Snake River Skies

The Newsletter of the Magic Valley Astronomical Society

www.mvastro.org

Membership Meeting

Saturday, July 8th 2017
7:00pm at the
Herrett Center for Arts & Science
College of Southern Idaho.

Public Star Party Follows at the Centennial Observatory

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Magic Valley Astronomical Society is a member of the Astronomical League

M-51 imaged by
Rick Widmer &
Ken Thomason
Herrett Telescope
Shotwell Camera

President's Message

Colleagues,

Summer is officially underway! We've had the Hagerman Summer star party at the end of June, and the skies were of such caliber that the group wants to hold private functions there as well. Right now, however, the next function for Hagerman is in the end of October.

But June was just a warm-up. Our next club event is the annual club potluck on Saturday, July 8, at the patio of the Herrett Center at 7 p.m. The club will provide the hamburgers and hotdogs, please bring a potluck dish of your choosing and be ready to eat a lot of food as usual.

Two weeks later comes the big event, the annual star party at the City of Rocks. Set for July 21-22, the event features solar viewing during the day at Smoky Mountain Campground, and deep sky viewing at the corral across from the lodge. These are some of the darkest skies in Idaho, so we look forward to seeing you there.

As you are no doubt aware, the Solar Sessions have started at the Centennial Observatory each Wednesday from 1:30pm to 3:30pm. Until labor Day Chris Anderson could always use volunteers there to help out, so if you have some free time consider helping out. Give Chris a call at (208) 732-6663 or send him an e-mail at canderson@csi.edu if you are able to assist with these events.

Finally, I have been asked to make the following announcement: The Idaho Star Party™ has been scheduled for the weekend of September 15th - September 17th, 2017. The guest speaker is Dr. Tanya Harrison from the New Space Initiative at Arizona State University - Tempe and an expert on Mars and Mars Rovers. Registration is still ongoing and if you would like to attend this annual event please contact David Olsen, the BAS President, or visit the Boise Astronomical Society website www.boiseastro.org and follow the link at the top for ISP (Idaho Star Party)

Until next month

Clear Skies,

Rob Mayer

Calendar for July

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					First Quarter 55% Visible ↑ Saturday 	1 Canada Day 150th 
2	3	4 Independence Day 	5	6	7	8 MVAS Meeting at 7:00pm at the Herrett Center Public Star Party Centennial Obs.
9 Full Moon Buck Moon  100% Visible	10	11	12	13	14	15
16 Last Quarter Visible 54% ↓ 	17	18	19	20	21 Castle Rocks S.P. Star Party 	22 Castle Rocks S.P. Star Party 
23 New Moon Lunation 1170 1% Visible ↓ 	24	25	26	27	28	29
30	31					

Snake River Skies is the Newsletter of the Magic Valley Astronomical Society and is published electronically once a month.
 Full Moon names follow the traditional Algonquin First Nation history.

Be Safe – Get Out There – Explore Your Universe

Celestial Calendar for July

All times, unless otherwise noted, are UT (subtract six hours and, when appropriate, one calendar day for MDT)

7/2 The Moon is 6.5 degrees north-northeast of the first-magnitude star Spica (Alpha Virginis) at 5:00; asteroid 3 Juno (magnitude +9.9) is at opposition at 13:00; the midpoint of the year occurs at 12:00
7/3 The Earth is at aphelion (152,092,504 kilometers or 94,505,901 miles from the Sun) at 20:00
7/5 Venus is at its greatest latitude south of the ecliptic plane (-3.4 degrees) at 4:00; Venus is 6.6 degrees south-southeast of the bright open cluster M45 (the Pleiades or Subaru) in Taurus at 8:00
7/6 Jupiter is at eastern quadrature (90 degrees from the Sun) at 3:00; the Moon is at apogee, subtending 29' 26" from a distance of 405,934 kilometers (252,236 miles) at 5:28
7/7 The Moon is 3.2 degrees north of Saturn at 4:00
7/10 Mercury is 0.31degree north-northeast of the center of the bright open cluster M44 (the Beehive Cluster or Praesepe) in Cancer at 7:00
7/11 Jupiter (heliocentric longitude 205.4 degrees) and Uranus (heliocentric longitude 25.4 degrees) are at heliocentric opposition at 22:00
7/12 The Moon is at the descending node (longitude 324.5 degrees) at 5:18
7/13 The Moon is 0.83 degree south-southwest of Neptune, with an occultation occurring in Chatham Island, New Zealand, and most of Antarctica, at 18:00; Venus (magnitude -4.1) is 3.1 degrees north of the first-magnitude star Aldebaran (Alpha Tauri), at 23:00
7/16 Asteroid 1 Ceres (magnitude +8.9) is 0.36 degree south of the bright open cluster M35 in Gemini at 7:00; Last Quarter Moon occurs at 19:26
7/17 Uranus is 4.1 degrees north-northwest of the Moon at 2:00; the Curtiss Cross, an X-shaped illumination effect located between the craters Parry and Gambart, is predicted to be at a midpoint at 11:33
7/19 The Moon is 9.2 degrees south-southeast of M45 at 8:00; the Moon is 0.48 degree south of asteroid 8 Flora at 12:00
7/20 The Moon is 0.4 degree north of Aldebaran, with an occultation occurring in Hawaii, the Aleutian Islands, central and northeast Asia, and India, at 0:00; asteroid 8 Flora at perihelion (1.8557 astronomical units from the Sun) at 10:00; Venus is 2.7 degrees north of the Moon at 12:00; the Sun enters Cancer (ecliptic longitude 118.24 degrees) at 19:00
7/21 Uranus is at western quadrature at 0:00; the Moon is 5.0 degrees south of the bright open cluster M35 in Gemini at 12:00; the Moon is at perigee, subtending 33' 05" at a distance of 361,238 kilometers (224,462 miles) at 17:12
7/23 Mercury is at the descending node through the ecliptic plane at 4:00; Mars is 3.1degrees north of the Moon at 12:00; the Moon is 2.8 degrees south of M44 at 21:00
7/25 The Moon is at the ascending node (longitude 144.3 degrees) at 0:47; the Moon is 0.84 degree north of Mercury, with an occultation occurring in northern Asia, most of Greenland, northern Europe, and the British Isles, at 9:00; the Moon is 0.07degree northwest of the first-magnitude star Regulus (Alpha Leonis), with an occultation occurring in Indonesia, Southern India, the Middle East, and northern Africa, at 11:00; Mercury (magnitude +0.3) is 0.95 degree south-southwest of Regulus (magnitude +1.4) at 22:00
7/26 The equation of time equals -6.54 minutes at 0:00
7/27 Mars is in conjunction with the Sun at 1:00
7/28 The Southern Delta Aquarid meteor shower (15 to 20 per hour) peaks at 3:00
7/29 The Moon is 6.6 degrees north-northeast of Spica at 12:00
7/30 Mercury is at greatest eastern elongation (27.2 degrees) at 5:00; First Quarter Moon occurs at 15:23

Friedrich Bessel was born this month.

