

Cache Valley Clear Skies

The Journal of the Cache Valley Astronomical Society



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Meeting Announcement

Our December meeting will be held on the **second Wednesday in December, December 13, 2017 at 7pm in room 806/808 of the main BATC campus.** Enter on the east side of the building located at 1301 North 600 West. Our featured presentation will be a video entitled, “The Star of Bethlehem – Unlock the Mystery of the World’s Most Famous Star”.

From the DVD jacket, “Scholars debate whether the Star of Bethlehem is a legend created by the early church or a miracle that marked the advent of Christ. Is it possible that the star was a real astronomical event?”

This is a fascinating and thought provoking video which has a lot of information related to astronomical events which you can check out yourself with your own planetarium software.

Announcement

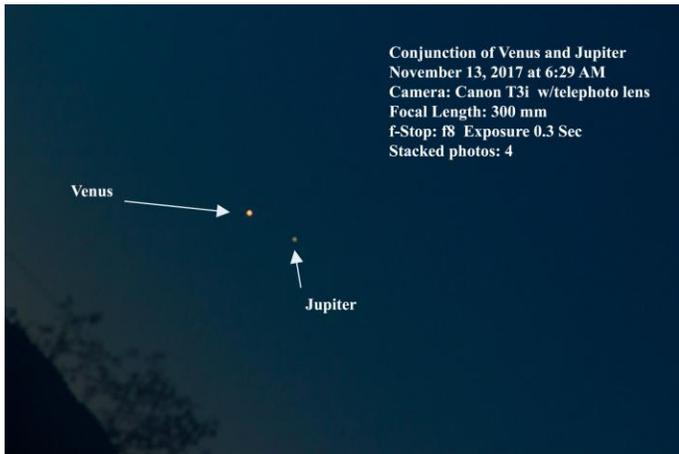
The Executive Committee is interested in hearing from the membership concerning meeting dates for 2018 meetings. If you like the current meeting date (fourth Wednesday) or if you would like a different meeting date considered please email Dale Hooper at dchooper5@gmail.com.

The President’s Corner By Dell Vance, CVAS President



November temperatures have been swinging considerably this year. This has been good and bad for making observations. Thanks to a heads up from Tom Westre about Jupiter passing to within 0.3° of Venus on the morning of November 13th, I decided to witness this for myself. I wanted to take a picture with my camera mounted on top of my telescope. Therefore, I got up at 4:00 AM that morning. The temperature was about 24°F and the sky was very clear. I aligned my telescope and viewed several items while I was waiting for the event. At 6:30 AM just before sunrise, there it was. Venus is always

easy to spot, and Jupiter was very bright as well. I was able to get the picture and it was well worth the effort to see.



**Conjunction of Venus and Jupiter,
November 13, 2017 at 6:29am - Courtesy Dell Vance**

The monthly meeting on Backyard Astronomy by Lyle Johnson was very good and we had about 23 people in attendance. It was a good reminder that there are many ways to do astronomy and it doesn't require a telescope to be able to enjoy the hobby. I'm particularly fond of using my binoculars during the cold weather because it doesn't require much set up time to start your observations. Many times, I get 15 to 30 minutes of observation time in and I am glad to get back into the house.

Tom Westre and Blaine Dickey have been working with the STEM Club members at Ridgeline High School in November. I joined them for a star party for the STEM Club members on November 30th. It was a challenge with the clouds coming in during the event. However, we were able to poke around the clouds and pick up some good sights for the youth. The moon was bright and is always a favorite with new astronomers. We also got glimpses of the Andromeda Galaxy, the double clusters NGC 869 & 884, Albireo, and Uranus. Not bad for a very cloudy night.

This month is our annual Star of Bethlehem presentation. Dale Hooper will be showing an interesting video and I'm sure there will be a good discussion of what the Star of Bethlehem was. The CVAS Meeting will be on December 13th at 7:00

PM. Be sure to bring your friends and family to this event.

