

DAS FOCUS

Vol. 62, No. 6, June 2020
*Still social distancing
in the grip of Covid-19*

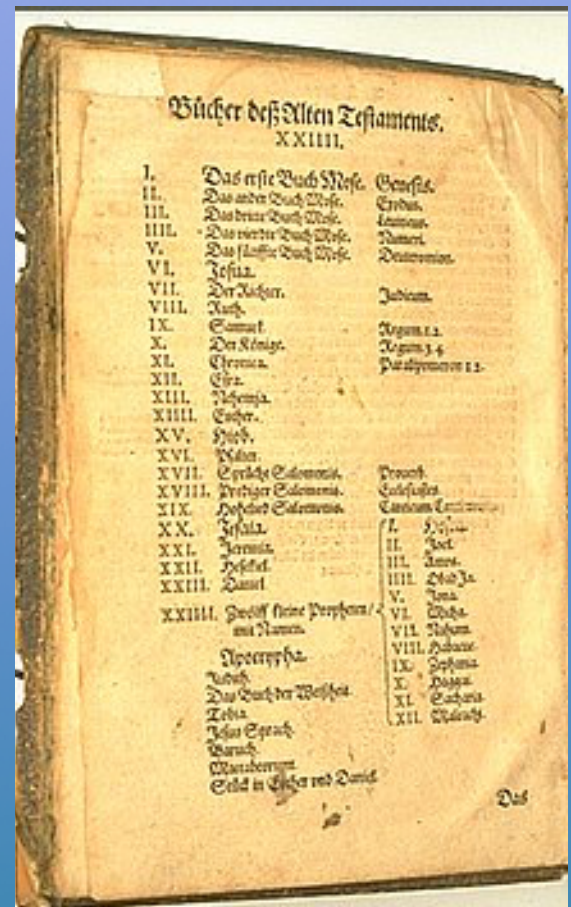
Next General Meeting

Tuesday, June 16, 2020, 8 PM

Zoom! Watch your email for a link, to be sent by Rob Lancaster

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FOCUS editor:
Richard G. Spencer
Publications Chair, DAS

June meeting speaker

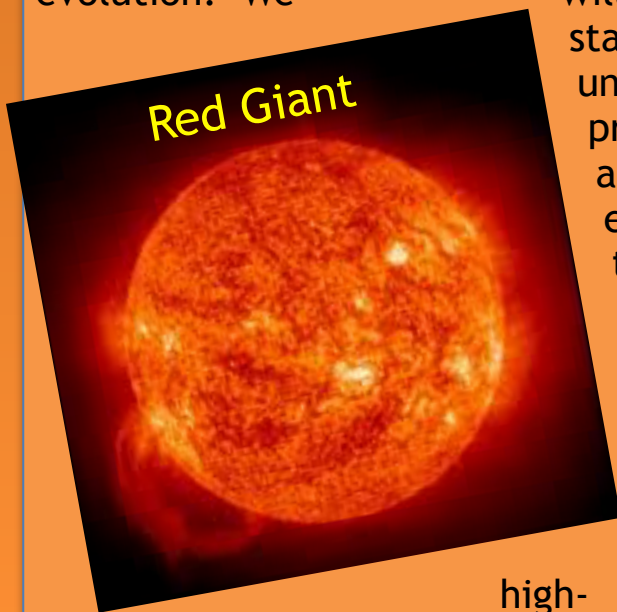
Massive Stars Throw Their Weight Around: An Overview of Their Influence, Properties, and Formation

Dennis F. Cioffi, Ph.D.

Professor of Physics George Washington University
Member, MUon proton Scattering Experiment (MUSE)

Bookended by Gamma Ray Bursts, this talk will illustrate the power of high-mass stars ($M > 20$ solar masses) and the astrophysical importance of understanding their births and deaths. We will first view astronomical observations that show the effects of high-mass stars on their interstellar surroundings, followed by a quick peek at how they can affect galaxy evolution. We

will also note how understanding high-mass star formation can give insight about the universe close to its origin. The general process of star formation will be described, and we will examine why the existence of even higher-mass stars ($M \gg 20$) presents theoretical difficulties; a possible solution will be illustrated. Finally, a couple of recent analyses of



high-mass stars in the form of GRBs can tell us about the formation of the first stars in the universe, the so-called Population III stars.



