CACHE VALLEY ASTRONOMICAL SOCIETY

Cache Valley Clear Skies

The Journal of the Cache Valley Astronomical Society

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Total Solar Eclipse Countdown:
152 days (as of March 22nd)

Total Solar Eclipse Image courtesy NASA

Meeting Announcement

This month we will be meeting on Wednesday, March 22nd at 7pm in room 806/808 of the main BATC campus. Enter on the east side of the building located at 600 W 1400 N.

This month we will have a discussion of our favorite constellations to observe. We will discuss topics such as where is it located, when is it visible, showpiece and other noteworthy objects, the origin of the constellation's name, mythology, and history, etc. This should be a log of fun. Those in attendance will select which constellations are presented.

The President's Corner
By Dell Vance, CVAS President

March from a CVAS perspective, started off like a lion. Tom Westre and I had the opportunity to participate in a Literacy Night at Lincoln Elementary School in Hyrum last night March 1. Tom did a great job of making 20 minute presentations to the students as they came to hear about Astronomy. The last group was over 50 people. I was outside showing the students views of Venus (which was a

beautiful crescent) and the Crescent Moon. It was fun convincing the students that Venus is a planet and not a smaller image of the Moon. The craters on the Moon were spectacular. After about 90 minutes, I was finally getting cold. Tom had the warm comfy job, but my job was a lot more fun. I always love to hear the excited exclamations as they finally get to see the object in the eyepiece.

Our February Meeting at the BATC (Bridgerland Applied Technology College) was a very well attended success. Dale Hooper provided valuable information to help us plan and prepare for the upcoming Total Solar Eclipse in August. He also demonstrated why it is worth traveling 175 miles to see the Total Eclipse rather than settling for only 96% here in Cache Valley. We had 48 people in attendance at the meeting. Our largest attendance in the last 4 years. The new venue was great for our club and should be a real important resource for us. We certainly appreciate the BATC's willingness to provide this venue.

This month we will have our meeting there again on March 22nd at 7:00 PM. The topic is Constellations. We hope to have several presenters giving important facts about some of our favorite constellations. Things like:

- How do you find it?
- Stories behind the Constellation.
- What things can you see within the Constellation?
- When is it visible?
- And other information

Be sure to bring your friends and share this evening with us.

Thanks for all your support in making CVAS a resource for the Cache Valley.

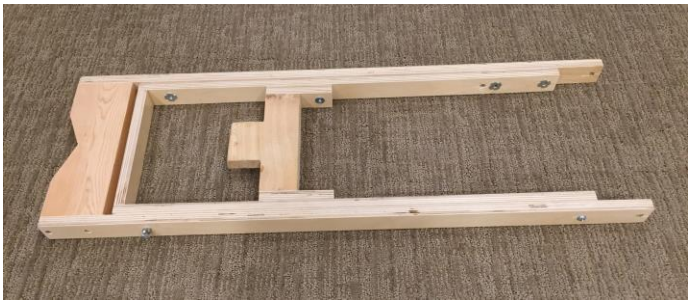
Clear Skies!

Binocular Supports

The club now has available a number of mostly completed binocular supports. These supports are being sold to club members at cost. These supports just need the binocular attachment – which is tailored to the type of binocular being mounted.

Please contact Ned Miller or Dell Vance if you are interested in purchasing a binocular support. The images below show what they look like with binoculars attached as well as an image showing them folded for storage.

