



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 29, No. 8 **Three-Time Winner of the Astronomical League's Mabel Sterns Award** ☼ 2006, 2009 & 2016 August 2021

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The Andromeda Galaxy in Ultraviolet



Spanning about 230,000 light-years, it took 11 different image fields from NASA's Galaxy Evolution Explorer (GALEX) satellite telescope to produce this gorgeous portrait of the spiral galaxy in ultraviolet light in 2003. While its spiral arms stand out in visible light images, Andromeda's arms look more like rings in ultraviolet.
Image Credit: [NASA, JPL-Caltech, GALEX](#)

Membership Renewals Due

08/2021	Barker Bogard Borowski Force Johnston & Stein Knabb Family Krus Lurcott, L. Manigly Tiedmann Tredinnick Trunk
09/2021	Atmore Holloway Lee Reilly Squire
10/2021	Kraynik Lane Lester Rosenblatt Wirth

August 2021 Dates

- 8th** • New Moon, 9:50 a.m. EDT
- 12th** • The Perseid meteor shower peaks in the early morning hours
- 15th** • First Quarter Moon, 11:19 a.m. EDT
- 20th** • The Moon is near Saturn
- 21st** • The Moon is near Jupiter
- 22nd** • Full Moon, the Full Sturgeon Moon or the Full Coho Salmon Moon, 8:01 a.m. EDT
- 30th** • Last Quarter Moon, 3:13 a.m. EDT



CCAS Summer Party

Roger and Linda Taylor have graciously offered to host the annual CCAS summer party at their home on Saturday, August 7, 2021, at 5:00 p.m. Please bring something to share such as an appetizer, salad, side dish or dessert.

Roger and Linda's phone number is 610-430-7768 and their address is 506 Northbrook Rd., West Chester, PA 19382.

Please RSVP online to invitation Roger sent members via email if you plan to attend.

Summer Society Events

August 2021

7th • Annual CCAS Summer Picnic at Roger and Linda Taylor's home starting at 5:00 p.m. More information will be shared with CCAS members via email and in the monthly CCAS newsletter *Observations*.

19th • The von Kármán Lecture Series: [Psyche: Mission to a Metal World](#), 10:00 pm EDT. Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

19th-21st • Astronomical League Virtual Convention. Register to attend online at <https://www.alconvirtual.org>

20th • Open call for articles and photographs for the September 2021 edition of *Observations*.

26th • Deadline for newsletter submissions for the September 2021 edition of *Observations*.

September 2021

14th • Monthly CCAS Meeting in Room 113, Merion Science Center, WCU. The meeting starts at 7:30 p.m. Dennis O'Leary, CCAS Member and NASA Ambassador – “NASA Robotic Missions: An Update on New Horizons, Insight, Perseverance, and Juno.”

16th • The von Kármán Lecture Series: [Instrumental: Engineers Who Make Science Possible](#), 10:00 pm EDT. Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Open call for articles and photographs for the October 2021 edition of *Observations*.

26th • Deadline for newsletter submissions for the October 2021 edition of *Observations*.

Thor's Helmet

by Bernard Miller, *Astronomy Picture of the Day*



Thor not only has [his own day](#) (Thursday), but a helmet in the heavens. Popularly called Thor's Helmet, [NGC 2359](#) is a hat-shaped cosmic cloud with wing-like appendages. Heroically sized even for a [Norse god](#), Thor's Helmet is about 30 light-years across. In fact, the cosmic head-covering is more like an [interstellar bubble](#), blown with a fast wind from the bright, massive star near the bubble's center. Known as a [Wolf-Rayet star](#), the central star is an extremely [hot giant](#) thought to be in a brief, pre-[supernova](#) stage of evolution. [NGC 2359 is located](#) about 15,000 light-years away toward the constellation of the [Great Overdog](#). This [remarkably sharp image](#) is a mixed cocktail of data from broadband and [narrowband filters](#), capturing not only [natural looking](#) stars but details of [the nebula's](#) filamentary structures. The [star in the center](#) of Thor's Helmet is expected to [explode](#) in a spectacular [supernova sometime](#) within the next few thousand years. **Image Credit & Copyright:** [Bernard Miller](#)

September 2021 CCAS Meeting Agenda

by Bruce Ruggeri, CCAS Program Chair

Our next meeting will be held on September 14, 2021, in Room 113, Merion Science Center, WCU. The meeting starts at 7:30 p.m. Dennis O'Leary, CCAS Member and NASA Ambassador – “NASA Robotic Missions: An Update on New Horizons, Insight, Perseverance, and Juno.”

Please note that inclement weather or changes in speakers' schedules may affect the pro-

gram. In the event there is a change, CCAS members will be notified via e-mail with as much advance notice as possible.

As for future meetings, we are looking for presenters for our 2021-2022 season and beyond. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

NASA Lucy Mission's Message to the Future

by Katherine Kretke, NASA's Goddard Space Flight Center

In the 1970s four spacecraft began their one-way trips out of our Solar System. As the first human-built objects to ever venture into interstellar space, NASA chose to place plaques on Pioneer 10 and 11 and golden records on Voyager 1 and 2 spacecraft to serve as messages to any alien spacefarers that may someday encounter these spacecraft. Continuing this legacy, NASA's Lucy spacecraft will carry a similar plaque. However, because Lucy will not be venturing outside of our Solar System, Lucy's plaque is a time-capsule featuring messages to our descendants.