The first photograph of a star, namely Vega, was taken on July 17, 1850. The first photograph of a total solar eclipse was taken on July 28, 1851.

The night sky has made its transition from spring to summer, and the bright stars and faint star clouds along the spine of the Milky Way are turning into view in the late evening hours. Saturn is still magnificent over the southern horizon, Venus and Mercury make an appearance at opposite ends of the sky, and July presents your last chance to get a good look at Jupiter before it gets too low in the southwest.

The Sun, the Moon, & the Planets

The Moon is 6.9 days old, is illuminated 50.1 %, subtends 30.8 arc minutes, and is located in Virgo on July 1st at 0:00 UT. The Moon is at its greatest northern declination of +19.4 degrees on July 22nd and its greatest southern declination of -19.3 degrees on July 8th. Longitudinal libration is at a maximum of +6.7 degrees on July 27th and a minimum of -6.6 degrees on July 15th. Latitudinal libration is at a maximum of +6.7 degrees on July 19th and a minimum of -6.7 degrees on July 5th. New Moon takes place on July 23rd. The Moon occults Mercury, Neptune, Aldebaran, and Regulus from various parts of the world this month. See http://www.lunar-occ...ota/iotandx.htm for information on these and other lunar occultations taking place in July.

The Sun is located in Gemini on July 1st. The Earth is farthest from the Sun on July 3rd, when it is 3.3% more distant than it was at perihelion and 1.7% farther than its average distance. The Sun enters Cancer on July 20th.

Mercury is located in the west, Jupiter in the southwest, Saturn in the south during the evening. At midnight, Jupiter is in the west, Saturn is in the south, and Neptune in the east. In the morning, Venus can be found in the east, Uranus in the southeast, and Neptune in the south. Mercury undergoes a rather poor apparition for northern hemisphere observers this month. The speediest planet passes in front of M44 on July 10th and less than a degree south of the two-day-old Moon and Regulus on July 25th.

Venus rises about 3 hours before sunset by the end of July. As it heads eastward through Taurus, it passes seven degrees south of M45 on July 5th. By the end of the second week of the month, Venus glides by Aldebaran and the Hyades (Melotte 25). It lies three degrees north of the waning crescent Moon on July 20th. The brightest planet passes less than one degree south of the supernova remnant M1 (the Crab Nebula) on July 26th and 0.4 degree north of the third-magnitude star Zeta Tauri on July 27th.

Mars is in conjunction with the Sun in Cancer on July 27th.

Jupiter sets around 1:00 a.m. DST as the month begins. It decreases in brightness by a tenth of a magnitude and in apparent size by three arc seconds during July. Jupiter reaches eastern quadrature on July 6th. The Galilean satellite Callisto lies due north of the planet on the evening of July 15th. On the evening of July 18th, the four Galilean satellites are arranged in order of their orbital distance from Jupiter. The King of the Planets passes nine arc minutes west of the eleventh-magnitude spiral galaxy NGC 4941 in Virgo on July 31st.

In mid-July, **Saturn's** rings span 41 arc seconds and are tilted 27 degrees with respect to the Earth. The disk of the planet subtends 18 arc seconds at the equator. On July 6th, an almost Full Moon passes three degrees north of the Ringed Planet. Eighth-magnitude Titan passes due north of the planet on July 9th and July 25th and due south of it on July 1st and July 17th. The much fainter Saturnian satellite Iapetus shines at tenth magnitude and is positioned approximately nine arc minutes west of Saturn when it reaches greatest western elongation on July 25th.

Uranus can be found one degree north of the fourth-magnitude star Omicron Piscium this month. Visit http://bluewaterastr...-chart-2017.png and http://www.nakedeyep....com/uranus.htm for finder charts.

Neptune continues to retrograde through Aquarius. The eighth planet is situated 0.2 degree southeast of the sixth-magnitude star 81Aquarii at the start of the month. By the end of July, Neptune lies 0.3 degree southwest of that star. Browse http://bluewaterastr...-chart-2017.png and http://www.nakedeyep...com/neptune.htm for finder charts.

Finder charts for Uranus and Neptune can also be found at http://wwwcdn.skyand...s_Neptune17.pdf

Pluto reaches opposition in northern Sagittarius on July 9th. Articles on locating and observing Pluto are available on pages 48-50 of the July 2017 issue of *Sky & Telescope* and pages 56-59 of the July 2017 issue of *Astronomy*. A finder chart appears on page 243 of the RASC Observer's Handbook 2017.

For more on the planets and how to locate them, browse http://www.nakedeyeplanets.com/

Asteroids

During July, asteroid 6 Hebe heads southwestward through Ophiuchus. It passes through the northern portion of the globular cluster NGC 6366 on July 3rd. On July 4th, 6 Hebe lies approximately halfway between NGC 6366 and the star SAO 141665 (magnitude +4.5). Information on asteroid occultations taking place this month is available at http://www.asteroido.../2017_07_si.htm

Comets

Comet C/2015 V2 (Johnson) heads southward through Virgo, Hydra, and Centaurus during July. It passes 0.3 degree south of the fourth-magnitude star Kappa Virginis on the evening of July 1st, two degrees west of the fourth-magnitude star Lambda Virginis on July 4th. In mid-July, Comet Johnson enters Hydra and glides three degrees east of the third-magnitude star Pi Hydrae on July 22nd. Browse http://cometchasing.skyhound.com/ and http://www.aerith.ne...t/future-n.html for additional information on comets visible this month.

Meteors

. Moonlight will not pose a problem for viewing the peak of this year's Southern Delta Aquarid meteor shower on the morning of July 30th. The radiant is located northwest of the first-magnitude star Fomalhaut (Alpha Piscis Austrini). Southern hemisphere observers are favored. Other minor meteor showers with southern radiants occurring this month are the Alpha Capricornids, the Piscis Austrinids, and the Northern Delta Aquarids.

Carbon Star

Notable carbon star for July: T Draconis Right Ascension: $17^h\ 56^m\ 23.31^s$ Declination: +58° 13′ 06.2

ISS

Information on Iridium flares and passes of the ISS, the Tiangong-1, the USAF's X-37B, the HST, and other satellites can be found at http://www.heavens-above.com/

Current information on solar system celestial bodies is posted at http://www.curtrenz.com/astronomy.html and http://nineplanets.org/

The Deep Sky

Sixty-five deep-sky objects for July: NGC 6140, NGC 6236, NGC 6340, NGC 6395, NGC 6412, NGC 6503, NGC 6543 (Draco); IC 4593, M13, M92, NGC 6106, NGC 6166, NGC 6173, NGC 6181, NGC 6207, NGC 6210, NGC 6229, NGC 6482 (Hercules); B61, B62, B63, B64, B72, IC 4634, IC 4665, LDN 42, LDN 1773, M9, M10, M12, M14, M19, M62, M107, NGC 6284, NGC 6287, NGC 6293, NGC 6304, NGC 6309, NGC 6356, NGC 6366, NGC 6369, NGC 6384, NGC 6401, Tr 26 (Ophiuchus); NGC 6440, NGC 6445 (Sagittarius); B50, B55, B56, Cr 316, M4, M6, M7, M80, NGC 6144, NGC 6153, NGC 6192, NGC 6231, NGC 6242, NGC 6302, NGC 6337, NGC 6451 (Scorpius); NGC 6217, NGC 6324 (Ursa Minor)

Top ten binocular deep-sky objects for July: IC 4665, LDN 1773, M4, M6, M7, M10, M12, M13, M92, NGC 6231

Top ten deep-sky objects for July: M4, M6, M7, M10, M12, M13, M92, NGC 6210, NGC 6231, NGC 6543

The objects listed above are located between 16:00 and 18:00 hours of right ascension.