From the President

Rob Lancaster

June 2020 President's Column

Dear DAS Members,

The summer is almost upon us. Pretty soon the summer milky way will climb high into the sky and grace us with beautiful nebulae! I hope you have been getting a chance to observe from the comfort of your home. I also hope you got a chance to view Venus as an extremely small crescent about a week ago.

That was a sight to see. I am very pleased that we have been quite active as a club, in spite of being apart. We have been having regular Tuesday Astronomy Workshops, we have had very productive discussions at our board meetings, we have had exciting presentations during the AP SIG group, and we have had some great Monthly Meetings over Zoom with awesome speakers!

Speaking of that, I think you all will join me in thanking Prof. Ben Maruca for an excellent presentation last month on NASA's Parker Solar Probe. Not only was his presentation great, but the videos were pretty stunning too. This month, Prof. Denis F. Cioffi, a Physics and Astrophysics professor from George Washington University, who is an expert on the early universe, supernovae, and Gamma Ray Bursts, should be a great hit as well! I hope you can join us next week for this month's talk.

During our board meeting, we discussed the summer months. We will certainly still be holding the weekly Tuesday night Astronomy Workshop, and we might try some breakout groups and/or some mini-projects, sort of like we do when we are at Mount Cuba. The Focus will probably not be issued in July and August, so that we can give Rick Spencer a break. Please thank him for his awesome service to our club! As usual, we also will not be holding Board

Meetings during the summer unless something significant comes up.

We are thinking about having some Summer Monthly Zoom Meetings with speakers just like we have been doing for the last couple of months. I checked, and the last time we held a regular monthly meeting in July was in the summer of 1958, when the DAS ByLaws/Constitution were first approved, so if we do have a meeting this July, that is historic. I want to say big thank you to Jeff Lawrence, our Vice President and Programs Chair, for being willing to consider this. I think it will go a long way toward making this time when we are forced to stay at home a little more interesting.



From the President (cont'd)

In other news, our next scheduled outreach event is at Woodside Farm Creamery in late June, and so far, it has not been canceled, however Woodside is drive-through only right now, so unless that changes, it probably will be cancelled. We will continue to keep the Intro to Astronomy Class and the Dinner Meeting on hold. Maybe a holiday dinner in December? The Book Club and the Astrophotography Special Interest Group, are also still planning some virtual events. Please stay tuned for more details from Bill Hanagan and Amy Hornberger. We will probably be sending a survey sometime during the summer to get your feedback about projects or things you might want to do in the fall or next year, based on discussions we have been having at our board meetings. Finally, just as a reminder, Mt. Cuba has cancelled all upcoming meetings and events and is closed until further notice. Nobody should be going out to Mt. Cuba for any reason without prior approval from Kim Green.

I hope you get a chance during your time spent at home to get outside and do some observing from your back yard. It is almost summer! Once the epidemic subsides, I hope to see you at our organized events again soon, and until then, I hope to see you virtually at our upcoming events!

Thank you,

Rob Lancaster
DAS President





DAS Election Results New board members for 2020 to 2022

Let us congratulate our newly elected Board Members!

President :

Robert Lancaster

Vice President:

Jeffrey Lawrence

Treasurer:

Bob Trebilcock

Secretary:

Bill McKibben

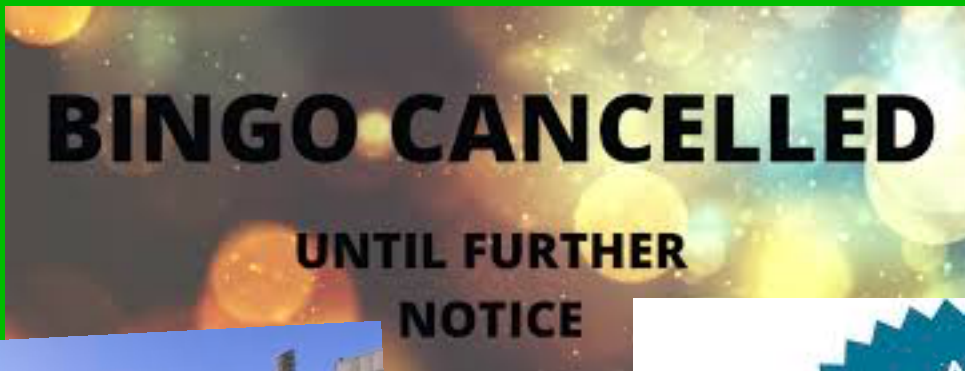
Reported by: Sidney Ocampo, Elections Chair

Summary of meeting schedule through Summer, 2020

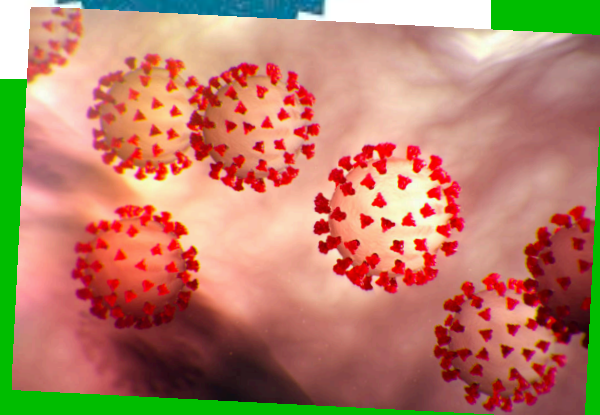
Weekly MCAO workshops, every Tuesday

Other gatherings, to be announced

Look for emails from Rob Lancaster before each meeting, containing links to enter the meeting! *All of this is “for now”, and may change down the road. And remember, please don't post the link on any websites or social media, for security reasons.*



CANCELLED



Poems for Summer

Contemporary & classic

Hesperus
BY SHANN RAY

My four-year-old daughter handed me
a card.

To Daddy written on the front
and inside a rough field
of five-pointed lights, and the words
You're my favorite Daddy in the stars.

In this western night we all light the
sky

like Vega, Deneb, Altair, Albireo,
the Summer Triangle,
Cygnus the Swan, our hair
tangled with wood and gravel,
our eyes like vacant docks
that beckon every boat.

Tell me about the word
stars, I said.

Oh, she said. Sorry.
I didn't know
how to spell world.

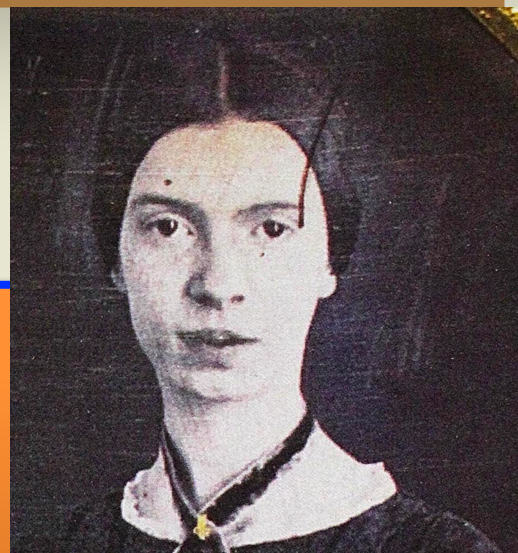


Emily Dickinson
To see the Summer Sky

To see the Summer Sky
Is Poetry, though never in a Book it lie —
True Poems flee —

Carl Sandburg
Summer Stars

Bend low again, night of summer stars.
So near you are, sky of summer stars,
So near, a long-arm man can pick off stars,
Pick off what he wants in the sky bowl,
So near you are, summer stars,
So near, strumming, strumming,
So lazy and hum-strumming.



Time is the coin of your life.
It is the only coin you have,
and only you can determine
how it will be spent.
Be careful lest you let
other people spend it for you.