As the first-ever mission to the Trojan asteroids, Lucy will sur-

vey this enigmatic population of small bodies that orbit the Sun beyond the main asteroid belt—trapped by Jupiter and the Sun so that they have led and followed Jupiter in its orbit. As these never before explored asteroids are in many ways "fossils" from the formation and evolution of the planets, the Lucy spacecraft is named in honor of the fossilized human ancestor discovered the year after Pioneer 11 began its journey out of the Solar System. Lucy's name was inspired by the Beatles' song "Lucy in the Sky with Diamonds."

After Lucy finishes visiting a record number of asteroids for a single mission in 2033 (8 asteroids on 6 independent orbits

around the Sun) the Lucy spacecraft will continue to travel between the Trojan asteroids and the orbit of the Earth for at least hundreds of thousands, if not millions of years. It is easy to imagine that someday in the distant future our descendants will find Lucy floating among the planets. Therefore, the Lucy team chose to put a time-capsule aboard the Lucy spacecraft in the form of a plaque, messages this time not for unknown aliens, but for those that will come after us. The plaque was installed on the spacecraft in a ceremony at Lockheed Martin Space in Littleton, Colorado, on July 9, 2021.

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Faraway NASA Probe Detects the Eerie Hum of Interstellar Space

by Will Dunham, Reuters.com



An undated artist's concept shows NASA's Voyager 1 spacecraft, the first human-made object to venture into interstellar space. Image Credit: REUTERS/NASA/JPL-Caltech/Handout via Reuters

The classic 1979 sci-fi horror film "Alien" was advertised with the memorable tagline, "In space

no can hear you scream." It did not say anything about humming. Instruments aboard

NASA's Voyager 1 spacecraft, which nine years ago exited our solar system's outer reaches, have detected a faint monotonous hum caused by the constant vibrations of the small amounts of gas found in the near-emptiness of interstellar space, scientists said.

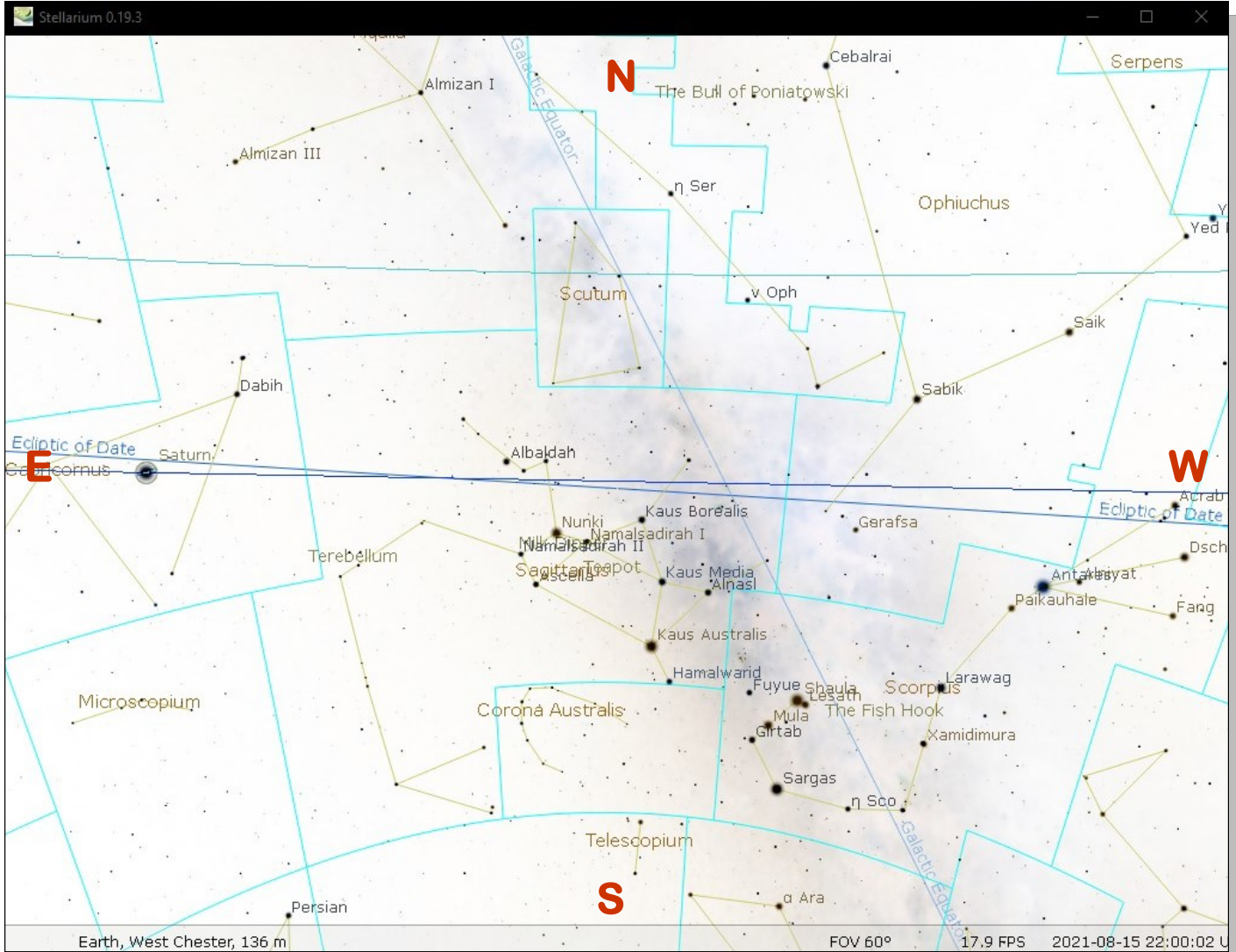
It essentially represents the background noise present in the vast expanse between star systems. These vibrations, called persistent plasma waves, were identified at radio frequencies in a narrow bandwidth during a three-year period as Voyager 1 traverses interstellar space. "The persistent plasma waves that we've just discovered are far too weak to actually hear with the human ear. If we could hear it, it would sound like a single steady