A wealth of current information on solar system celestial bodies is posted at http://nineplanets.org/ and http://www.curtrenz.com/astronomy.html

Free star maps for July can be downloaded at http://www.skymaps.com/downloads.html and http://www.telescope...thly-Star-Chart

Information pertaining to observing some of the more prominent Messier galaxies can be found at http://www.cloudynig...ur-astronomers/

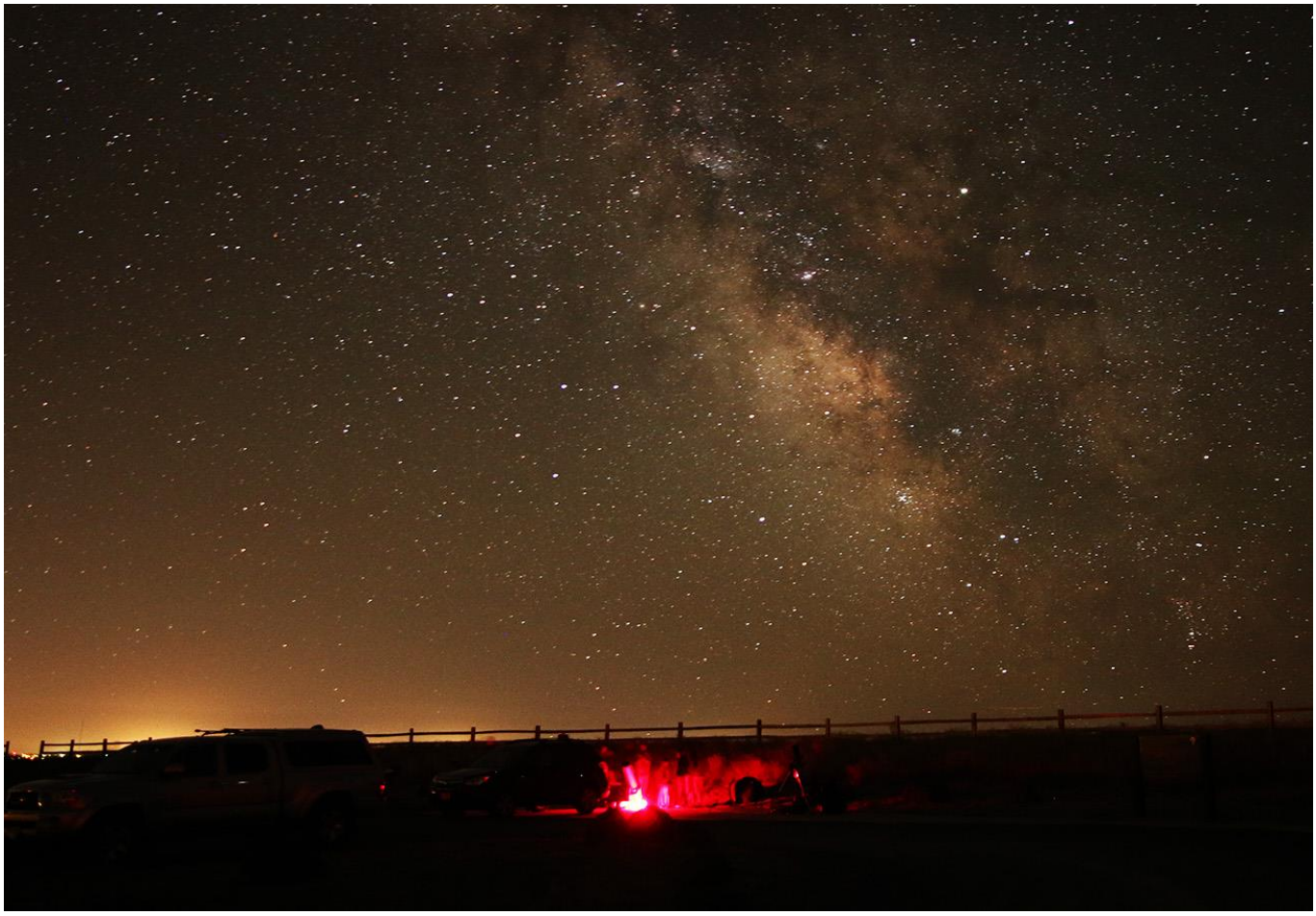
Deep-sky object list generators can be found at http://www.virtualcolony.com/sac/ and http://tonightssky.com/MainPage.php

The multiple star 36 Ophiuchi consists of three orange dwarf stars. For more on this interesting system, see https://stardate.org...orange-triplets and http://www.solstatio...rs/36ophiu3.htm

Challenge deep-sky object for July: NGC 6380 (Scorpius) Right Ascension: $17^h\ 34^m\ 28.00^s$ Declination: −39° 04′ 09.0″

NGC 6380 A Globular Cluster in Scorpius Image Credit: HLA STScI/NASA, ST-ECF/ESA CADC/NRC/CSA.

Members Photos



The Star Party at Hagerman Fossil Beds Overlook, Hagerman National Monument, Hagerman, Idaho

Looking Through the Eyepiece / Solar Safety

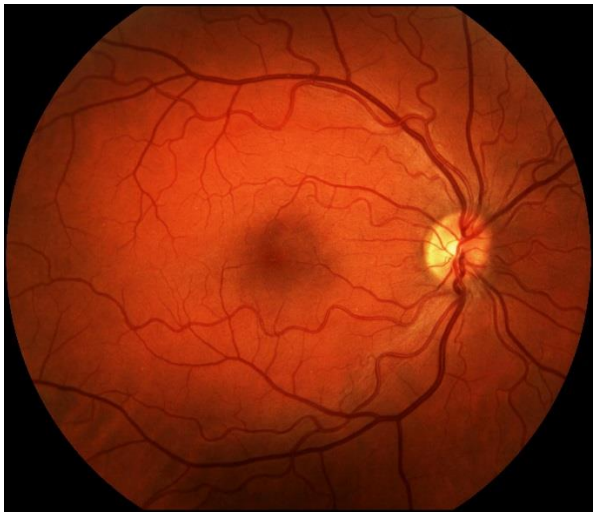
City Light of Hagerman, Idaho**ching the Total Solar Eclipse Safely!**
Article by Dr. Jay A. Hartwell, O.D.