— Carl Sandburg



Famous Scientist Birthday for June*

Hannes Alfvén

May 30, 1908 – April 2, 1995

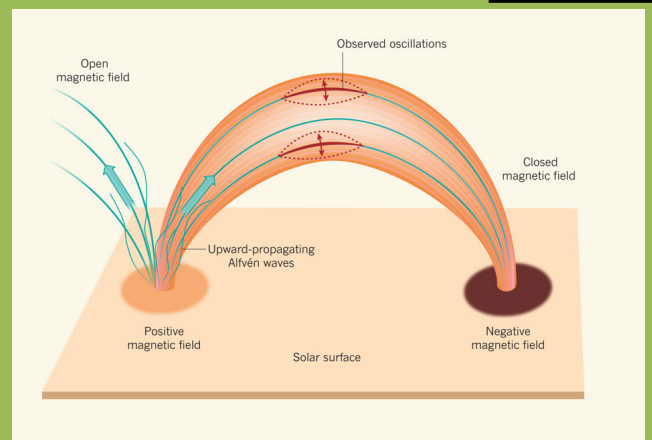
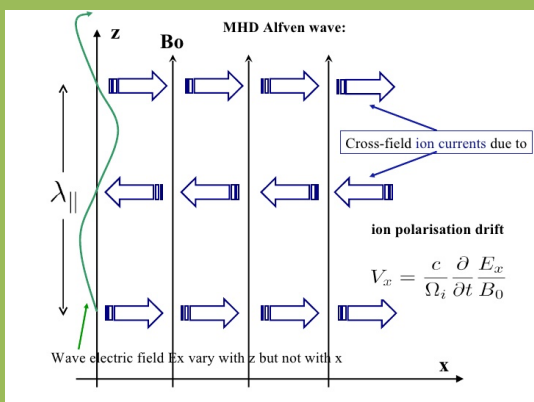


Nobel Prize in Physics, 1970 for "fundamental work and discoveries in magneto-hydrodynamics with fruitful applications in different parts of plasma physics".

Although Alfvén made many contributions, he is a household name largely for his description of what is now known as the Alfvén wave.

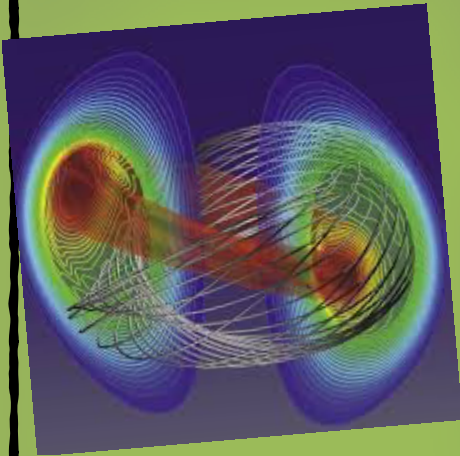
Among other tricks, these waves carry energy from the solar interior to the various layers of the solar atmosphere

*Late May can be very similar to June



–*Hydrodynamics* is the study of fluid motion

–*Magnetohydrodynamics* (MHD) is the study of fluids that are (at least in part) comprised of separable charged particles (e.g. ions) as they interact with magnetic fields



–*Plasmas* are (partly or fully) ionized gasses; the treatment of plasmas and fluids (including magnetic fluids) differs due to differences in density and particle collision rates.



One of the reasons that MHD and plasma physics are so complicated is that the trajectory of charged particles is affected by a magnetic field, but these trajectories themselves create magnetic fields, which affect trajectories, which create magnetic fields, and so on. So the equations must be solved in a self-consistent manner and it gets pretty complicated pretty fast.

Alfvén helped to sort this out, explaining the behavior of many natural phenomenon, including the Aurora Borealis and solar weather phenomena.

Alfvén waves were featured in last month's DAS talk on the solar wind!!! And that, along with his ~June birthday, is why Alfvén is honored in this month's FOCUS.

