PRESIDENT'S CORNER

by Dell Vance

Ann-Maree Vance

We are starting to see some clear nights in the 20s. Spring must be coming. Wait a minute—we are already past the spring equinox! Spring is here, Cache Valley style. When you think about it, the spring and fall equinox are when the sun is directly over the equator. Therefore, that is not the beginning of spring or fall; it is actually the midpoint of the season. Technically, I would think spring should start about six weeks before that date. I doubt they will change the calendars just for me.

It was great to get out into my observatory and to start imaging again. I've shared a couple of my images on Facebook. I also finally was able to get an image of the Rosette Nebula, C49. With the Sky-Watcher 100ED telescope, I can get the whole nebula in the image. I attached my stacked image below.

We had a really great CVAS meeting last month. It was our first time meeting at the Engineering Lab at

Wikimedia Commons

UPCOMING EVENTS

Club Meeting
- Friday, April 14, at 7:00 p.m. We will be meeting at the USU Engineering Lab building, room 107. (NEW location! Reach out to a member of the Exec-Comm if you need a map or directions.)
- Brief business meeting about club participation.
- Speaker: CVAS Secretary-Treasurer will be presenting on archaeoastronomy and architecture.

STEM Events
Events last from 6:00 to 8:00 p.m. Please plan to arrive at 5:30.
- April 13: Canyon Elementary
- April 13: Center for Creativity, Innovation, and Discovery (CCID)

Star Parties
Please be there with your telescope set up by 7:45 p.m.
- April 27: Smithfield Public Library
- April 28: North Logan Public Library

Keep up to date by visiting our website:

President's Corner, cont'd from p. 1

USU. We want to thank Randy Jost for hosting us. We had 32 people in attendance. It is the largest group we've had since the pandemic. Dale Hooper gave a great presentation about the James Webb Space Telescope (JWST). It was an update of things we are already learning from the JWST. It is a marvel, to say the least. We also recognized our 18 members that received NASA Night Sky Network Outreach Awards for 2022. We certainly appreciate all the good work that is being done by our members.

Our next meeting is April 14 at the USU Engineering Lab, room 107. Bonnie Schenk-Darrington will give a presentation on how ancient cultures used astronomy. It should be very informative. Bonnie has a passion for this topic and I'm sure she will do a great job.

Of the 32 people that attended our last meeting, only 10 were members of CVAS. We have concerns about the apparent drop in participation of our membership. We have 58 members on the roll. Many we have not seen or heard from since the beginning of the pandemic. We would like to get the membership's opinion on what we can do to increase club participation. We will have a short business item at our next meeting on April 14. I would like to see as many members attend as possible so we can get input on this issue. If you cannot attend, please send a member of the Executive Committee your thoughts. One thought that has been brought up in the Executive Committee is to reinstate annual dues as a measurement of the interest among our membership. This would probably be a nominal fee of $10 per family. We don't really need the money for the club expenses, but it would show commitment to CVAS. Active members would con-

tinue to be on the Groups.Io mailing list and receive current information as usual, including the monthly newsletter. They would also be eligible to be on the club roster on the Night Sky Network website.

Thanks again for your support and we hope to see you at the April Meeting.

Clear Skies,
Dell Vance

Image courtesy of the author.

C49 Rosetta Nebula
9/17/2023 9:00 to 10:30 PM MDT.
Canon T3i ISO1600 29 Stacked images 180 sec
SW 100 ED telescope w/AG & FR f/.08
Distance: 5,200 LY

USU Observatory Update

The observatory is currently closed and will reopen in the spring. For details about location, targets, weather, and parking, visit the USU Physics Department website here.