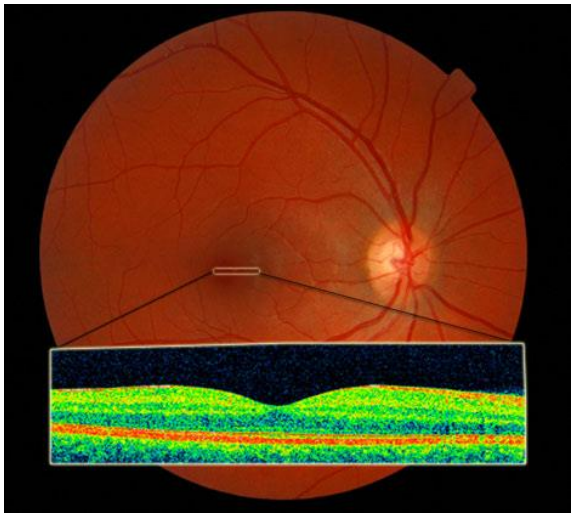
Looking directly at the Sun without eye protection can cause permanent eye damage or blindness! The eye focuses on an object by bending all of the light rays from a single point on the observed object toward a single point on the retina. In the eyeball, light rays passing through the cornea are bent by its curvature toward the pupil. The lens flexes to change its curvature and finish the focusing process. When an object is located at infinity, the focal length, or the distance from the cornea to the retina, of a normal relaxed eye is about 1.7 cm (17 mm).

The relaxed eye has an approximate optical power of 60 diopters (D) with the corneal power being about 40 D, or two thirds of the total power. When the eye focuses a high-power light from the Sun, arc welder, and lasers onto the retina the light-sensing cells of the retina are overstimulated, they release a flood of signaling chemicals. In sufficient concentrations, like during a long look at the Sun, these can damage surrounding tissue.

With enough damage to the retina by staring at the Sun can leave you partially blind. Prolonged UV exposure can damage the macula, a tiny substructure of the retina responsible for the majority of your central detail vision. The pupil will naturally contract when exposed to bright light, but the amount of light still entering the eye is concentrated on the macula tissue.

Damaging it can cause macular degeneration, eventually resulting in permanent blindness in the center of your field of vision. Basically, that black dot you see after a photo flash would just never go away. **Lack of pain doesn't equal lack of damage.** Photo below showing normal retina and Optical Coherence Tomography (OCT)

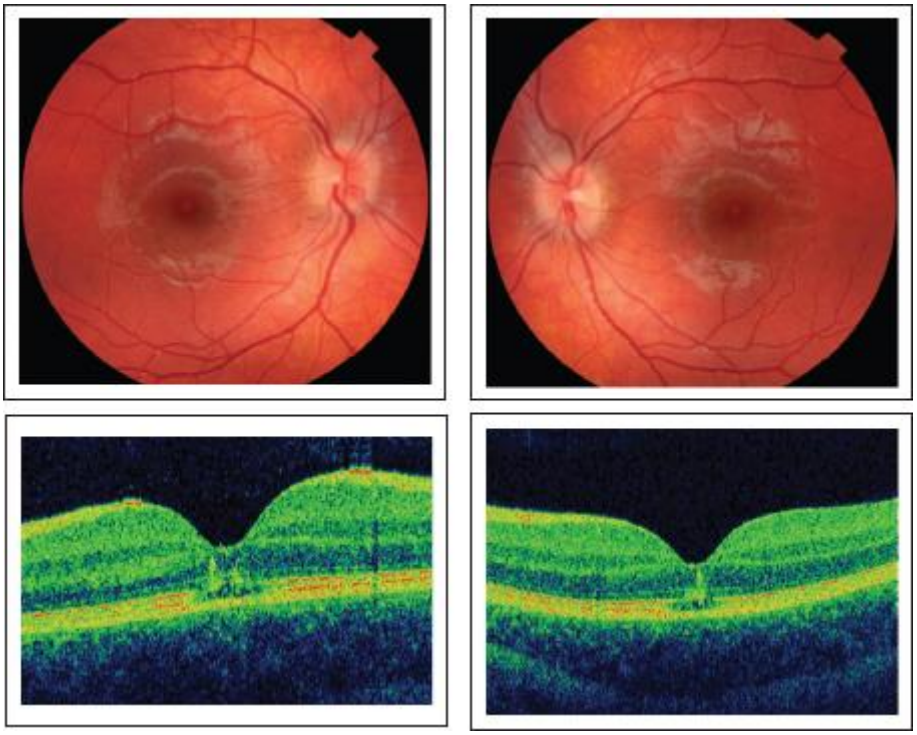




Normal Retina
Normal OCT

Sun damaged retinal and OCT:

Eclipse-damaged retina viewing the eclipse unprotected rendered this man blind. Source BBC



Ophthalmoscopy of the right and left eye of a patient with solar retinopathy
Credit: HINDAWI PUBLISHING CORP.

The solar energy has baked the retina resulting in scarring and loss of the central seeing area resulting in vision 20/80 or worse. And in a nutshell, solar eclipses are dangerous because the Sun can come out from behind the moon and "surprise you" before you have a chance to look away. And this is actually even worse than when you normally look away from the Sun because during the total eclipse, it is dark out, and your pupil therefore dilates so that it can let in enough light to get a good picture. Then, when the Sun reappears and starts flooding the area with really bright light, not only are you staring straight at it, but your eye is in a state where it is wide open, and actively trying to let in as much light as possible. Time your viewing – the total eclipse is about 2minutes and 40 seconds. Allow the moon 20 seconds of full eclipse before removing your glasses. Time the time without eclipse glasses for 2 minutes and then put the glasses back on, this give you a 20 second time to prevent surprises. This protocol can only be used if you are on the path of the total eclipse, outside of this area the Sun is never fully covered. There is an eclipse timing app for iPhones: Solar Eclipse Timer: http://tinyurl.com/y7lj6duv

According to NASA, the following materials should **never** be used to view a solar eclipse:

1. Sunglasses of any kind
2. Color film
3. Medical X-ray film
4. Smoked glass
5. Floppy disks
6. Welders' glasses below a number 14 rating

Insufficient filters are worse than none at all, because they allow you to look longer (doing more damage) without the discomfort, as well as dilating your pupil which lets in even more light. To view the Sun directly and safely, use "solar-viewing glasses" or "eclipse glasses" or "personal solar filters" (these are all names for the same thing), according to the safety recommendations from NASA. The "lenses" of solar-viewing glasses are made from special-purpose solar filters that are hundreds of thousands of times darker than regular Sunglasses. These glasses are so dark that the face of the Sun should be the only thing visible through them. Solar-viewing glasses can be used to view a solar eclipse, or to look for Sunspots on the Sun's surface.