Astrophotos by AP-SIG & DAS Members

The Leo Trio (M65, M66, and NGC 3628) by Bill Hanagan

Springtime is known as “Galaxy Season” because, at this time of year, the emission and reflection nebulae, globular clusters, and open clusters that adorn our home galaxy, the Milky Way, are below the horizon or too near it for most of the night, leaving the many galaxies that you can see when looking away from the Milky Way as the prime targets for visual observers and imagers alike. My first version of the Leo Trio appears below.

Copyright 2020 Wm. D. Hanagan, Jr., Ph.D.



As luck would have it, the raw data for this image were acquired on a clear night when the moon was 68% illuminated and the trio was separated from the moon by only 40 degrees.

In visual observing, this amount of moonlight greatly reduces the contrast between faint objects and the sky background, making entire galaxies like these disappear, which is why deep-sky observers greatly prefer moonless nights. A moonless night is also *preferred* when imaging galaxies because the “broad-band” filters used when imaging galaxies transmit a large fraction of the visible spectrum, including moonlight.

Fortunately, the increased sky background level added by moonlight is easily subtracted from digital images. Unfortunately, imagers don’t get away completely unscathed by moonlight. Sky background photon shot noise goes up significantly in the presence of moonlight, and that noise can’t be subtracted from an image. The added noise can obscure very faint details that might otherwise be made visible when stretching the brightness range of the image data for display. So why did I acquire the data for this image on a night when the moon was 68% illuminated? That’s when the sky was clear!

This particular image has some fine detail and color that’s best seen by zooming in. For those whose browsers don’t support that, I’ve included a mildly cropped version below.

Copyright 2020 Wm. D. Hanagan, Jr., Ph.D.



M65 is on the upper right, M66 is on the lower right, and NGC 3628, the “Hamburger” galaxy, is on the left. Note the red and blue regions in M66 as opposed to the neutral character of M65. Also note the semi-transparent red-tinted dust lane in the Hamburger galaxy. If you can’t see all of these details you may need to adjust the brightness or contrast of your monitor.

Data Acquisition Details for the Leo Trio

- My images of the Leo Trio were produced from data acquired jointly with Rick Spencer.
- Total exposure time: 2 hours 5 minutes.
- Sub-exposures: Luminance: 10 x 5 minutes binned 1x1; RGB: 5 x 5 minutes (each binned 2x2).
- Optics: 10” Takahashi CCA-250 with an 0.72 focal reducer, operating at 890 mm and f/3.6 (f/4.4 based on the amount of light blocked by the central obstruction)
- Telescope mount: Astro-Physics AP1100GTO with CP4 controller
- Imaging Camera: QSI-683wsg8, with off-axis guider (OAG), operated at -10C
- Guiding camera: Starlight Xpress Ultrastar, mounted in the OAG
- Software: Windows 10 Pro, ASCOM, Astro-Physics Command Center (APCC), Cartes du Ciel (SkyChart), Sequence Generator Pro, and PHD2

Image Processing Details for the Leo Trio

PixInsight 1.8 was used for all image processing. Combined words like “ImageCalibration” and “StarAlignment” are not typos—they denote specific PixInsight Processes and Scripts that were used during image processing.

ImageCalibration was performed using master dark, master bias, and master flat frames. This was followed by CosmeticCorrection to remove hot pixels that survived calibration. Blink was used to check the quality of the images and to determine how many pixels to trim around the edges. StarAlignment, Crop, and ImageIntegration were used in the usual way. MultiscaleLinearTransform was used for noise reduction. ChannelCombination was used to produce a Chrominance image. HistogramTransformation was then used on both the Chrominance and Luminance masters for an initial basic stretch. LRGBCombination was used to merge the Luminance and Chrominance masters. DBE was used to eliminate background gradients and neutralize the background. ColorCalibration was performed using M65 as the white reference. CurvesTransformation was used for the final stretch.

