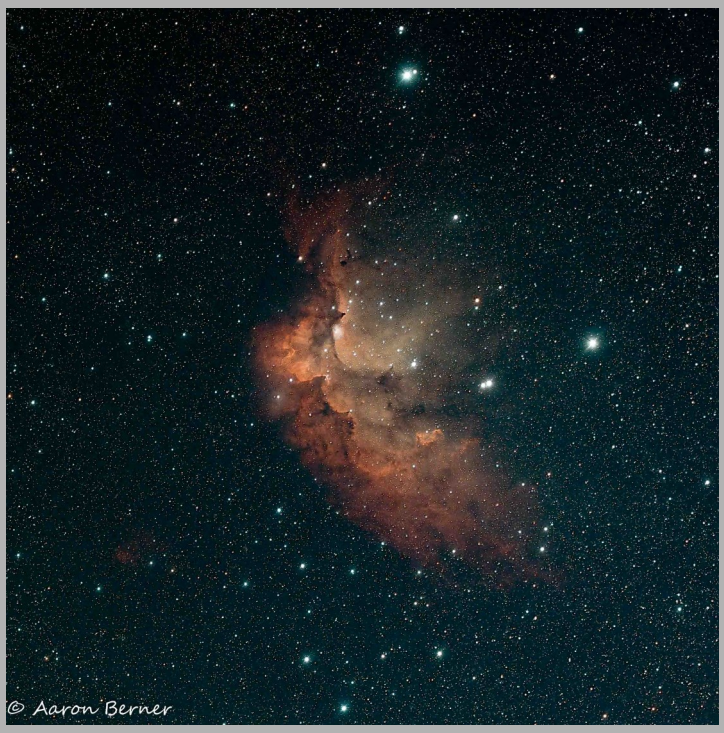
SBIG STF-8300M cooled CCD @ -5 C

Celestron NexStar 8i optical tube with 0.63x reducer

SkyWatcher HEQ5 pro mount with Rowan Astronomy belt mod

All images taken in front yard in North Wilmington using KStars and processed in Siril

VIEW FROM PIKE CREEK by Aaron Berner



All data was acquired August 30-September 5 from my front yard in Pike Creek where I try to set up as often as possible. All processing was in PI, with the exception of exporting to jpeg through Lightroom.

11" RASA
ASI 6200MC
Baader UHC-S L Booster

NGC 2380

NGC 2635—Bubble Nebula



BOARD MEETING AGENDA – 9/19/2023

- Review of Minutes from Last Meeting – Bill McKibben
- Review of Fast Track Votes - Bill McKibben
- Treasurer's Report – Bob Trebilcock
- Approval of any donations from the summer - Bob Trebilcock
- 2023 Annual Budget – Bob Trebilcock
- Donation of Nico Carver's modded 60D Camera - Jeff Lawrence
- DAS Intro to Astronomy Course - Jim Kerschen
- We now have Google Workspace and all its benefits - Rob Lancaster
- Extension Tube for Telescope - Rob Lancaster
- Discussion of Procedures for Donations - Jeff Lawrence
- Folding Chairs for Observatory - Jeff Lawrence
- Fully automated Goto astrophotography telescope - Dave Groski

DAS CONTACTS

OFFICERS:

President: Rob Lancaster, Rlancaste AT gmail DOT com

Vice-President: Jeff Lawrence, (302) 668-8277, Jeff.law76 AT gmail DOT 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

Dave Groski, groski AT udel DOTedu

Sidney Ocampo, sidastronomy AT yahoo DOT com

STANDING COMMITTEE CHAIRS:

Observatory: Chris Horrocks, bettysmithers AT verizon DOT net

Education: Jim Kerschen Kerschen AT Verizon.net

Library: Mary Webb, dasbookclub AT gmail DOTcom

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

Publications: Mark Jacobini 484 643-2162 focusAT delastro DOT org

OTHER POSITIONS:

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

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

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

Awards Chair: Chris Horrocks bettysmithers AT verizon DOT net

DAS Book Club Leader: Mary Webb, dasbookclub AT gmail DOTcom

Elections Chair: Sidney Ocampo, gegocampo AT gmail DOT com

Programs Chair: Jeff Lawrence, Jeff AT DelAstro DOT org

Webmaster: Rob Lancaster, Rlancaste AT gmailDOTcom

Refreshments Diana Metzger, (302) 290-2108, DmetzgerMD AT gmail DOT com