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The Sky Over Chester County

August 15, 2021 at 10:00 p.m. ET

Note: This screen capture is taken from Stellarium, the free planetarium software available for download at www.stellarium.org.



Date	Civil Twilight Begins	Sunrise	Sunset	Civil Twilight Ends	Length of Day
08/01/2021	5:30 a.m. EDT	6:01 a.m. EDT	8:15 p.m. EDT	8:45 p.m. EDT	14h 14m 28s
08/15/2021	5:45 a.m. EDT	6:14 a.m. EDT	7:58 p.m. EDT	8:27 p.m. EDT	13h 44m 09s
08/31/2021	6:01 a.m. EDT	6:29 a.m. EDT	7:34 p.m. EDT	8:02 p.m. EDT	13h 05m 22s

Moon Phases					
			New Moon	08/08/2021	9:50 a.m. EDT
First Quarter	08/15/2021	11:19 a.m. EDT	Full Moon	08/22/2021	8:01 a.m. EDT
Last Quarter	08/30/2021	3:13 a.m. EDT			

August 2021 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

2	Saturn is at opposition
8	New Moon, 9:50 a.m. EDT
10	Venus is near the thin crescent Moon
12	The Perseid meteor shower peaks in the early morning hours
15	First Quarter Moon, 11:19 a.m. EDT
16	The Lunar Straight Wall is visible
19	Jupiter is at opposition
20	The Moon is near Saturn
21	The Moon is near Jupiter
22	Full Moon, the Full Sturgeon Moon or the Full Coho Salmon Moon
30	Last Quarter Moon, 3:13 a.m. EDT

The best sights this month: It is a joy to once again see Venus, the “evening star” in our western sky not long after the Sun sets. On August 10th there will be a nice meeting of Venus and a thin crescent Moon shortly after sunset. Look for “Earthshine” on the Moon, the reflection of light off the Earth that dimly illuminates the part of the Moon that is in shadow. Then on the evening and night of August 11/12 we have the Perseid meteor shower. Most people rate this as the best meteor shower of the year.

Mercury: Mercury passes behind the Sun on August 1st and is difficult to observe during August.

Venus: Our sister planet shines brightly at magnitude -3.9 in the southwest not long after sunset. Look for a nice meeting of Venus and a thin crescent Moon on August 10th.

Mars: Mars is much dimmer than Venus at magnitude 1.8 and is to the lower right of Venus, very low in the sky. If you have a clear view of the horizon, try using binoculars to find the red planet just as the sky darkens.

Jupiter: Jupiter reaches opposition – the point at which it is opposite the Sun in our sky – on August 19th. It glows at a bright magnitude -2.8 most of the month. August is a great time to look at the two dark bands that straddle the equator of Jupiter, and don’t miss the Great Red Spot!

Saturn: Saturn reaches opposition on August 2nd so it is visible all night and is highest in the sky around 1 a.m.

Uranus and Neptune: Neptune rises 2 hours after sunset and is in best viewing position in the wee hours of the morning. Uranus doesn’t rise until after midnight, so it is best observed just before dawn. I think I’ll wait until this fall to seek out these distant cold ice giants.

The Moon: Full Moon is on August 22nd. Native Americans called this the Full Sturgeon Moon. The fishing tribes are given credit for the naming of this Moon, since sturgeon, a large fish of the Great Lakes was most readily caught during this month. A few tribes knew it as the Full Red Moon because as the Moon rises it appears reddish through the sultry haze of summer. Native Canadians called this the Ripening Moon or the Coho Salmon Moon.

Constellations: The warm nights and bright stars of August make for some great observing opportunities. The Summer Triangle and all its treasures are shining overhead and if we get a good clear night the Milky Way arches overhead like the backbone of the sky. The Dipper is holding water and Cassiopeia is climbing up the opposite side of the sky. As the night gets late the Great Square of Pegasus is easily visible so grab your binoculars and look for our neighbor galaxy Andromeda.

Messier/deep sky: M13 and M92, bright globular clusters in Hercules are nearly overhead so they are in a great position for viewing with binoculars or a telescope. If you use binoculars, lie down on a blanket or a lounge chair to make looking directly overhead easy. Not far away from Hercules is M57, the Ring Nebula in Lyra. This is an amazing object that is best viewed with averted vision to see the ring structure. Do not miss the southern Messier objects in Scorpius and Sagittarius while we have the chance to see them. That part of the sky is filled with incredible objects that are visible for only a short time from Chester County.