-- Bill Hanagan

Contribution from Jim Barkley

Conjunction April 16, 2020
Moon, Mars, Saturn and Jupiter

Equipment: Olympus E-510, 40mm, 8sec, ISO



Contribution from Mark Mitchell

M64, the Black Eye Galaxy in Coma Berenices, has its name because it has a dark dust lane that makes it look like it's been punched in the eye. It is a type 2 Seyfert galaxy that is only 17.3 million light years away. A study in 1992 showed that the galaxy comprises two counter-rotating disks of interstellar medium. The inner disk contains the dust lanes. The stars themselves apparently all rotate in the same direction. Some theories have been proposed for this odd situation - one of which is that there is an undetected gas-rich satellite galaxy in a retrograde orbit around M64. This is a 6.4 hour exposure using a 5 inch refractor.



Mark L. Mitchell ©2020

M64, The Black Eye Galaxy | Coma Berenices
ED127 + Atik 460ex + RGB 6.5h

Contribution from Ron Worden

Leo Triplet(M65 Lower Left, M66 Upper Left, NGC3628 Upper Right)

From the Snobie Observatory at the Lincoln Control Center in Bear, DE
Leo Triplet(M65 Lower Left, M66 Upper Left, NGC3628 Upper Right) in
constellation Leo

Technical Information:

Date: 5/21/2020

Location: 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: 61°F cooled to -10°C

Filters: L,Ha,Oiii

Exposure: 29LF-300sec .sub frames (2.41hrs.)(12 L,5 Ha,12 Oiii) L in Luminance
channel, Ha in Red channel, Oiii in Green channel, Oiii in Blue channel.

Software: PixInsight/PaintShopPro6

Frame: 54.4 x 71.2 arcmin

Calibration: Master Dark



Copyright Ron Worden

Daytime Venus & Daytime Moon

Rick Spencer

~11:30 AM Sunday June 14

Single snapshots

Sony alpha 6000 camera through Explore Scientific 127mm apochromatic refractor

ISO 500, 1/2000 sec

Nexus DSC



Good morning, Moon.



AP-SIG Meetings Continue On-Line Using Zoom by Bill Hanagan, AP-SIG Founder

Elephant Trunk detail by Mark Mitchell

On Saturday, May 30 The AP-SIG “met” once again via Zoom. After welcoming everyone, we began with a review of recent astrophotos shown by myself as well as Nico Carver, who joined the meeting from Boston, and Igor Peshenko. Some of those photos appear elsewhere in this issue of the FOCUS.

After the presentation of photos, we took a break so everyone could watch the SpaceX launch. The meeting resumed after the launch for the special topic discussion on “Plate Solving.” I presented an overview of Plate Solving programs along with an in-depth review of the ways they can fail and how to avoid those failures. Rob Lancaster followed up with a demonstration of a test program that combines open-source code from “Source Extractor” <http://adsabs.harvard.edu/full/1996A%26AS..117..393B> and the blind plate solver used on the web site www.Astrometry.NET.

The screen capture below stands in place of our usual group photo. Most of the participants appear here with their names, but Anthony Albence, Bruce Allison, and Sidney Ocampo all joined the meeting after this screen capture was taken. In all, 15 people participated in the meeting.



The next AP-SIG meeting will be held using Zoom on Saturday, June 20.

DAS Members Can Join the Astronomical League



Astronomical League Membership

As a member of the Delaware Astronomical Society (DAS), you are eligible to join the Astronomical League. Membership in the league costs \$7.50 per year with an annual July 1 renewal date. Lynn King is the Astronomical League coordinator for DAS. You can email Lynn at klynnking AT Verizon DOT net if you have additional questions about the Astronomical League.

What is the Astronomical League?

The Astronomical League is an umbrella organization of amateur astronomy societies. Currently their membership consists of over 240 local amateur societies across the United States of which DAS is a member.

The objective of the Astronomical League is to promote the science of astronomy by:

- 1) fostering astronomical education
- 2) providing incentives for astronomical observation and research
- 3) assisting communication among amateur astronomical societies.

The League's basic goal is to encourage an interest in astronomy (especially amateur astronomy) throughout America. They want people to receive access to telescopes, whether through their local astronomical society, school, or use of their own instruments, and then use them to view the beauty in the heavens.