December is sure to be a very busy month. We wish each and every one of you a very Merry Christmas and a Happy New Year. Share your hobby with someone and help spark an interest in those that you meet.

Thanks again for your support.
Clear Skies!

December Skies

By Tom Westre

Moon Phases:

Full: Dec 3, **Last Qtr:** Dec 10, **New:** Dec 18,
First Qtr: Dec 26

The December Full Moon is known as the Oak Moon, Cold Moon, Long Nights Moon and shines in the constellation of Taurus high in the night sky. This moon occurs less than one day before perigee, when the moon is closest to the earth in its orbit which makes this full moon the largest and brightest in 2017, so it is referred to as a supermoon.

Geminid Meteor Shower

The total active period is from December 4th to the 17th, with the peak on December 13- 14. More than 120 per hour are possible under dark skies. Geminid's are generally bright and colored and slower moving. The best time to view them will be from sunset Wednesday until dawn on Thursday.

Ursid Meteor Shower

This annual meteor shower is from December 17 to the 23rd and peaks in the early hours of December 22 when you might see up to 20 meteors per hour. The best time to observe this shower is from midnight to dawn that morning. The moon should not be an issue as it's a waxing crescent and sets in the early evening on the peak night. The radiant of the shower is above the Little Dipper (Ursa Minor) near the North Star, Polaris.

Planets During December

Saturn and Mercury are in the southwest after sunset and difficult to see due to the sky glow.

Mars rises in the east about 3 a.m.

Jupiter rises in the east about 4:30 a.m.

Uranus is well placed in the evening sky in Pisces the Fish. At magnitude 5.7 it can be seen in binoculars.

Neptune is in the evening sky of Aquarius and sets in late evening. Look for Neptune only 0.5 degrees for the naked eye star Lambda Aquarii.

Venus disappears eastward into the Sun's glare by mid-month

On New Year's Eve morning look for **Jupiter, Mars and Saturn** low in the eastern sky.

On December 13th the waning crescent moon will lie less than 5 degrees above Mars in the eastern predawn sky morning. Both objects will fit in the field of view of binoculars.

On December 14th the old crescent moon is about 4 degrees above Jupiter and 3 degrees to the upper right of the large asteroid Vesta in the eastern pre-dawn sky. All objects will fit in the field of view of binoculars.

Winter Solstice December 21st

Winter begins in the Northern hemisphere and Summer begins in the Southern Hemisphere on December 21st at 9:28 a.m. MST as the sun reaches its southernmost declination for the year. Cheer up, from now on the length of the day increases each day in the northern hemisphere.

CVAS Loaner Telescope

CVAS provides a 10 inch Dobsonian telescope to club members. Contact Garrett Smith to make arrangements to use this telescope. Garrett can be contacted by email at GarrettGillSmith@gmail.com.



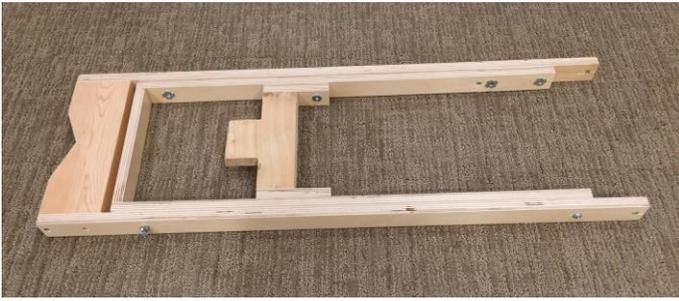
Binocular Supports

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 Astronomy Library List

By Tom Westre

The following books are available to dues paying members of CVAS. To borrow a book from the list contact Tom Westre at 435-787-6380 or email him at: twestre45@aol.com If you contact Tom before the monthly meeting Tom will bring the book to the meeting for you to pick up for one month. It should be returned the following month. If you need it longer and there are no requests for the book contact Tom.