ClipartMax

SPRING GALAXIES

by Blaine Dickey

After a long, cold, cloudy winter, it feels good to go outside again to observe under warm, clear skies. What greets the eager observer in the springtime sky is an expansive group of galaxies waiting to be admired through the eyepiece of your telescope. Each galaxy is unique in that none of them are exactly alike. Here are several of the many galaxies worth seeing this time of the year.
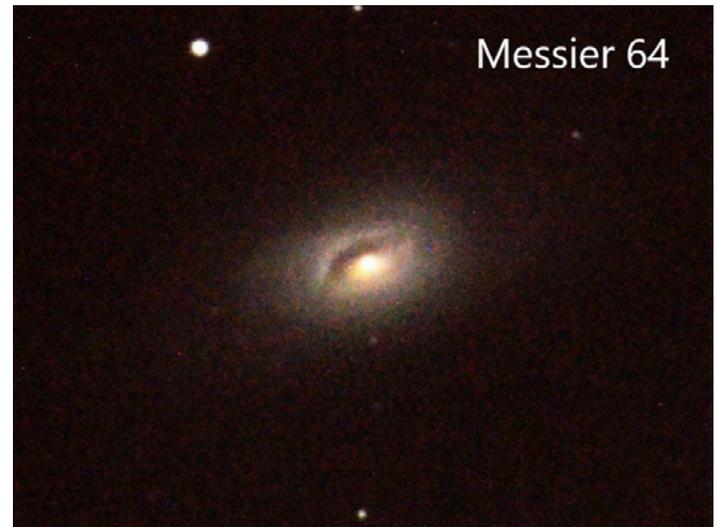

Messier 51

Messier 51, also known at the **Whirlpool Galaxy**, lies in the constellation Canes Venatici. The distance from the Earth is between 23-31million light-years. Though it is magnitude +8.4, it is quite dim in the eyepiece of a telescope. The other galaxy in the image is **NGC 5195**, which is interacting gravitationally with Messier 51.

Messier 61 in Virgo, also known as **NGC 4303**, is
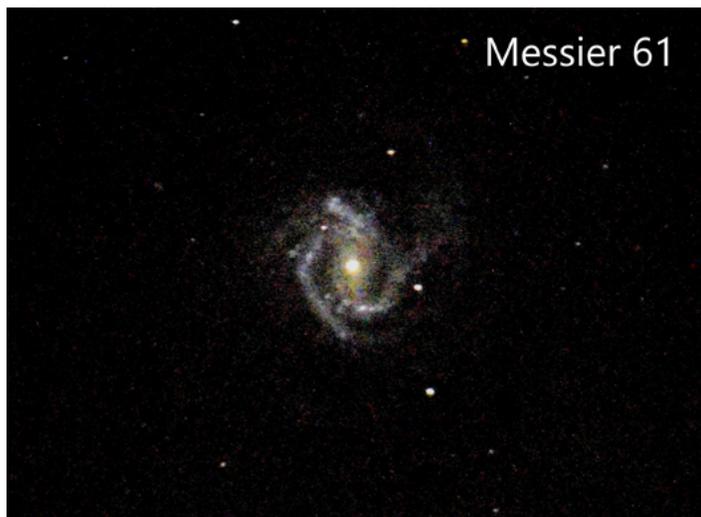
an intermediate barred spiral galaxy at a distance of 55 million light-years and a magnitude of +10.2. It is one of the largest galaxies in the Virgo cluster, with a diameter of about 100,000 light-years, which is about the size of our Milky Way galaxy.

Messier 64

Messier 64 in Coma Berenices is also known as the **Black Eye Galaxy**, the **Evil Eye Galaxy**, or the **Sleeping Beauty Galaxy**. It is relatively close by at 24 million light-years, at a magnitude of +9.36. You will notice the band of absorbing dust that gives it an appearance that is suggestive of its various names.

NGC 4244 in Canes Venatici is also called the **Silver Needle Galaxy**. This edge-on galaxy was discovered by William Herschel in 1788. It is 14 million

Messier 61

NGC 4244

Spring Galaxies, cont'd from p. 3

light-years from Earth and has a magnitude of +10.0. This galaxy is part of a local group of 16 galaxies known as the M94 Group, which includes our own Milky Way.


Messier 106

Messier 106 in Coma Venatici is also known as **NGC 4258**. Its distance is about 24 million light-years from the Earth. It comes in at magnitude +9.1, so it should be visible in small telescopes. In the center of this galaxy is a black hole estimated to have a mass of 40 million solar masses. Supernova 1981K was discovered in this galaxy by several amateur astronomers in 1981. It only reached a magnitude of +16.