The Astronomical League provides a number of observing programs for members that require locating and describing certain specified astronomical objects or events. The league also produces a publication for the members, *The Reflector*.

Observing Programs

One of the important programs of the Astronomical League is the Observing Programs. The Astronomical League provides many different Observing Programs. These Observing Programs are designed to provide both a direction for your observations and a goal. The Observing Programs have certificates and pins to both recognize the observers' accomplishments and their demonstration of observing skills with a variety of instruments and objects.

The first observing program was the Messier Observing Award, which was created in 1967. There are currently 65 observing programs, many of which have more than one level. The observing programs are designed for both beginner and advanced astronomers. A list of the observing programs and requirements can be found at astroleague.org.

The most popular program is the Outreach Award, which exists in three levels: Outreach, Stellar, and Master. The Outreach Award is designed to recognize the work of those astronomers who are involved in programs designed to introduce astronomy to the general public.

How to join the Astronomical League

If you are interested in joining the Astronomical League there are several payment options. To allow time for sending payments to the Astronomical League, please send payment by June 25 if you are interested in joining.

- 1) You can use your PayPal account to send payment of \$7.50 to DASmtcuba@gmail.com Mention in the comments section that payment is for Astronomical League annual membership.
- 2) You can pay with PayPal using the link below; you don't need to have an account with PayPal, just a credit card.

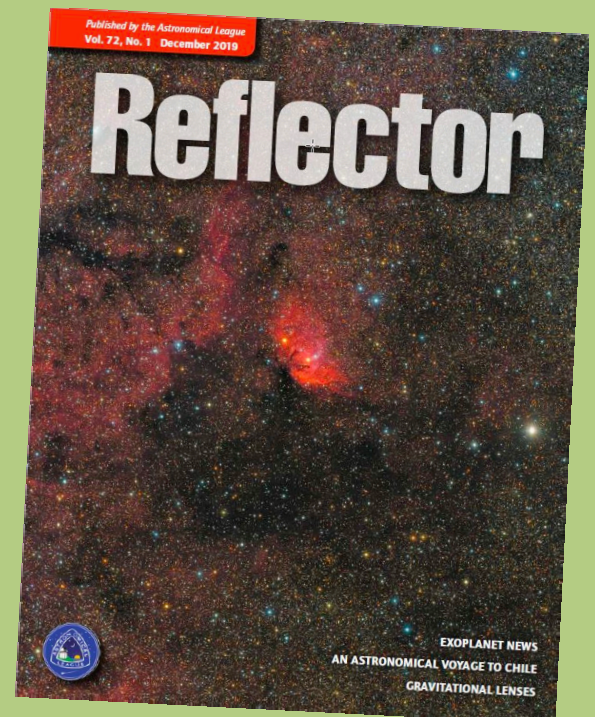
https://www.paypal.com/cgi-bin/webscr?cmd=s-xclick&hosted_button_id=BH7T5RSDXKHMJ

- 3) You can mail payment of \$7.50 to:

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

If you have any questions you can contact me at trebilcock@aol.com.

Robert Trebilcock
DAS Treasurer



Woodside Creamery Outreach Schedule— *All cancelled or on hold for the present*

We will once again host a series of Outreach events at Woodside Farm Creamery. Enjoy some delicious ice cream as we share views of the night sky with the public. This will offer many their first time to see the Moon or major planets through a telescope! Bring a basic scope, pair of binoculars, or just your (basic) knowledge of astronomy. The club even has some loaner telescopes you



can use for this event! Woodside Creamery is located at 378 North Star Road, Newark, DE. The dates are as follows, and I hope to see you there! —Jeff Lawrence

Friday, May 1:	7:00- 8:00
Friday, May 29:	7:30 - 9:00
Friday, June 26:	7:30 - 9:00
Friday, July 24	7:30 - 9:00
Friday, August 28:	6:30 - 9:00
Friday, September 25:	6:00 - 8:00
Friday, October 23:	5:30 - 8:00

MCAO Volunteers Needed

My name is Kim Green and I am the secretary at the Mount Cuba Astronomical Observatory. This year we have increased our field trip activity, we have added many additional Public and Family Nights and we have added additional children's programs to our calendar. The community has requested these programs and we

are doing our best to accommodate. With that being said, we are looking for volunteers to help out.