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Marsquakes Reveal the Red Planet Boasts a Liquid Core Half Its Diameter

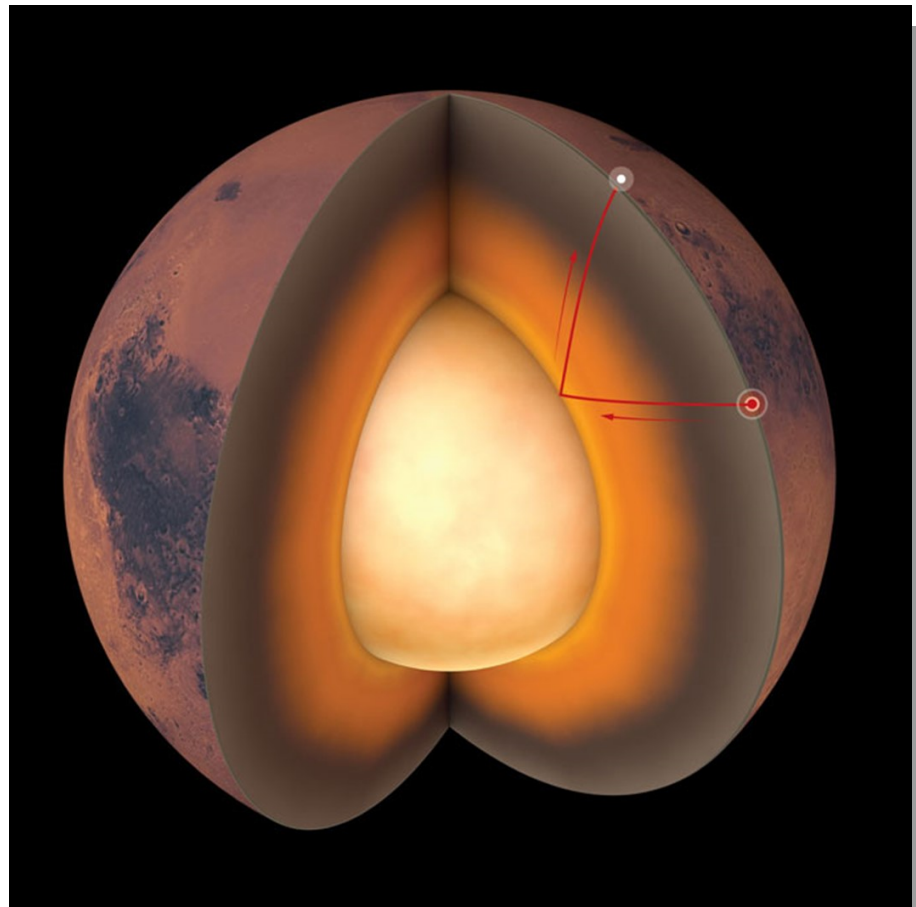
by Sid Perkins, ScienceNews

Mars has had its first CT scan, thanks to analyses of seismic waves picked up by NASA's InSight lander. Diagnosis: The Red Planet's core is at least partially liquid, as some previous studies had suggested, and is somewhat larger than expected.

InSight reached Mars in late 2018 and soon afterward detected the first known marsquake (SN: 11/26/18; SN: 4/23/19). Since then, the lander's instruments have picked up more than a thousand tremors, most of them minor rumbles. Many of those quakes originated at a seismically active region more than 1,000 kilometers away from the lander. A small fraction of the quakes had magnitudes ranging from 3.0 to 4.0, and the resulting vibrations have enabled scientists to probe Mars and reveal new clues about its inner structure.

Simon Stähler, a seismologist at ETH Zurich, and colleagues analyzed seismic waves from 11 marsquakes, looking for two types of waves: pressure and shear. Unlike pressure waves, shear waves can't pass through a liquid, and they move more slowly, traveling side to side through solid materials, rather than in a push-and-pull motion in the same direction a wave is traveling like pressure waves do.

Of those 11 events, six sets of vibrations included shear waves strong enough to stand out from background noise. The strength of those shear waves suggests that they reflected off of the outer surface of a liquid core, rather than entering a solid core and being partially absorbed, Stähler



Seismic waves (red lines in this illustration) traveling through Mars from a quake's source (example, red dot) to the InSight lander (white dot) reveal the Red Planet's internal structure, including a massive core (yellow-white) more than half the diameter of the planet.

Image Credit: CHRIS BICKEL/SCIENCE

says. And the difference in arrival times at InSight for the pressure waves and shear waves for each quake suggest that Mars' core is about 3,660 kilometers in diameter, he and colleagues report in the July 23 *Science*.

That's a little more than half of the diameter of the entire planet, larger than most previous estimates. The Red Planet's core is so big, in fact, that it blocks InSight from receiving certain types of seismic waves from a large part of the planet. That, in turn, suggests that Mars may be more seismically active than the

lander's sensors can detect. Indeed, one of the regions in the lander's seismic blind spot is the Tharsis region, home to some of Mars' largest volcanoes. Volcanic activity there, as well as the motion of molten rock within the crust in that region, could trigger quakes or seismic waves.

While the newly analyzed data confirm the planet's outer core is liquid, it's not clear yet whether Mars has a solid inner core like Earth, says study coauthor Amir Khan, a geophysicist also at

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Marsquakes (Cont'd)

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ETH Zurich. "The signal should be there in the seismic data," he says. "We just need to locate it."