But beware! NASA and the AAS recommend that solar-viewing or eclipse glasses meet the current international standard: ISO 12312-2. Some older solar-viewing glasses may meet previous standards for eye protection, but not the new international standard. "Manufacturers that meet this standard include Rainbow Symphony, American Paper Optics, Eclipse Glasses, Seymour Solar, and Thousand Oaks Optical." "According to the information sheet on safe eclipse viewing. Homemade filters or ordinary Sunglasses, even very dark ones, are not safe for looking at the Sun."

A few safety tips regarding solar filters/eclipse glasses/solar viewers:

- Always inspect your solar filter before use; if scratched or damaged, discard it. Read and follow any instructions printed on or packaged with the filter.
- Always supervise children using solar filters.
- Stand still and cover your eyes with your eclipse glasses or solar viewer before looking up at the bright Sun. After glancing at the Sun, turn away and remove your filter — do not remove it while looking at the Sun.
- Do not look at the uneclipsed or partially eclipsed Sun through an unfiltered camera, telescope, binoculars or any other optical device.
- Do not look through any optical instrument wearing solar glasses, the solar filter must be for the instrument and on the front of the instrument. Any optical instrument that focuses light can increase the damaging power of the Sun and can result in destroying the eclipse shades, thus leaving your eyes unprotected. You also risk causing damage to the optical instrument because of the increase in focused power.

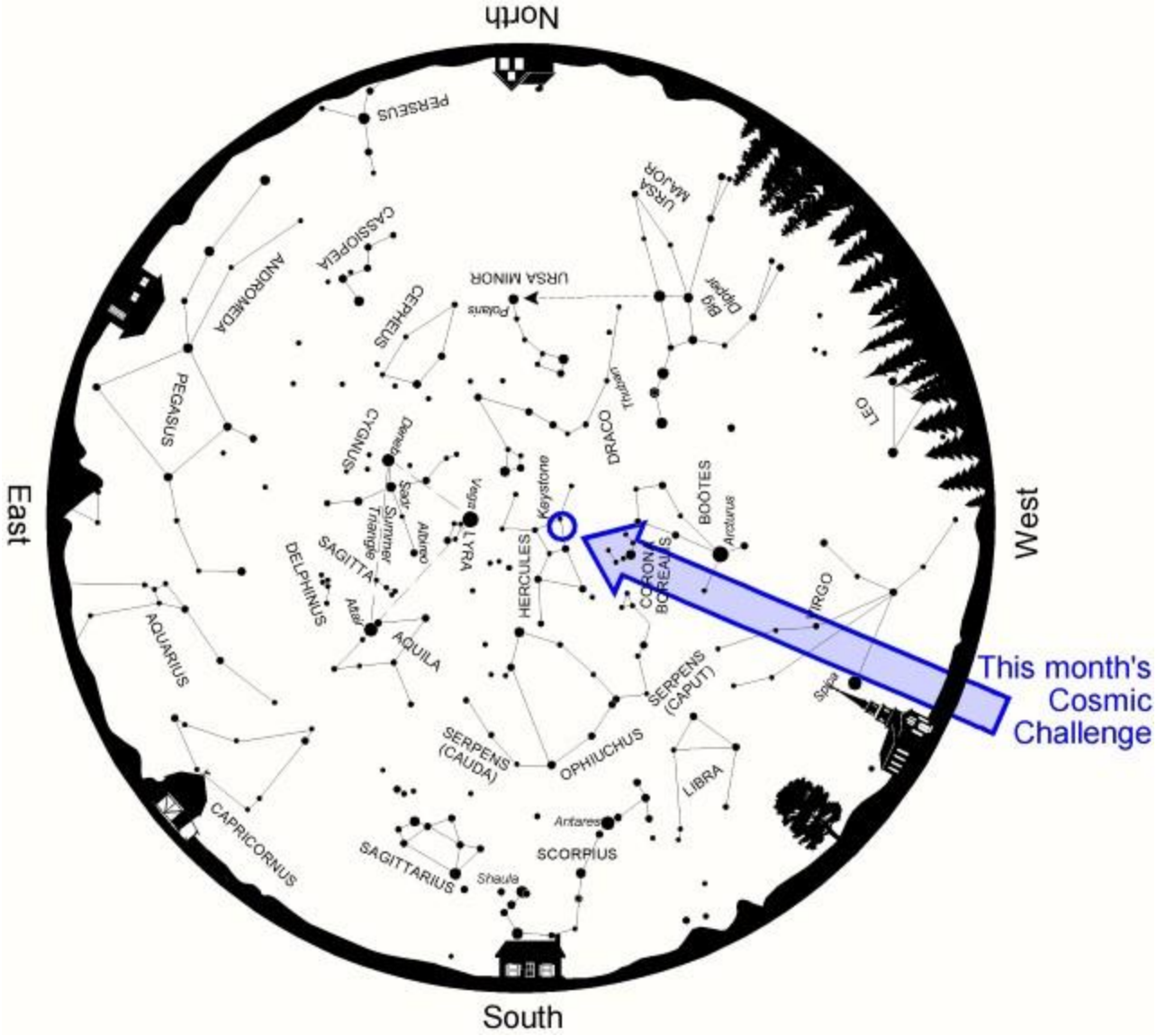
Editors Celestron SkyMaster 20x80 Binoculars with Solar Filters from Seymour Solar.
Coronado PST (Boise Astronomical Society)
Eclipse Glasses available through the Herrett Center Store
In the Cellophane package is #14 Welders Glass from Norco Industrial.

With the equipment in the photo above the editor will be **safely** viewing the solar eclipse before totality as well as after. Note: The welder's glass is too fragile to use without a frame or an actual helmet. With all of the information on the internet about the Welder's glass, the Editor obtained some and *uses the glass for show and tell purposes only.* Dropping the Welder's glass and picking up a fragment to view the Sun is very dangerous and not recommended. Views with the Welder's glass also produce a green tinge on the Sun, which is another reason the Editor does not use the glass.