Completed Binocular Support (with binos attached) - Courtesy Ned Miller

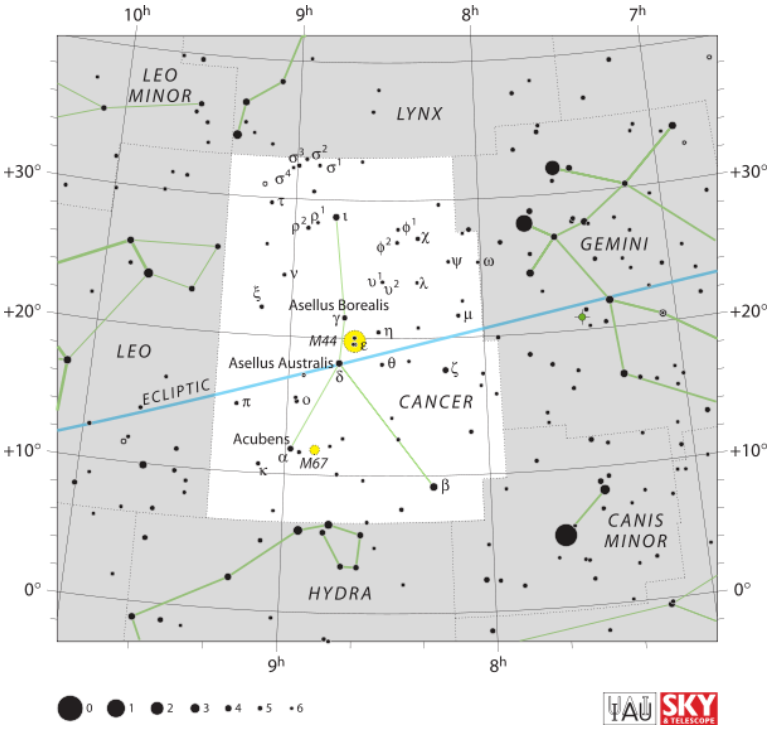


Binocular support (folded for storage) - Courtesy Ned Miller

CVAS Loaner Telescope

CVAS provides a 10 inch Dobsonian telescope to club members. Contact Brad Kropp to make arrangements to use this telescope.

Brad can be contacted by email at brad.kropp@usu.edu.



IAU and Sky & Tel - Roger Sinnott & Rick Fienberg

Spotlight on Cancer, the Crab

By Dale Hooper

Cancer the Crab is certainly not known for the brightness of its stars. It is definitely a dim constellation but it is also a zodiacal constellation. So the moon passes through it each month and occasionally planets will be located there. Cancer is sandwiched between the much brighter Leo and Gemini. Cancer is best known for two very nice open clusters, Messier 44 the Beehive Cluster and Messier 67. It is also the home of a few nice multiple stars and some galaxies.

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Objects which rank at least three stars in *The Night Sky Observer's Guide* (Cancer is in Volume 1) have been included. As usual, the table is organized according to increasing Right Ascension values.

Object	R.A.	Dec.
Messier 44 (Open cluster)	08h40.1m	+19°59'
48 Cancri (Double star)	08h46.7m	+28°46'
NGC 2672 (Galaxy mag 11.7)	08h49.4m	+19°04'
Messier 67 (Open cluster)	08h50.4m	+11°49'
57 Cancri (Triple star)	08h54.2m	+30°35'
NGC 2749 (Galaxy mag 11.8)	09h05.7m	+18°20'
NGC 2775 (Galaxy mag 10.1)	09h10.3m	+07°02'

Messier 44 (Beehive Cluster) - Courtesy Joseph Brimacombe

CVAS Minutes – February 2017

The meeting was held on February 22nd in room 840 in the Main Campus building of BATC. Dell Vance and Dale Hooper discussed current sky events. There were 48 people in attendance.

The time was then turned over to Dale Hooper to discuss preparing for the August 21st Total Solar Eclipse. Dale mentioned that the last total solar eclipse in the continental United States occurred in 1979. He shared a segment from a History Channel episode of The Universe concerning information about total eclipses. He then reviewed the Sun-Moon-Earth configuration required for a total eclipse to explain why they are fairly rare.

Dale then discussed some of the phenomena associated with solar eclipses including crescent shadows, sky darkening and the Moon's shadow, temperature drop, the ability to see bright stars and planets during totality and shadow bands.

He then discussed the brightness and beauty and some of the features of the solar corona and prominences that may be visible during totality.

He then explained the importance of eye protection during partial phases and several ways to observe the Sun safely during partial phases of the eclipse.

The presentation then turned to the path of totality including the importance of staying near the center line, staying mobile and maps of the eclipse path.

Dale then touched on photography of the eclipse including photo sequencing solutions but recommended against attempting photography of your first total solar eclipse.