In a separate analysis also published in *Science*, Khan and colleagues suggest that InSight's seismic blind spot may also stem, in part, from the way that seismic waves slow down and bend as they travel deep within the planet. Changes in seismic wave speed and direction can result from gradual variations in rock temperature or density, for example.

Mars' seismic waves also hint at the thickness of the planet's crust. As they bounce back and forth within the planet, the waves bounce off interfaces between different layers and types of rocks, says Brigitte Knapmeyer-Endrun, a seismologist at the University of Cologne in Bergisch Gladbach, Germany. In a separate study in *Science*, she and her team analyzed seismic signals that reflected off several such interfaces near Mars' surface, making it difficult to determine the depth at which the planet's crust ends and the underlying mantle begins, she says. The researchers concluded, however, that the average thickness of the crust likely lies between 24 and 72 kilometers. For comparison, Earth's oceanic crust is about 6 to 7 kilometers thick, while the planet's continental crust averages from 35 to 40 kilometers thick.

Together, these seismic analyses are the first to investigate the innards of a rocky planet other than Earth, Stähler says. As such, they provide "ground

truth" for measurements made by spacecraft orbiting Mars, and could help scientists better interpret data gathered from orbit around other planets, such as Mercury and Venus.

The findings could also provide insights that would help planetary scientists better understand how Mars formed and evolved over the life of the solar system, and how the Red Planet ended up so unlike Earth, says Sanne Cottaar, a geophysicist at the University of Cambridge. Cottaar wrote a commentary, also published in *Science*, on the new research. "Mars was put together with similar building blocks" as Earth, she says, "but had a different result."

Read the article online at [Science News](#)

Citations

S. Cottaar and P. Koelemeijer. The interior of Mars revealed. *Science*. Vol. 373, p. 388. doi: 10.1126/science.abj8914.

A. Khan *et al.* Upper mantle structure of Mars from InSight seismic data. *Science*. Vol. 373, p. 434. doi: 10.1126/science.abf2966.

B. Knapmeyer-Endrun *et al.* Thickness and structure of the Martian crust from InSight seismic data. *Science*. Vol. 373, p. 438. doi: 10.1126/science.abf8966.

S. Stähler *et al.* Seismic detection of the Martian core. *Science*. Vol. 373, p. 443. doi: 10.1126/science.abi7730.

Voyager (Cont'd)

(Continued from page 3)

note, playing constantly but changing very slightly over time," said Stella Koch Ocker, a Cornell University doctoral student in astronomy and lead author of the study published this week in the journal *Nature Astronomy*.

The Voyager 1 spacecraft, launched in September 1977, is currently located about 14.1 billion miles (22.7 billion km) from Earth - roughly 152 times the distance between our planet and the sun - and is still obtaining and transmitting data. Having decades ago visited the huge planets Jupiter and Saturn, Voyager 1 is now providing insight into interstellar space.

The immense regions between star systems in a galaxy are not a complete vacuum. The stew of matter and radiation present in low densities - mostly gas - is called the interstellar medium. About 15% of the visible matter in our Milky Way galaxy is composed of this interstellar gas, dust and energetic particles like cosmic rays. Much of the interstellar medium is in what is called an ionized, or electrically charged, state called plasma. "Interstellar plasma is extremely diffuse compared to what we're used to on Earth. In this plasma, there are about 0.1 atoms for every cubic centimeter, whereas the air we breathe on Earth has billions of atoms for every cubic centimeter," Ocker said.

Voyager 1 previously detected disturbances in the gas in interstellar space triggered by occasional flares from our sun. The

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Through the Eyepiece: Herschel's Garnet Star in Cepheus, Mu Cephei

by Don Knabb, CCAS Treasurer & Observing Chair



Public domain image by Francesco Malafarina

Galaxies, nebula and clusters are the most observed objects in the night sky. But sometimes it is nice to look for other objects and sometimes individual stars are more than worthy of our attention. One such star can be found about half way to the zenith in the northeastern sky in August. There you will find a bright red star that is referred to as Herschel's Garnet Star, which is the star Mu Cephei.

Mu Cephei is a red supergiant star. It appears garnet red and is located at the edge of the IC 1396 nebula. Mu Cephei is one of the most luminous red supergiants in the Milky Way. It is also one of the largest stars so far discovered. Mu Cephei is one of the largest and brightest stars visible not only to the naked eye but in the entire Galaxy. Mu Cephei is so large that its actual apparent disk is readily discernable with professional telescopes!

Were Herschel's Garnet Star placed in the Sun's position it would reach between the orbit of Jupiter and Saturn. Mu Cephei could fit around 2 billion Suns into its volume. Only five known stars are believed to be larger than it. The luminosity of Mu Cephei is estimated at approximately 400,000 times that of our Sun.