NGC 3628

NGC 3628 in Leo is also known as the **Hamburger Galaxy**. A trip to it would take you 35 million years if you could travel at the speed of light. It comes in at magnitude +9.6, putting it in view of a small telescope. It is part of a galaxy group known as the Leo Triplet, which includes Messier 65 and 66.
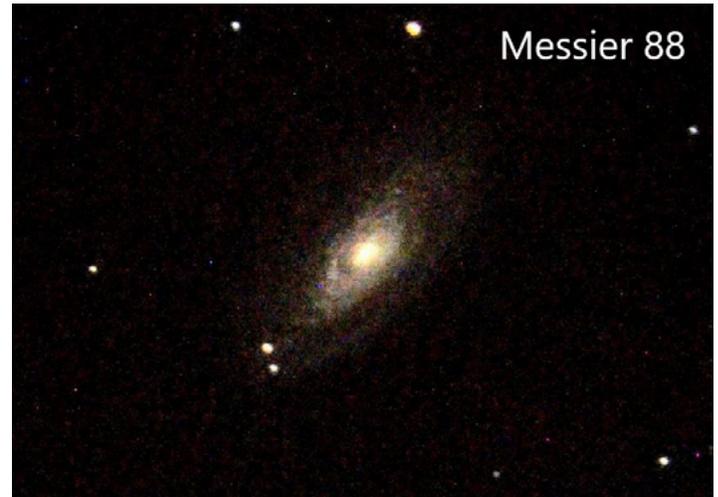
Messier 88

Messier 88 in Coma Berenices is a beautiful spiral galaxy discovered by Charles Messier in 1781. It is between 50 to 60 million light-years distant, appearing at magnitude +9.6. This is a large galaxy and contains around 400 billion stars. It also has a black hole at the center estimated to be 100 million times the mass of our sun.

NGC 4490 & NGC 4485

NGC 4490 in Canes Venatici is also called the **Cocoon Galaxy**. It is about 25 million light-years distant and appears at magnitude +9.8. **NGC 4485** is a close companion galaxy at only 24,000 light-years from the Cocoon Galaxy and forms a pair called Arp 269 in the *Atlas of Peculiar Galaxies* by Halton Arp. The gravity interaction between these galaxies has produced a trail of stars between them.

PROBABLY MORE THAN YOU EVER WANTED TO KNOW ABOUT THE EXIT PUPIL

$$\text{Minimum Magnification} = \frac{\text{Aperture}}{\text{Exit Pupil}}$$

by Dale Hooper

Last November, I gave a club presentation about telescope eyepieces. One of the subjects I covered was the exit pupil value, and Bonnie asked if I could explain a bit more about it.

Expansive wide-field views are always great. Everyone likes a nice, low-power, immersive view of the Milky Way. However, for any given instrument and individual astronomer, there is a limitation for how low the magnification can be without creating issues. This limitation is affected by the level of dark adaptation and age of the observer. With any optical system such as a telescope or binoculars, a small virtual image is formed at the "eye relief" distance (typically 15 to 20mm behind the eyepiece); see Figure 1. The diameter of this virtual image is known as the **exit pupil size**.
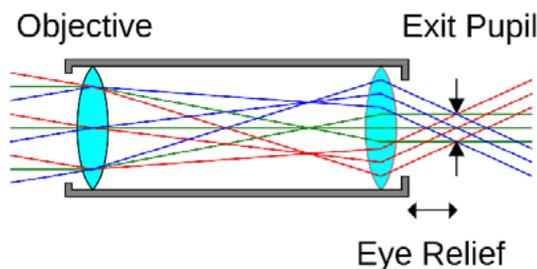
Wikimedia Commons

Figure 1. Eye relief and exit pupil.

If the magnification is too low, the exit pupil will be larger than the observer's pupil, so some of the light from the telescope will not make it into the observer's eye. This causes the observer to have to move his/her eye around to see the "full picture." In addition, if we are using a reflector telescope, as we decrease the magnification, the size of the secondary mirror shadow becomes bigger. This can get annoying and decreases contrast if the mirror shadow gets too big.

One of the reasons that we want to observe with dark-adapted eyes is so that our pupil size will be as large as possible and allow in all of the available light.