Lastly, he mentioned several future total and annular eclipses which could be observed from the United States including "the Big One" which will cross Utah on August 12, 2045 and which provide for five minutes of totality in locations in Utah.

We finished up by giving out some great door prizes.

Upcoming Star Parties

There are currently no CVAS star parties planned for March 2017.

Upcoming Events

01 Mar	Ash Wednesday
	Venera 3, first craft to impact Venus (1966)
02 Mar	Ceres 0.4° north of Moon
04 Mar	Occultation of Aldebaran by the Moon at approximately 8:23pm. Ingress occurs on the dark side of the Moon and egress will occur on the lit side of the nearly first quarter Moon.
05 Mar	First quarter Moon
07 Mar	John Herschel born (1792)
10 Mar	Regulus 0.8° north of Moon
12 Mar	Daylight Saving Time begins
	Full Moon
13 Mar	William Herschel discovers Uranus (1781)
	Percivall Lowell born (1855)
	Giotto flies past Halley's Comet (1986)
14 Mar	Albert Einstein born (1879)
	International PI day
16 Mar	Robert Goddard launches first liquid fueled rocket (1926)
17 Mar	Saint Patrick's Day
	MESSENGER orbits Mercury (2011)
18 Mar	Alexei Leonov first space walk (1965)
20 Mar	Last Quarter Moon
	Vernal Equinox, 1st Day of Spring!
22 Mar	CVAS club meeting (7pm), Room 806/808 main BATC campus
23 Mar	First photograph of Moon (1840)
24 Mar	Walter Baade born (1893)
25 Mar	Christiaan Huygens discovers Saturn's moon Titan (1655)
26 Mar	Occultation of Neptune by the Moon
27 Mar	New Moon
28 Mar	Heinrich Olbers discovers asteroid Pallas (1802)
29 Mar	Heinrich Olbers discovers asteroid Vesta (1807)
	Mariner 10, first Mercury flyby (1974)

NASA Telescope Reveals Largest Batch of Earth-Size, Habitable-Zone Planets Around Single Star

This illustration shows the possible surface of TRAPPIST-1f, one of the newly discovered planets in the TRAPPIST-1 system. Scientists using the Spitzer Space Telescope and ground-based telescopes have discovered that there are seven Earth-size planets in the system.
Credits: NASA/JPL-Caltech
View this and many more images, as well as several videos, in an extensive multimedia gallery highlighting this discovery.

NASA's Spitzer Space Telescope has revealed the first known system of seven Earth-size planets around a single star. Three of these planets are firmly located in the habitable zone, the area around the parent star where a rocky planet is most likely to have liquid water.

The discovery sets a new record for greatest number of habitable-zone planets found around a single star outside our solar system. All of these seven planets could have liquid water – key to life as we know it – under the right atmospheric conditions, but the chances are highest with the three in the habitable zone.

“This discovery could be a significant piece in the puzzle of finding habitable environments, places that are conducive to life,” said Thomas Zurbuchen, associate administrator of the agency’s Science Mission Directorate in Washington. “Answering the question ‘are we alone’ is a top science priority and finding so many planets like these for the first time in the habitable zone is a remarkable step forward toward that goal.”

At about 40 light-years (235 trillion miles) from Earth, the system of planets is relatively close to us, in the constellation Aquarius. Because they are located outside of our solar system, these planets are scientifically known as exoplanets.