Asimov, Isaac. Eyes on the Universe: A history of the telescope.

Bok, Bart L. The Milky Way.

Calder, Nigel. Einsteins universe: the laypersons guide.

Carlowicz, Michael. Storms from the Sun: The emerging Science of Space Weather.

Chaisson, Eric. Astronomy Today. Prentice Hall, 1997

Carroll, Sean. From Eternity to here: the quest for the ultimate theory of time.

Corliss, William. The moon and planets: A catalog of astronomical anomalies.

Cornell, James. The First Stargazers: An introduction to the Origins of Astronomy.

Eagle, Dave. From casual stargazer to amateur astronomer: how to advance to the next level. Lots of information to help develop your skills.

Enright, Leo. The beginner's observing guide: an introduction to the night sky for the novice stargazer. For those with no or limited background with the stars and constellations.

Fix, John. Astronomy: journey to the Cosmic Frontier. McGraw Hill, 2008 5th Ed.

Greene, Brian. The Elegant universe: superstrings, hidden dimensions, and the quest for the ultimate theory . Vintage, 1999

Finlay, W.H. Concise catalog of deep sky objects: concise information for 500 galaxies, clusters, and Nebulae.

Frazier, Kendrick. Our Turbulent Sun

Greene, Brian. The fabric of the cosmos: Space, time, and the texture of reality

Hadingham, Evan. Early man and the Cosmos. (ancient astronomy, Stonehenge, death and the sun in ancient Britian, the Moon and the megaliths, Riddle of the Fairy Stone, Moon calendars of the American Indian, Sun Priests of the Southwest, Myan astronomy, Astronomy and ancient Peru, Hovenweap)

Halpern, Paul. Edge of the universe: the voyage to the cosmic horizon and beyond.

Hamburg, Michael. Astronomy made simple. Doubleday, 1995

Harrington, Philip. Starware: the amateur astronomer's ultimate guide to choosing, buying, and using telescopes and accessories.

Harriston, Edward R. Cosmology: the science of the universe.

Kaku, Michio. Beyond Einstein: the cosmic quest for the theory of the universe.

Kaku, Michio. Hyperspace: a scientific odyssey through parallel universes, time warps, and the 10th dimension.

Kaler, James. The Ever-changing Sky: a guide to the celestial sphere. Cambridge, 1996.

Kaufmann, William. Black Holes and warped spacetime. King, Henry C. The History of the Telescope.

Krupp, E.C. In Search of Ancient Astronomers: Stonehenge, to Von Daniken, Archeoastronomy discovers our sophisticated ancestors.

Luginbuhl, Christian. Observing handbook and catalog of deep-sky objects. 1,500 objects by constellation most often observed by amateurs.

Maffei, Paolo. Beyond the Moon. (solar system, nearby stars, variable stars, birthplace of stars, star clusters, the galaxy, Beyond the galaxy, among the galaxies, the limits of time and space.

Moring, Gary F. The complete idiots guide to the theories of the universe. Pearson, 2002

Moche, Dinah L. Astronomy: A Self-teaching guide.

North, Gerald. Astronomy Explained.

Owens, Steve. Stargazing for dummies. This book contains all you need to learn constellations, find planets, hunt down galaxies with binoculars and telescopes.

Pasachoff, Jay. Astronomy: From the Earth to the Universe.

Raymo, Chet. The soul of the night: an astronomical pilgrimage.

Rees, Martin. Before the beginning? our universe and others.

Rees, Martin. Just six numbers: the deep forces that shape the universe.

Rukl, Antonin. Atlas of the Moon. Kalmbach, 1990.

Sagan, Carl. Comet.

Schaaf, Fred. The Starry room: Naked eye astronomy in the intimate universe.

Trefil, James S. Space, Time, Infinity: The Smithsonian Views the Universe.

The Universe. (essays about our galaxy, stars, supernovae, pulsars, black holes, galaxies and clusters quasars, intergalactic matter, cosmology, other planets.