However, as mentioned, as we get older, our dilated pupil size becomes smaller. An average 20-year-old may have a maximum pupil size of 8 mm, but a typical 50-year-old will have a maximum pupil size of 5 mm. Table 1 shows the maximum day and night pupil size for the average person of different ages. Keep in mind that these are average values and that the maximum pupil size for a given individual can vary from these by up to +/- 2 mm.

Average Human Eye Pupil Diameter vs. Age		
Age (years)	Day (mm)	Night (mm)
20	4.7	8
30	4.3	7
40	3.9	6
50	3.5	5
60	3.1	4.1
70	2.7	3.2
80	2.3	2.5

Rob Roy and Hamilton Amateur Astronomers

Table 1. Typical maximum pupil size vs age.

The formula for calculating the exit pupil is given by:

$$\text{Exit pupil (in mm)} = \frac{\text{Aperture (in mm)}}{\text{Magnification}}$$

We can also rework this equation to give us the lowest reasonable magnification value for any specific exit pupil size. This would be given as:

$$\text{Minimum magnification} = \frac{\text{Aperture}}{\text{Exit pupil}}$$

For these calculations, recall that magnification is computed as the telescope focal length (in mm) divid-

Exit Pupil, cont'd from p. 5

ed by the eyepiece focal length (in mm).

For example, if we are a typical 30-year-old observer with an 8-inch telescope, the minimum usable magnification would be calculated as follows:

$$\text{Aperture (in mm)} = 8 \text{ inches} \times \frac{25.4 \text{ mm}}{\text{inch}} = 203.2 \text{ mm}$$

$$\text{Minimum magnification} = \frac{203.2 \text{ mm}}{7 \text{ mm}} = \sim 29x$$

Likewise, the minimum usable magnification for a typical 50-year-old with a 12-inch (304.8 mm) telescope would be:

$$\text{Minimum magnification} = \frac{304.8 \text{ mm}}{5 \text{mm}} = \sim 61x$$

So, it may not always make sense for us run out and purchase a 40mm eyepiece for our new telescope!

To get an approximation of your pupil size, as suggested by Alan MacRobert of *Sky & Telescope* magazine, you can use a standard pencil, which is about 7 mm in diameter. Place the pencil in front of your eye, resting it on your eyebrow and cheek and then close the other eye. In bright light, you will see a fuzzy edge and an opaque core. In dim light, if the core thins away completely so that you can see a little light right through the center, your pupil has enlarged greater than 7 mm.

You can do a more exacting measurement by having a friend use a millimeter scale ruler to measure your pupil in low light, or you could possibly do it yourself using a mirror.

However, when all is said and done, you will likely notice that the most pleasing views through your telescope will occur when the exit pupil value is somewhere between 2 mm and 5 mm. If the exit pupil size is much smaller than 2 mm, the magnification power is probably too large. This dims the image and the "floaters" in your eyes may begin to affect your ability to see the field clearly. And as we've just discussed, if the magnification is too small, you also lose light.
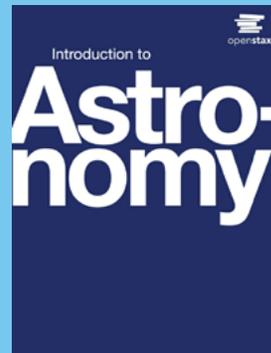
Spring Galaxies, cont'd from p. 4

Messier 105, NGC 3379, and NGC 3384

Finally, **Messier 105** (right center) in Leo is an elliptical galaxy, appearing smooth and without features. It is located about 35 million light-years from Earth at magnitude +10.2. It forms a group of galaxies with **NGC 3379** (at top) and **NGC 3384** (left bottom), called the Leo l group.

This is but the tip of the iceberg of the galaxies visible in the evening spring time skies. These galaxy groups form a second Milky Way of sorts, stretching between Ursa Major in the north to Virgo in the south. To see each of these galaxies in an eyepiece is sublime. If you have a telescope equipped with a camera, you will be busy for a long time. Happy hunting!
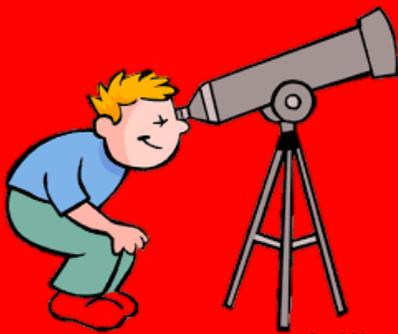
Images courtesy of the author.