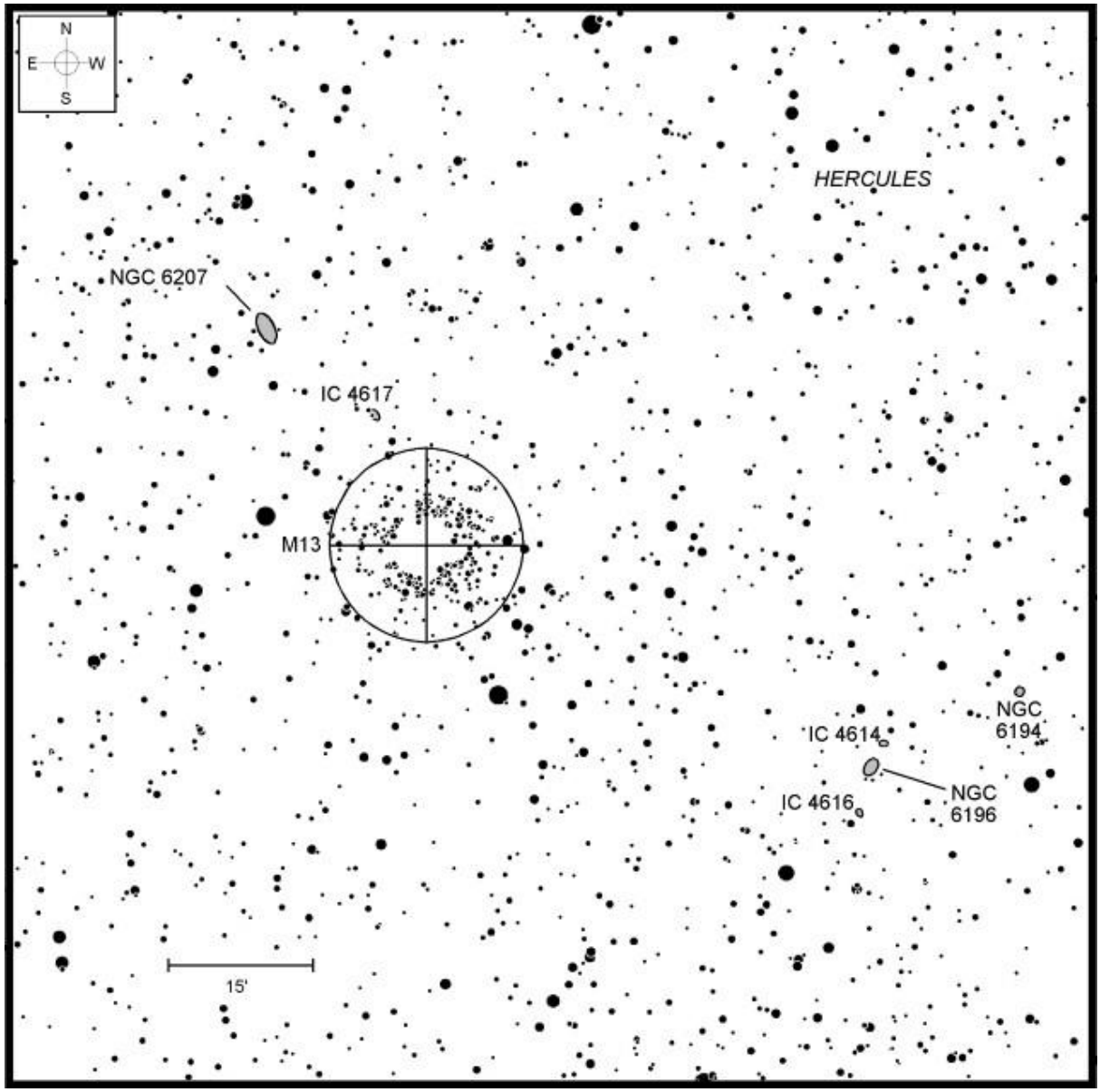
Cosmic Challenge

Target	Type	RA	DEC	Constellation	Magnitude	Size
M13's propeller	Globular cluster	16 41.7	+36 27.6	Hercules	5.8	20'

In last month's column, we paid a visit to the Moon and the crater pair of Messier and Messier A. This month, we head back out into deep space to examine one of the most spectacular entries in Charles Messier's catalog: M13, the Great Hercules Globular Cluster.



*Above: Summer star map from **Star Watch** by Phil Harrington*



*Above: Finder chart for this month's Cosmic Challenge. Chart adapted from **Cosmic Challenge** by Phil Harrington. Click on the chart to open a printable PDF version in a new window.*

There are few deep-sky objects more spectacular through a large telescope than globular clusters. Each globular cluster may contain hundreds of thousands to several million stars, all swarming together around a core so densely packed that seeing individual points may defy resolution. But the view is spectacular nonetheless.

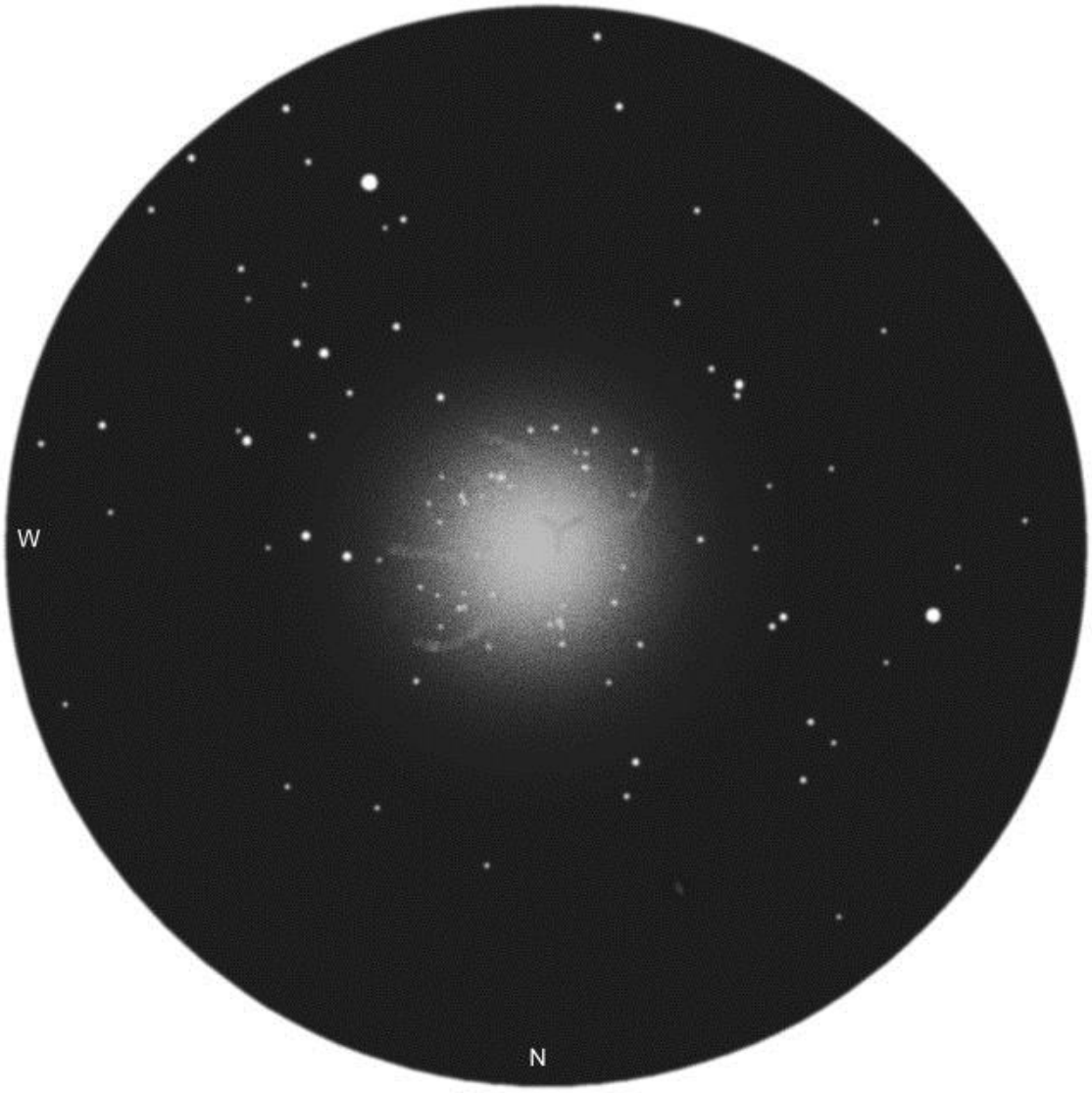
To the casual eye, all globular clusters may look the same. Just a big ball of stars, right? Nothing could be further from the truth. Each has a personality all its own, often with hidden treasures lying within, if you take the time to look.