Webb Society. Web Society Deep Sky Observers Handbook. 4 volumes.

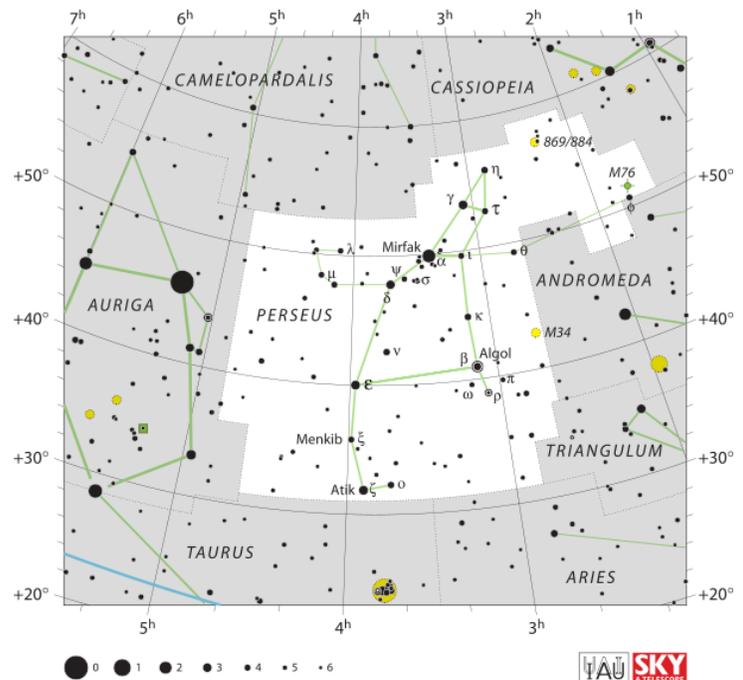
Zubrin, Robert. The Case for Mars; the plan to settle the red planet and why we must

Spotlight on Perseus, the Hero

By Dale Hooper

Having covered Andromeda, the Princess last month, it is probably fitting that this month we highlight the hero that came to her rescue. Perseus was also the slayer of Medusa and holds her head in his right hand. One of Medusa's eyes is the most famous eclipsing binary star Algol, also known as the "Demon Star". Algol goes through a ten hour eclipse every 2.86739 days. It is normally magnitude 2.1 but drops to magnitude 3.4 during each eclipse. Perseus is home to two Messier objects and includes a wide variety of objects including some of the finest open clusters, planetary nebulae, reflection nebulae, emission nebulae, galaxies and the very challenging Perseus Galaxy Cluster (Abell 426).

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



IAU and Sky & Tel - Roger Sinnott & Rick Fienberg

Object	R.A.	Dec.
Messier 76 (Planetary nebula)	01h42.4m	+51°34'
Stock 4 (Open cluster)	01h52.8m	+57°04'
NGC 744 (Open cluster)	01h58.4m	+55°29'
NGC 869 (Open cluster)	02h19.0m	+57°09'
NGC 884 (Open cluster)	02h22.4m	+57°07'
Σ268 (Double star)	02h29.4m	+55°32'
Σ270 (Double star)	02h30.8m	+55°33'
NGC 957 (Open cluster)	02h33.6m	+57°32'
Trumpler 2 (Open cluster)	02h37.3m	+55°59'
NGC 1023 (Galaxy)	02h40.4m	+39°04'
Messier 34 (Open cluster)	02h42.0m	+42°47'
Σ296 (Double star)	02h44.2m	+49°14'
Miram (η Persei)(Double star)	02h50.7m	+55°54'
Σ331 (Double star)	03h00.9m	+52°21'
Algol (Eclipsing Binary)	03h08.2m	+40°57'
NGC 1220 (Open cluster)	03h11.7m	+53°20'
King 5 (Open cluster)	03h14.5m	+52°43'
NGC 1245 (Open cluster)	03h14.7m	+47°15'
Σ369 (Double star)	03h17.2m	+40°29'
NGC 1275 (Galaxy)	03h19.8m	+41°31'
Melotte 20 (Open cluster)	03h22m	+49°
NGC 1333 (Reflection Neb)	03h29.3m	+31°25'
Σ392 (Double star)	03h30.3m	+52°54'
NGC 1342 (Open cluster)	03h31.6m	+37°20'
Barnard 1 (Dark nebula)	03h32.1m	+31°10'
Barnard 3 (Dark nebula)	03h44.0m	+31°47'
IC 351 (Planetary nebula)	03h47.5m	+35°03'
NGC 1444 (Open cluster)	03h49.4m	+52°40'
44 Persei (Multiple star)	03h54.1m	+31°53'
IC 2003 (Planetary nebula)	03h56.4m	+33°52'
NGC 1491 (Emission nebula)	04h03.4m	+51°19'
NGC 1513 (Open cluster)	04h10.0m	+49°31'
NGC 1528 (Open cluster)	04h15.4m	+51°14'
NGC 1545 (Open cluster)	04h20.9m	+50°15'
56 Persei (Multiple star)	04h24.6m	+33°58'