Clipart.World and Cliparts Zone

Need a quick astronomy fix?
Tune in to CVAS's astronomy show on Utah Public Radio!

UTAH SKIES

Every Tuesday at 4:48 p.m.
91.5 KUSU-FM (west Cache Valley)
89.5 KUSR (east Cache Valley)

You can also download the UPR app or listen to the livestream here.
Check out our past radio shows here.

Stumped? Befuddled?? Bamboozled???
Telescope Help Is Available!

When even your CVAS friends can't answer your obscure telescope
questions, you might find it helpful to
call Tom Sevcik
at the Clark Planetarium in Salt Lake City!
His number is (385) 468-1264. You can read his bio on the
Clark Planetarium website.

CoolClipart.com

You can see CVAS events on the NASA Night Sky Network
calendar at https://nightsky.jpl.nasa.gov/clubs-and-events.cfm. If you don't yet have access to the NSN
website, please let a member of the
Executive Committee know! We can add you to the roster
and help you create a login and
password.

Classroom Clipart

PHOTOS FROM RECENT STEM NIGHTS

Clockwise from top left:

Bruce Horrocks demonstrates Stellarium to students and their families; Dane Darrington helps students craft small models of Comet C2022 E3 (ZTF); Becca and Dean L. teach students about the solar system; a comet craft; Alannah Darrington helps a student make a comet craft.

Photos courtesy of Bonnie Schenk-Darrington.

PHOTOS FROM RECENT CLUB MEETINGS

Club meeting on February 10:

Right: Blaine Dickey discusses viewing and imaging Comet C2022 E3 (ZTF).

Below: Zach Casper, an engineer who helped build the booster rockets for the Artemis I mission, presents to the club.

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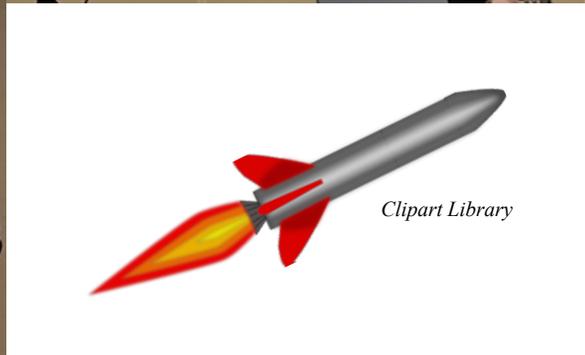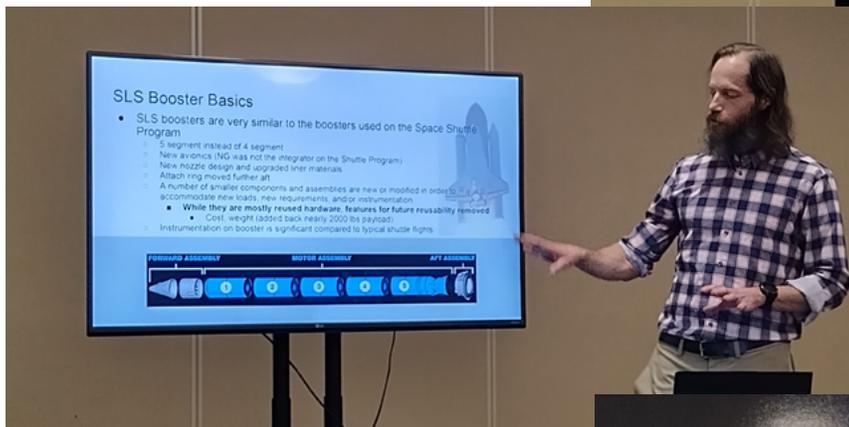
Club meeting on March 10:

Right: Dale Hooper shows images contrasting the capabilities of Hubble and JWST.

Below: Members socialize after the meeting's end.

Photos courtesy of Bonnie Schenk-Darrington.