We are in need of people who are available to help during the day time with our field trips and tours. But we would also love to have some



evening help as well. If you are interesting in helping out please contact me at 302-654-6407 or email me at KimGreenMCAO@gmail.com and I can add you to our volunteer email list so you know when we will need help.

Did you know?...*another way to contribute to the DAS*

The Delaware Astronomical Society is a registered charity under AmazonSmile. Amazon donates 0.5% of the price of eligible smile.amazon.com purchases to the charities selected by customers. If you are making Amazon purchases and want to see a portion of your purchase price donated to DAS please use the link below

Delaware Astronomical Society's unique AmazonSmile charity link: <https://smile.amazon.com/ch/23-7281900>

Do you believe 0.5% couldn't matter?
Think again!

From: Mary Poppins;
extolling the virtues of small
investments



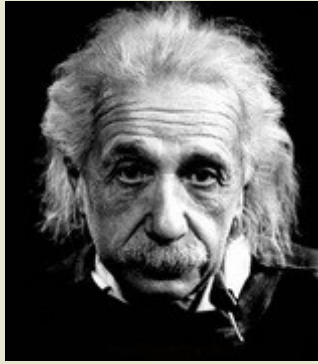
Fidelity Fiduciary Bank

If you invest your tuppence
Wisely in the bank
Safe and sound
Soon that tuppence safely invested in the bank
Will compound
And you'll achieve that sense of conquest
As your affluence expands
In the hands
Of the directors
Who invest as propriety demands

You see, Michael, you'll be part of...
Railways through Africa
Dams across the Nile
Fleets of ocean greyhounds
Majestic self-amortizing canals
Plantations of ripening tea

All from
Tuppence prudently, thriftily, frugally
Invested in the...
To be specific
In the Dawes, Tomes, Mousley, Grubbs
Fidelity Fiduciary Bank

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 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

It is time to renew Delaware Astronomical Society 2020 Annual Membership Dues

November 1 is past--time to renew DAS Dues!

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

Dues remain \$30 for the 2020 calendar year.

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 any meeting. 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
- 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
- 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

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

If you believe that you have already paid your 2020 dues, send me an email at trebilcock@aol.com and we will try to figure out what happened.

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!

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

How to Join the DAS Groups.io Group

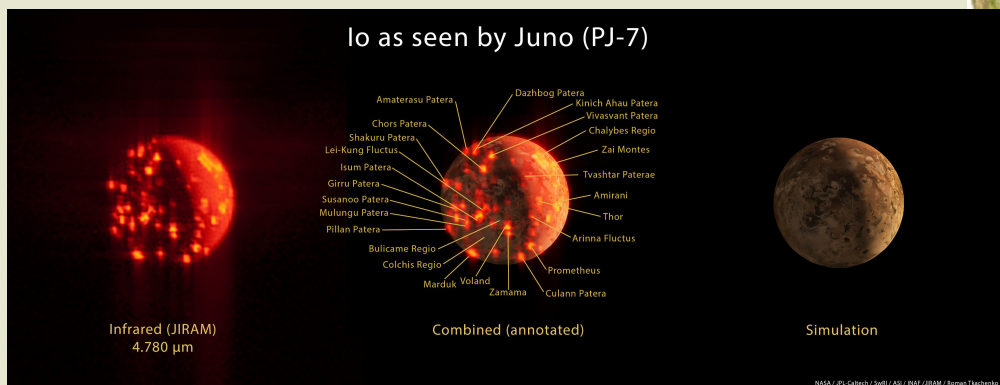
DAS FORUM / E-MAIL SITE ON GROUPS.IO

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**

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: bettysmithers AT verizon.net

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, klynking 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