CVAS Minutes – November 2017

It was announced that our December meeting will be earlier in the month (December 13th) because of the Christmas holiday. Everyone at the meeting was provided with name tags to assist all of us with getting to know each other better.

The time was then turned over to Lyle Johnson for our main presentation. Lyle started with a brief tour

of the universe. He mentioned that Earth is the only habitable place that we know of. He then provided tours of the solar system, the solar neighborhood and solar interstellar neighborhood.

Lyle showed us visuals of the Milky Way which consists of stars, clusters of stars, globular clusters, nebulae, dust and gas. He then showed us images and diagrams of the local galactic group, the Virgo Supercluster, Local Superclusters and the observable universe.

Lyle then presented information on observing. He stated that there are three ways for amateur astronomers to explore the sky: with unaided eyes, binoculars and telescopes.

He then presented information about what each method offers.

With unaided eyes we always have them, they provide a wide field of view, we can see meteor showers, observe entire constellations and observe the overall Milky Way.

Binoculars are inexpensive, provide a fairly wide field of view, are portable and can show open clusters.

Telescopes capture more light, give us detailed views and allow us to observe deep sky objects and the planets.

Lyle explained that there are many objects for us to observe in the night sky – we will never run out of things to observe. He then presented an overview of use the free SkyMap.

Lyle next presented information on obtaining and using binoculars. He explained that the first number shown for binoculars is the magnification and that the second number is the lens size (in millimeters). He also showed how the binocular supports can be used for added image stability.

He mentioned that there are many locations for acquiring binoculars, such as: KSL.com, sporting goods stores and other online locations. Lyle emphasized that it is good to try them before

purchasing them. He said to focus the image on dimmer stars to get the best focus.

Lyle then explained the differences and similarities of various telescopes, namely reflectors (mirror), refractors (lens), and catadioptrics (lens and mirror folded design). He spoke briefly about goto telescopes which can track and find but emphasized that a nice simple Dobsonian telescope usually works best for beginners.

He emphasized that magnification is not that important and shouldn't be one of the main purchase drivers. He stated that light gathering power and price are important. He also said to avoid purchasing telescopes from department stores. He then gave those in attendance a small flyer with helpful information about tools, books, purchasing advice and helpful websites.