UPCOMING ASTRONOMY EVENTS AND ANNIVERSARIES

by Bonnie Schenk-Darrington

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- April 5: Judith Resnick, the first Jewish woman in space, born in 1949. She was killed in the *Challenger* disaster in 1986.
- April 5: Paschal full moon.
- April 9: NASA announces the first team of astronauts, the Mercury 7, 1959.
- April 9: Easter Sunday—or, in other words, the first Sunday after the full moon that occurs after March 21 (Paschal full moon).
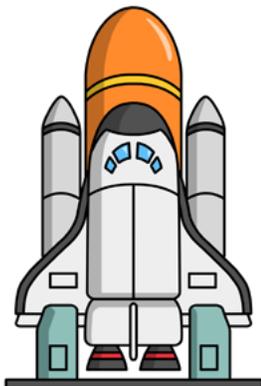- April 11: Bernhard Schmidt, inventor of the Schmidt telescope, born in 1879.

Stamp Community Family

- April 11: Mercury at its highest altitude in the evening sky.
- April 12: Yuri's Night, a holiday celebrating the anniversary of the launch of the first man into space: Yuri Gagarin in 1961.
- April 12: First space shuttle launch in 1981.
- April 14: Christiaan Huygens born in 1629. He studied the rings of Saturn and discovered its moon, Titan. He was also one of the most important figures of the scientific revolution.

PNGlib and Creazilla

Wikimedia Commons

- April 15: Conjunction of the moon and Saturn.
- April 15–22: International Dark Sky Week. Check out the IDSW website and cool events celebrating dark skies, such as this online showing of the documentary *Northern Nights, Starry Skies* or the Stellar Vista star party in Kanab, Utah.
- April 19: Gertrude Bacon, aeronaut and astronomer, born in 1874.
- April 21: Conjunction of moon and Mercury.
- April 23: Lyrids meteor shower peaks.
- April 23: Conjunction of the moon and Venus.
- April 25: Conjunction of the moon and Mars.
- April 28: Moon at apogee; it will be at its farthest point from Earth and will appear a bit smaller than usual.

EXECUTIVE COMMITTEE

CACHE VALLEY ASTRONOMICAL SOCIETY

Our Website: CVAS-UTAHSKIES.ORG

- President: Dell Vance; avteam.dell@gmail.com
- Vice President: Dale Hooper; dchooper5@gmail.com
- Secretary-Treasurer: Bonnie Schenk-Darrington; bschenkdarr@gmail.com
- Night Sky Network Coordinator: Dell Vance; avteam.dell@gmail.com
- Public Relations: Bruce Horrocks; bruceh@gembuildings.com
- Webmaster-Librarian: Tom Westre; twestre45@aol.com

Your Image Could Be in *Cache Valley Clear Skies* Next Month!

We all learn when you share your astrophotography with the club! Send your images to bschenkdarr@gmail.com for publication!

PNGEgg

pngset

Hey, Astronomy Hero!
What's Your Origin Story?

CVAS members are astronomy superheroes who share their love of astronomy with the galaxy! (Or, at least with the people of Earth!)

What piqued your interest in astronomy? Please tell us! Send your article to Bonnie at bschenkdarr@gmail.com!

A LITTLE ASTRONOMY HUMOR

Employees must applaud the planets.

EMPLOYEES

Mercury Venus Earth Mars Jupiter Saturn

Highest Tax Rate in the Solar System

Memebase

CACHE VALLEY ASTRONOMICAL SOCIETY
MEMBERSHIP APPLICATION FORM
Member # _____

NAME:_____ _____ _____
       First   Middle Initial   Last

Address:_____ _____ _____ _____
                     Street   City   State   Zip Code

Home Phone: _____ **Cell Phone**:_____

Work Phone : _____ **Occupation** :_____

Email Address: _____

How did you learn about CVAS?

    _____Website   ____Star Party   ____CVAS Member   ____Other _____

 Membership: $20 lifetime membership

Tell us about yourself: Do you have a special interest in astronomy?   Do you have special skills? Are you willing to volunteer on CVAS projects or attend public outreach star parties? Astro equipment owned.

_____

_____

By signing this application, I acknowledge I have access to the CVAS website, cvas-utahskies.org , and the CVAS constitution. I agree to abide by the constitution.

Signature: _____ Date:_____

Bring this form to the meeting or contact **Bonnie Schenk-Darrington, Secretary/Treasurer** at bschenkdarr@gmail.com.