M13, the grand globular cluster in mighty Hercules, is the perfect example. It doesn't take a double-digit aperture to see that the stars of M13 are distributed asymmetrically.
An 8-inch (20cm), and even smaller instruments, will show how the stars appear to be arranged into curves or rows. Many have likened the cluster's appearance to that of a spider. John Herschel described the cluster as exhibiting "hairy-looking, curvilinear branches." Later, Lord Rosse saw M13 as "more distinctly separated and brighter than anticipated; singularly fringed appendages to the globular figure branching out into the surrounding space."

Observing notes made while I was viewing through my 10-inch telescope at 58x recall irregular strings of stars streaming out from the cluster's dense core. Two thin threads curving away toward the west strike me as particularly conspicuous. These star-strings give the impression that M13 is hurtling through space so quickly that is it leaving a trail of stars behind in its wake.

Increasing the 10-inch's magnification to 181x reveals a surprise that goes unsuspected at lower values. The star streamers are still evident, but hidden within the core, southeast of the exact center, are three subtle dark lanes that seemingly join together to form the letter "Y." The combined effect is nicknamed the M13 propeller.

These unusual lanes, or propeller as many call them, were first discovered by Bindon Stoney in about 1850. At the time, Stoney was an astronomer working for Lord Rosse at Birr Castle in Parsontown, Ireland. After Stoney's initial sighting became known, many other observers confirmed the existence of these unique dark rifts through instruments as small as 6 inches (15cm) aperture. But as photography diminished the need for accurate visual observations, the M13 propeller became lost in the glow of the intense core.



Above: A sketch of M13 and its propeller through my 10-inch (25cm) Newtonian.

Above: Stoney's sketch of M13.
The breadth of the blades is greatly exaggerated, but the overall shape is correct.

Walter Scott Houston resurrected Stoney's dark lanes in his *Deep-Sky Wonders* column back in the July 1953 issue of *Sky & Telescope* magazine. His mention garnered little response at the time, however. But thanks to his persistence, along with the Dobsonian revolution, the propeller started to become a popular challenge in the 1980s. Today, another three decades later, many of today's amateurs have seen the M13 propeller.

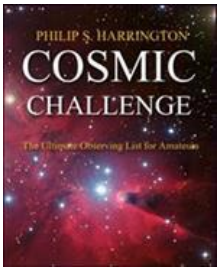
Most photographs of M13 do not show the propeller, however, because the cluster's core is usually so overexposed that they are absorbed into the glow. Yet by using a shorter exposure geared to resolve the core, the propeller can be seen. I took the photograph here several years ago through a 100mm apochromatic refractor that I was reviewing for *Astronomy* magazine at the time.

Above: M13's propeller is visible in this image taken by the author through a 100mm apochromatic refractor.

For a successful visual sighting, magnification is key. Too low and the lanes will remain hidden from view. To see the lanes for yourself, wait until the cluster is high in the sky, away from any haze and light pollution, which can stifle them. Under ideal conditions, the dark lanes are evident through a 12-inch, joined at their ends to resemble the corporate logo of a famous German auto maker -- proving once again that M13 is the Mercedes-Benz of globular clusters.

Have a favorite challenge object of your own? I'd love to hear about it, as well as how you did with this month's test. Contact me through my web site. Remember, half of the fun is the thrill of the chase. Game on!

 Phil Harrington writes the monthly Binocular Universe column in Astronomy magazine and is the author of 9 books on astronomy. Visit his web site at www.philharrington.net to learn more.



The Shape of the Solar System

By Marcus Woo

When Stamatios (Tom) Krimigis was selected for the Voyager mission in 1971, he became the team's youngest principal investigator of an instrument, responsible for the Low Energy Charged Particles (LECP) instrument. It would measure the ions coursing around and between the planets, as well as those beyond. Little did he know, though, that more than 40 years later, both Voyager 1 and 2 still would be speeding through space, continuing to literally reshape our view of the solar system.

The solar system is enclosed in a vast bubble, carved out by the solar wind blowing against the gas of the interstellar medium. For more than half a century, scientists thought that as the sun moved through the galaxy, the interstellar medium would push back on the heliosphere, elongating the bubble and giving it a pointy, comet-like tail similar to the magnetospheres—bubbles formed by magnetic fields—surrounding Earth and most of the other planets "We in the heliophysics community have lived with this picture for 55 years," said Krimigis, of The Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland. "And we did that because we didn't have any data. It was all theory."

But now, he and his colleagues have the data. New measurements from Voyager and the Cassini spacecraft suggest that the bubble isn't pointy after all. It's spherical.

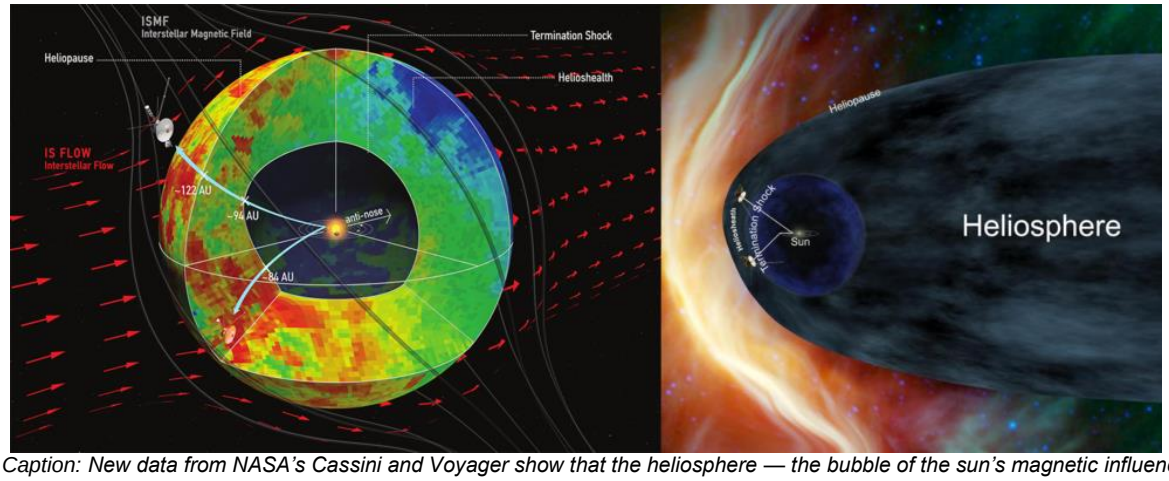
Their analysis relies on measuring high-speed particles from the heliosphere boundary. There, the heated ions from the solar wind can strike neutral atoms coming from the interstellar medium and snatch away an electron. Those ions become neutral atoms, and ricochet back toward the sun and the planets, uninhibited by the interplanetary magnetic field.