Upcoming Star Parties

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

Upcoming Events

- 02 Dec Mars 3, first craft which soft landed on Mars (1971)
- 03 Dec Pioneer 11 flies past Jupiter (1974)
- 03 Dec Full Moon
- Aldebaran 0.8° south of Moon
- 07 Dec Pioneer 10, first Jupiter flyby (1973)
- 07 Dec Pearl Harbor Remembrance Day
- Galileo spacecraft arrives at Jupiter (1995)
- 08 Dec Regulus 0.7° south of Moon
- 10 Dec Last Quarter Moon
- 13 Dec **CVAS Monthly Meeting, 7pm**
- BATC room 806/808**
- Hanukkah begins
- Geminid meteors
- 14 Dec Vesta 0.2° north of Moon
- Tycho Brahe born (1546)
- Mariner 2, first successful planetary flyby (Venus) (1962)
- Geminid meteors

- 15 Dec Venera 7 first craft to soft land on Venus (1970)
- Geminid meteors
- 18 Dec New Moon
- 20 Dec Hanukkah ends
- 21 Dec Winter solstice, beginning of winter
- Apollo 8 launched, first manned spacecraft to leave Earth's gravity (1968)
- 22 Dec Ursid meteors
- 23 Dec Giovanni Cassini discovers Saturn's moon Rhea (1672)
- 24 Dec Neptune 1.4° north of Moon
- 25 Dec Christmas Day
- Isaac Newton born (1642)
- 26 Dec First Quarter Moon
- 27 Dec Johannes Kepler born (1571)
- 28 Dec Arthur Eddington born (1882)
- 30 Dec Aldebaran 0.8° south of Moon
- Cassini spacecraft flies past Jupiter (2000)
- 31 Dec New Year's Eve

Solar System's First Interstellar Visitor Dazzles Scientists



Artist's concept of interstellar asteroid 1I/2017 U1 ('Oumuamua) as it passed through the solar system after its discovery in October 2017. The aspect ratio of up to 10:1 is unlike that of any object seen in our own solar system. Image credit: European Southern Observatory / M. Kornmesser

Astronomers recently scrambled to observe an intriguing asteroid that zipped through the solar system on a steep trajectory from interstellar space—the first confirmed object from another star.

Now, new data reveal the interstellar interloper to be a rocky, cigar-shaped object with a somewhat reddish hue. The asteroid, named 'Oumuamua by its discoverers, is up to one-quarter mile (400 meters) long and highly-elongated—perhaps 10 times as long as it is wide. That aspect ratio is greater than that of any asteroid or comet observed in our solar system to date. While its elongated shape is quite surprising, and unlike asteroids seen in our solar system, it may provide new clues into how other solar systems formed.

The observations and analyses were funded in part by NASA and appear in the Nov. 20 issue of the journal *Nature*. They suggest this unusual object had been wandering through the Milky Way, unattached to any star system, for hundreds of millions of years before its chance encounter with our star system.

"For decades we've theorized that such interstellar objects are out there, and now - for the first time - we have direct evidence they exist," said Thomas Zurbuchen, associate administrator for NASA's Science Mission

Directorate in Washington. "This history-making discovery is opening a new window to study formation of solar systems beyond our own."

Immediately after its discovery, telescopes around the world, including ESO's [Very Large Telescope](#) in Chile, were called into action to measure the object's orbit, brightness and color. Urgency for viewing from ground-based telescopes was vital to get the best data.

Combining the images from the [FORS instrument](#) on the ESO telescope using four different filters with those of other large telescopes, a team of astronomers led by Karen Meech of the Institute for Astronomy in Hawaii found that 'Oumuamua varies in brightness by a factor of 10 as it spins on its axis every 7.3 hours. No known asteroid or comet from our solar system varies so widely in brightness, with such a large ratio between length and width. The most elongated objects we have seen to date are no more than three times longer than they are wide.

"This unusually big variation in brightness means that the object is highly elongated: about ten times as long as it is wide, with a complex, convoluted shape," said Meech. "We also found that it had a reddish color, similar to objects in the outer solar system, and confirmed that it is completely inert, without the faintest hint of dust around it."

These properties suggest that 'Oumuamua is dense, composed of rock and possibly metals, has no water or ice, and that its surface was reddened due to the effects of irradiation from cosmic rays over hundreds of millions of years.