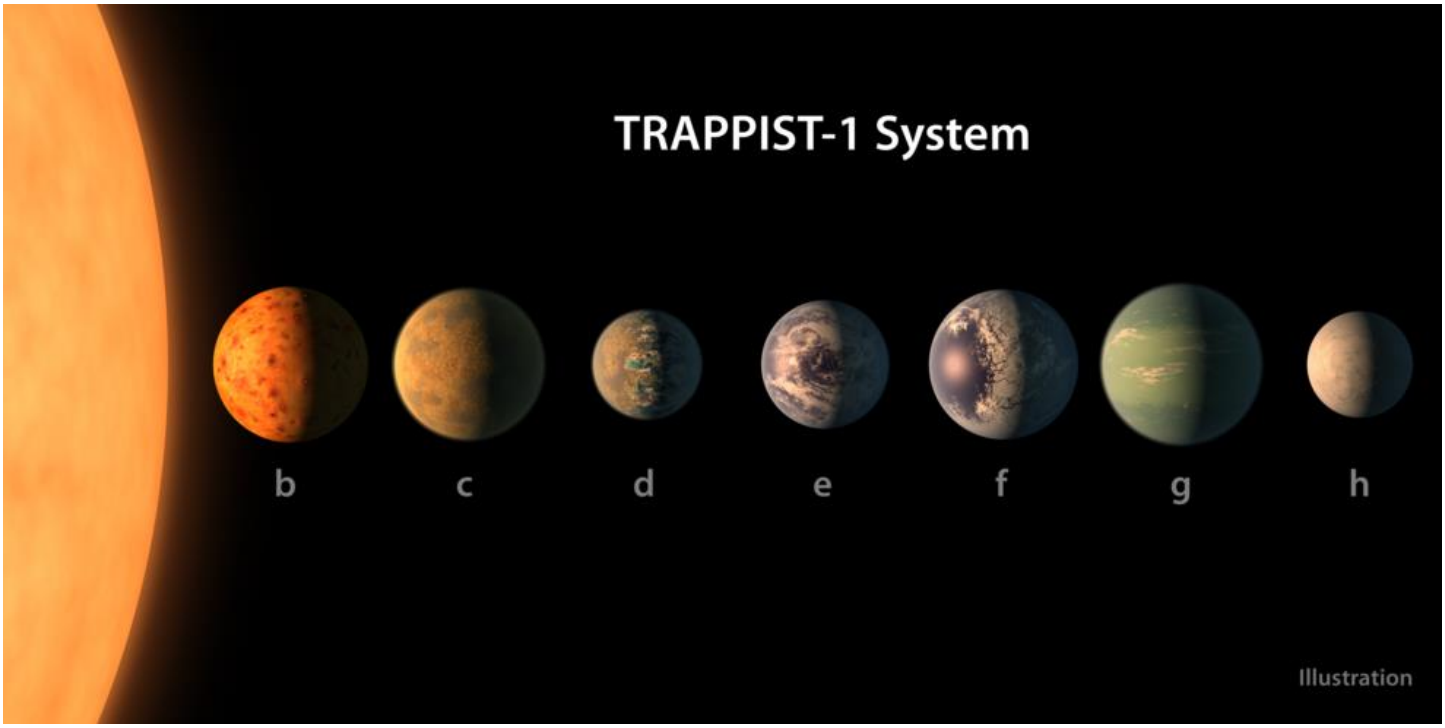
This exoplanet system is called TRAPPIST-1, named for The Transiting Planets and Planetesimals Small Telescope (TRAPPIST) in Chile. In May 2016, researchers using TRAPPIST announced they had discovered three planets in the system. Assisted by several ground-based telescopes, including the European Southern Observatory's Very Large Telescope, Spitzer confirmed the existence of two of these planets and discovered five additional ones, increasing the number of known planets in the system to seven.

The new results were published Wednesday in the journal Nature, and announced at a news briefing at NASA Headquarters in Washington.

Using Spitzer data, the team precisely measured the sizes of the seven planets and developed first estimates of the masses of six of them, allowing their density to be estimated.

Based on their densities, all of the TRAPPIST-1 planets are likely to be rocky. Further observations will not only help determine whether they are rich in water, but also possibly reveal whether any could have liquid water on their surfaces. The mass of the seventh and farthest exoplanet has not yet been estimated – scientists believe it could be an icy, "snowball-like" world, but further observations are needed.

"The seven wonders of TRAPPIST-1 are the first Earth-size planets that have been found orbiting this kind of star," said Michael Gillon, lead author of the paper and the principal investigator of the TRAPPIST exoplanet survey at the University of Liege, Belgium. "It is also the best target yet for studying the atmospheres of potentially habitable, Earth-size worlds."