The deep red color of Mu Ce-

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Eyepiece (Cont'd)

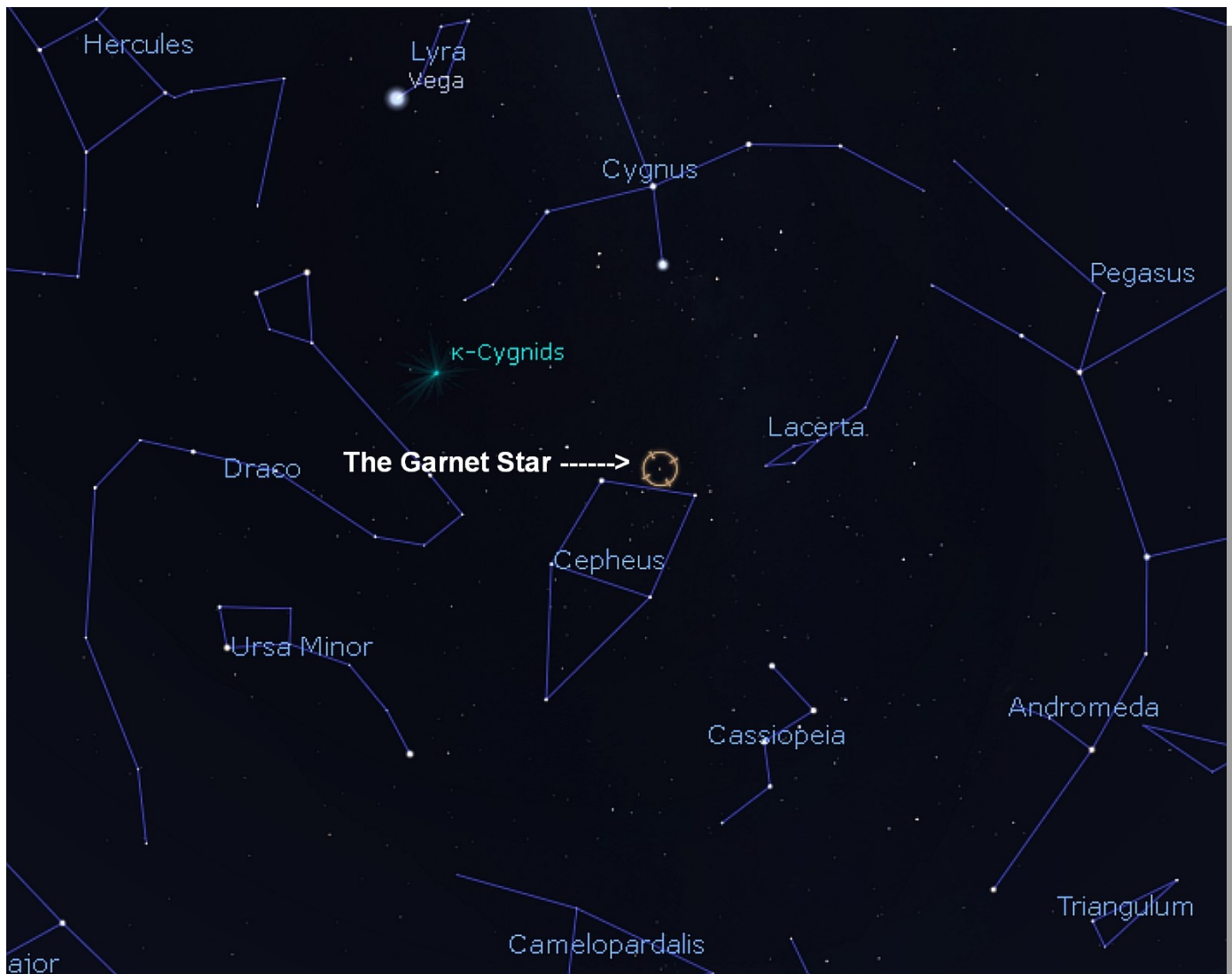


Image Credit: Stellarium, the free planetarium software

(Continued from page 8)

Cephei was noted by William Herschel, who described it as "a very fine deep garnet colour, such as the periodical star of Ceti". Though sometimes known as "Erakis," it is more familiarly referred to as "Herschel's Garnet Star," the name honoring both the star's deep color and Sir William Herschel, who in 1781 discovered the planet Uranus and who also founded modern observational astronomy with vast numbers of other discoveries that included infrared radiation.

Note to science fiction fans – when I first learned the formal name of this star as Erakis, I immediately thought of the planet in Frank Herbert's *Dune* novel. However, the planet in *Dune* is named "Arrakis."