Voyager is now at the edge of the heliosphere, where its LECP instrument can detect those solar-wind ions. The researchers found that the number of measured ions rise and fall with increased and decreased solar activity, matching the 11-year solar cycle, showing that the particles are indeed originating from the sun.

Meanwhile, Cassini, which launched 20 years after Voyager in 1997, has been measuring those neutral atoms bouncing back, using another instrument led by Krimigis, the Magnetosphere Imaging Instrument (MIMI). Between 2003 and 2014, the number of measured atoms soared and dropped in the same way as the ions, revealing that the latter begat the former. The neutral atoms must therefore come from the edge of the heliosphere. If the heliosphere were comet-shaped, atoms from the tail would take longer to arrive at MIMI than those from the head. But the measurements from MIMI, which can detect incoming atoms from all directions, were the same everywhere. This suggests the distance to the heliosphere is the same every which way. The heliosphere, then, must be round, upending most scientists' prior assumptions.

It's a discovery more than four decades in the making. As Cassini ends its mission this year, the Voyager spacecraft will continue blazing through interstellar space, their remarkable longevity having been essential for revealing the heliosphere's shape. "Without them," Krimigis says, "we wouldn't be able to do any of this."

To teach kids about the Voyager mission, visit the NASA Space Place: https://spaceplace.nasa.gov/voyager-to-planets

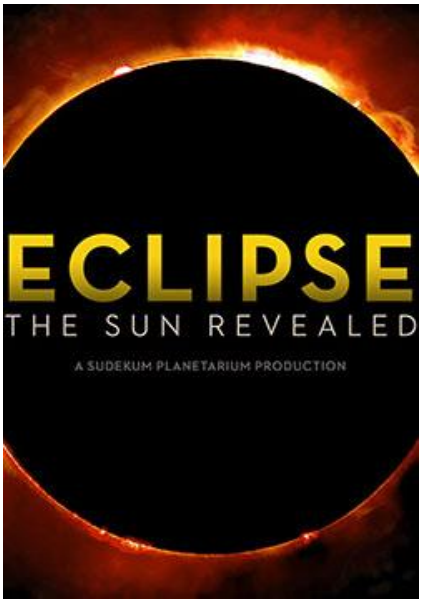


Caption: New data from NASA's Cassini and Voyager show that the heliosphere — the bubble of the sun's magnetic influence that surrounds the solar system — may be much more compact and rounded than previously thought. The image on the left shows a compact model of the heliosphere, supported by this latest data, while the image on the right shows an alternate model with an extended tail. The main difference is the new model's lack of a trailing, comet-like tail on one side of the heliosphere. This tail is shown in the old model in light blue.
Image credits: Dialynas, et al. (left); NASA (right)

Centennial Observatory and Faulkner Planetarium

Event	Place	Date	Time	Admission
Summer Solar Session #6	Centennial Observatory	Wednesday, July 5th, 2017	1:30 to 3:30 PM	FREE
Monthly Free Star Party	Centennial Observatory	Saturday, July 8th, 2017	9:30 PM to midnight	FREE
Summer Solar Session #7	Centennial Observatory	Wednesday, July 12th, 2017	1:30 to 3:30 PM	FREE
Summer Solar Session #8	Centennial Observatory	Wednesday, July 19th, 2017	1:30 to 3:30 PM	FREE
City of Rocks Star Party	Castle Rocks State Park, Almo, ID	Friday, July 21st - Saturday, July 22nd, 2017	2:00 PM to 12:00 AM	FREE

CSI Centennial Observatory / Faulkner Planetarium Herrett Center
College of Southern Idaho Campus Twin Falls, ID
Faulkner Planetarium / Show Times
http://herrett.csi.edu/astronomy/planetarium/showtimes.asp
Now Showing



About the Magic Valley Astronomical Society

Magic Valley Astronomical Society
550 Sparks St.
Twin Falls, ID

The Magic Valley Astronomical Society (MVAS) was founded in 1976. The Society is a non-profit [501(c) 3] educational and scientific organization dedicated to bringing together people with an interest in astronomy.

In partnership with the Centennial Observatory, Herrett Center, College of Southern Idaho - Twin Falls; we hold regularly scheduled monthly meetings and observation sessions, at which we share information on current astronomical events, tools and techniques for observation, astrophotography, astronomical computer software, and other topics concerning general astronomy. Members enthusiastically share their telescopes and knowledge of the night sky with all who are interested. In addition to our monthly public star parties we hold members only star parties at various locations throughout the Magic Valley.

MVAS promotes the education of astronomy and the exploration of the night sky along with safe solar observing through our public outreach programs. We provide two types of outreach; public star parties and events open to anyone interested in astronomy, and outreach programs for individual groups and organizations (e.g. schools, churches, scout troops, company events, etc.), setting up at your location. All of our outreach programs are provided by MVAS volunteers at no cost. However, MVAS will gladly accept donations. Donations enable us to continue and improve our public outreach programs.

Membership is not just about personal benefits. Your membership dues support the work that the Magic Valley Astronomical Society does in the community to promote the enjoyment and science of astronomy.
Speakers, public star parties, classes and support for astronomy in schoolrooms, and outreach programs just to name a few of the programs that your membership dues support.

Annual Membership dues will be:
$20.00 for individuals, families, and $10.00 for students.
Contact Treasurer Jim Tubbs for dues information via e-mail: jtubbs015@msn.com

Donations to our club are always welcome and are even tax deductible. Please contact a board member for details.

Membership Benefits:
Lending Telescopes: The society currently has three telescopes for loan and would gladly accept others please contact President Robert Mayer, for more information on these and other benefits.

Telescopes are an individual thing and not practical for public use. However, everyone should have the experience of a good look at the moon for at least 5 minutes in their life time. It is a dimension and feeling that is unexplainable. Pictures or TV can't give this feeling, awareness, or experience of true dimension. A person will not forget seeing our closest neighbor, the moon. Norman Herrett in a letter to Dr. J. L. Taylor, president of the College of Southern Idaho, Twin Falls, ID, USA circa 1980.