This artist's concept shows what each of the TRAPPIST-1 planets may look like, based on available data about their sizes, masses and orbital distances.
Credits: NASA/JPL-Caltech
View full image and caption

In contrast to our sun, the TRAPPIST-1 star – classified as an ultra-cool dwarf – is so cool that liquid water could survive on planets orbiting very close to it, closer than is possible on planets in our solar system. All seven of the TRAPPIST-1 planetary orbits are closer to their host star than Mercury is to our sun. The planets also are very close to each other. If a person was standing on one of the planet's surface, they could gaze up and potentially see geological features or clouds of neighboring worlds, which would sometimes appear larger than the moon in Earth's sky.

The planets may also be tidally locked to their star, which means the same side of the planet is always facing the star, therefore each side is either perpetual day or night. This could mean they have weather patterns totally unlike those on Earth, such as strong winds blowing from the day side to the night side, and extreme temperature changes.

Spitzer, an infrared telescope that trails Earth as it orbits the sun, was well-suited for studying TRAPPIST-1 because the star glows brightest in infrared light, whose wavelengths are longer than the eye can see. In the fall of 2016, Spitzer observed TRAPPIST-1 nearly continuously for 500 hours. Spitzer is uniquely positioned in its orbit to observe enough crossing – transits – of the planets in front of the host star to reveal the complex architecture of the system. Engineers optimized Spitzer's ability to observe transiting planets during Spitzer's "warm mission," which began after the spacecraft's coolant ran out as planned after the first five years of operations.

"This is the most exciting result I have seen in the 14 years of Spitzer operations," said Sean Carey, manager of NASA's Spitzer Science Center at Caltech/IPAC in Pasadena, California. "Spitzer will follow up in the fall to further refine our understanding of these planets so that the James Webb Space Telescope can follow up. More observations of the system are sure to reveal more secrets."

Following up on the Spitzer discovery, NASA's Hubble Space Telescope has initiated the screening of four of the planets, including the three inside the habitable zone. These observations aim at assessing the presence of puffy, hydrogen-dominated atmospheres, typical for gaseous worlds like Neptune, around these planets.

In May 2016, the Hubble team observed the two innermost planets, and found no evidence for such puffy atmospheres. This strengthened the case that the planets closest to the star are rocky in nature.

"The TRAPPIST-1 system provides one of the best opportunities in the next decade to study the atmospheres around Earth-size planets," said Nikole Lewis, co-leader of the Hubble study and astronomer at the Space Telescope Science Institute in Baltimore, Maryland. NASA's planet-hunting Kepler space telescope also is studying the TRAPPIST-1 system, making measurements of the star's minuscule changes in brightness due to transiting planets. Operating as the K2 mission, the spacecraft's observations will allow astronomers to refine the properties of the known planets, as well as search for additional planets in the system. The K2 observations conclude in early March and will be made available on the public archive.

Spitzer, Hubble, and Kepler will help astronomers plan for follow-up studies using NASA's upcoming James Webb Space Telescope, launching in 2018. With much greater sensitivity, Webb will be able to detect the

chemical fingerprints of water, methane, oxygen, ozone, and other components of a planet's atmosphere. Webb also will analyze planets' temperatures and surface pressures – key factors in assessing their habitability.

NASA’s Jet Propulsion Laboratory (JPL) in Pasadena, California, manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate. Science operations are conducted at the Spitzer Science Center, at Caltech, in Pasadena, California. Spacecraft operations are based at Lockheed Martin Space Systems Company, Littleton, Colorado. Data are archived at the Infrared Science Archive housed at Caltech/IPAC. Caltech manages JPL for NASA.

For more information about Spitzer, visit:

https://www.nasa.gov/spitzer

For more information on the TRAPPIST-1 system, visit:

https://exoplanets.nasa.gov/trappist1

For more information on exoplanets, visit:

https://www.nasa.gov/exoplanets

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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 a year

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 Mail Application to:

Ned Miller, CVAS Treasurer
480 N 400 E
Providence, Utah 84332

For any questions contact our Treasurer at nedmiller2008@gmail.com or our Secretary Dale Hooper at dchooper5@gmail.com .