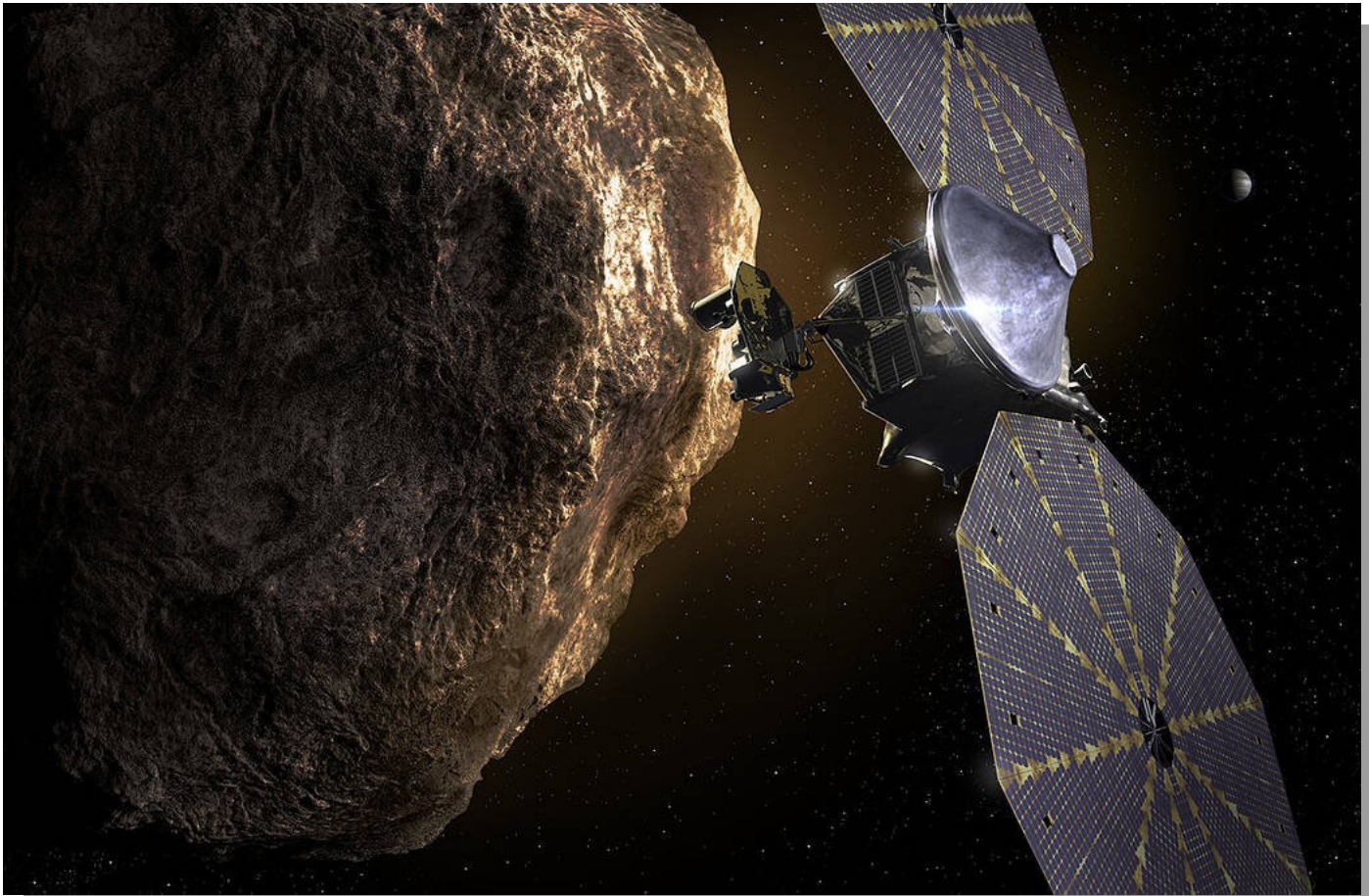
Strongly colored stars have always fascinated astronomers. The long history of red-star observations begins in the early 19th century, with famous observers such as Angelo Secchi and Thomas Espin. And those who think that stars are not high-

ly colored need only look at Mu Cephei.

Mu Cephei is nearing death. It has begun to fuse helium into carbon, whereas a main sequence star fuses hydrogen into helium. When a supergiant star has converted elements in its core to iron, the core collapses to produce a supernova and the star is destroyed, leaving behind a vast gaseous cloud and a small, dense remnant. For a star

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Lucy (Cont'd)



Artist's concept of Lucy. Credit: NASA

(Continued from page 3)

This time-capsule contains messages from prominent members of our society; individuals who have asked us to contemplate the state of the human condition as well as our place in the universe. These thoughtful leaders were asked to provide words of advice, words of wisdom, words of joy, and words of inspiration to those who may read this plaque in the distant future. These messages were solicited from Nobel Laureates in Literature, United States Poet Laureates, and other inspirational figures including the members of the band that indirectly inspired the Lucy mission's name.

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Eyepiece (Cont'd)

(Continued from page 9)

as massive as Mu Cephei the remnant is likely to be a black hole.

Finding Herschel's Garnet Star is not difficult, but since it shines at 4th magnitude it is not very bright in our light polluted Chester County skies. Binoculars are a great help, as is a telescope. Cepheus is between Ursa Minor and Cassiopeia and is a somewhat dim constellation in the shape of a house. The Garnet Star is in the basement of this house, nearly equidistant from the two "foundation" stars. When you find it you will know

it because of the distinct red color. It is best seen from the Northern hemisphere from August to January.

Information sources:

- Sky Safari app, adapted from STARS by Jim Kaler, Professor Emeritus of Astronomy, University of Illinois
- <http://stars.astro.illinois.edu/sow/garnet.html>
- http://www.nightskyinfo.com/archive/mu_cephei/
- https://en.wikipedia.org/wiki/Mu_Cephei

Lucy (Cont'd)