A few large ground-based telescopes continue to track the asteroid, though it's rapidly fading as it recedes from our planet. Two of NASA's space telescopes ([Hubble](#) and [Spitzer](#)) are tracking the object the week of Nov. 20. As of Nov. 20, 'Oumuamua is travelling about 85,700 miles per hour (38.3 kilometers per second) relative to the Sun. Its location is approximately 124 million miles (200 million kilometers) from Earth -- the distance between Mars and Jupiter - though its outbound path is about 20 degrees above the plane of planets that orbit the Sun. The object passed Mars's orbit around Nov. 1 and will pass Jupiter's orbit in May of 2018. It will travel beyond Saturn's orbit in January 2019; as it leaves our solar system, 'Oumuamua will head for the constellation Pegasus.

Observations from large ground-based telescopes will continue until the object becomes too faint to be detected, sometime after mid-December. NASA's Center for Near-Earth Object Studies ([CNEOS](#)) continues to take all available tracking measurements to refine the trajectory of 1I/2017 U1 as it exits our solar system.

[This remarkable object was discovered Oct. 19](#) by the University of Hawaii's Pan-STARRS1 telescope, funded by NASA's [Near-Earth Object Observations](#) (NEOO) Program, which finds and tracks asteroids and comets in Earth's neighborhood. NASA Planetary Defense Officer Lindley Johnson said, "We are fortunate that our sky survey telescope was looking in the right place at the right time to capture this historic moment. This serendipitous discovery is bonus science enabled by NASA's efforts to find, track and characterize near-Earth objects that could potentially pose a threat to our planet."

Preliminary orbital calculations suggest that the object came from the approximate direction of the bright star Vega, in the northern constellation of Lyra. However, it took so long for the interstellar object to make the journey - even at the speed of about 59,000 miles per hour (26.4 kilometers per second) -- that Vega was not near that position when the asteroid was there about 300,000 years ago.

While originally classified as a comet, observations from ESO and elsewhere revealed no signs of cometary activity after it slingshotted past the Sun on Sept. 9 at a blistering speed of 196,000 miles per hour (87.3 kilometers per second).

The object has since been [reclassified as interstellar asteroid](#) 1I/2017 U1 by the International Astronomical Union (IAU), which is responsible for granting official names to bodies in the solar system and beyond. In addition to the technical name, the Pan-STARRS team dubbed it 'Oumuamua (pronounced oh MOO-uh MOO-uh), which is Hawaiian for "a messenger from afar arriving first."

Astronomers estimate that an interstellar asteroid similar to 'Oumuamua passes through the inner solar system about once per year, but they are faint and hard to spot and have been missed until now. It is only recently that survey telescopes, such as Pan-STARRS, are powerful enough to have a chance to discover them.

"What a fascinating discovery this is!" said Paul Chodas, manager of the Center for Near-Earth Object Studies at NASA's Jet Propulsion Laboratory, Pasadena, California. "It's a strange visitor from a faraway star system, shaped like nothing we've ever seen in our own solar system neighborhood."

For more on NASA's Planetary Defense Coordination Office:

<https://www.nasa.gov/planetarydefense>

To watch a NASA Planetary Defense video on International Asteroid Day:

https://www.youtube.com/watch?v=VYO-mpoC8_s

Click here for interstellar asteroid FAQs:

<https://www.nasa.gov/planetarydefense/faq/interstellar>

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301-728-8637
roygal@hawaii.edu

CVAS Members may also be interested in more detailed papers about 1I/Oumuamua (2017) U1:

<https://arxiv.org/abs/1711.11530>, 1I/Oumuamua is tumbling, Fraser, Pravec et al (submitted)

<https://arxiv.org/abs/1711.01402> , On the rotation period and shape of the hyperbolic asteroid 1I/Oumuamua (2017) U1 from its lightcurve

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:

Brad Kropp, CVAS Treasurer
1573 E 1425 N
Logan, UT 84341

For any questions contact our Treasurer at brad.kropp@usu.edu or our Secretary Dale Hooper at dchooper5@gmail.com