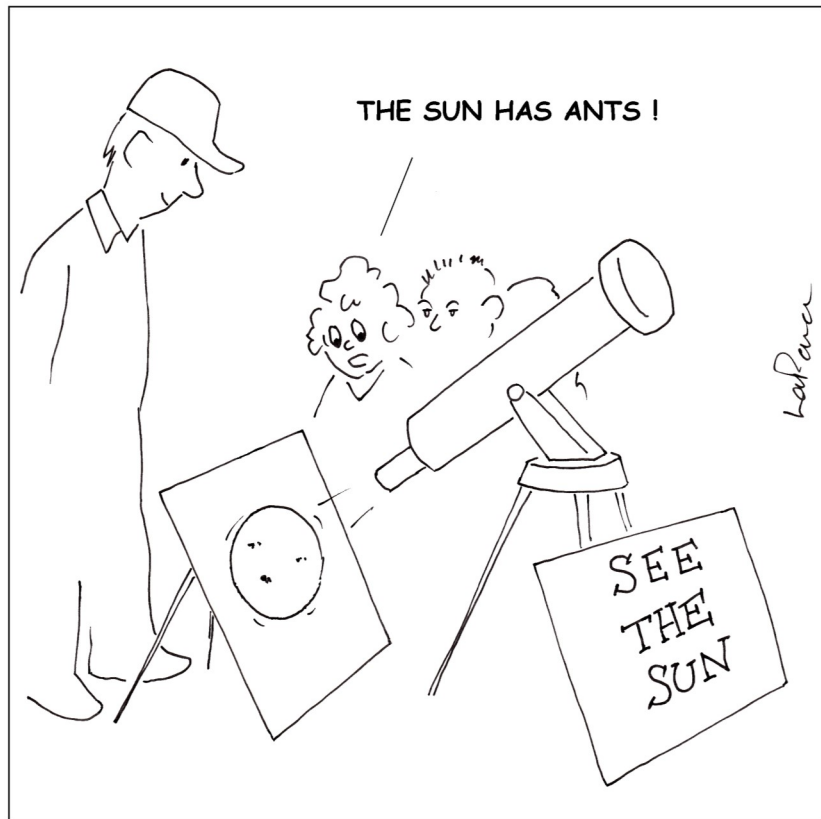
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To date this time-capsule, the plaque also includes a depiction of the Solar System on the day of Lucy's anticipated launch of October 16, 2021. The original trajectory of the Lucy spacecraft, traveling between the Trojan swarms and the Earth's orbit, is shown as well.

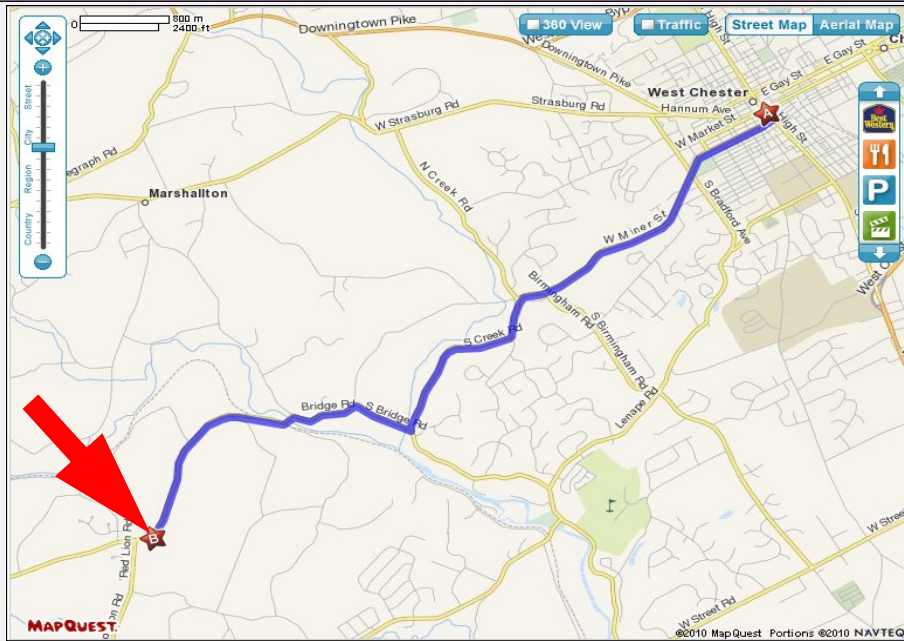
NASA places this plaque with the hope that space exploration continues and someday astro-archeologists may travel among the planets and retrieve this spacecraft as an artifact of the early days when humanity took its first steps to explore our Solar System.

Watch a video of several of the contributors to the project sharing their submissions at <https://youtu.be/wqI2ysgilN0>

Classic La Para by Nicholas La Para



CCAS Directions



Brandywine Red Clay Alliance

The monthly observing sessions (held February through November) are held at the Myrick Conservation Center of the Brandywine Red Clay Alliance.

To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BRC property, turn left off Route 842 into the parking lot by the office: look for the signs to the office along Route 842. From that parking lot, go left through the gate and drive up the farm lane about 800 feet to the top of the hill. The observing area is on the right.

If you arrive after dark, *please turn off your headlights and just use parking lights* as you come up the hill (so you don't ruin other observers' night vision).

Brandywine Red Clay Alliance

1760 Unionville Wawaset Rd
West Chester, PA 19382
(610) 793-1090

<http://brandywinewatershed.org/>

BRC was founded in 1945 and is committed to promoting and protecting the natural resources of the Brandywine Valley through educational programs and demonstrations for all ages.

NASA Night Sky Notes: Corner the Great Square of Pegasus

by David Prosper

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach.

Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.

The Summer Triangle may be the most famous seasonal star pattern, but during early August evenings another geometrically-themed asterism rises: the Great Square of Pegasus. This asterism's name is a bit misleading: while three of its stars - Scheat, Markab, and Algenib - are indeed found in the constellation of the winged horse Pegasus, its fourth star, Alpheratz, is the brightest star in the constellation Andromeda!

August evenings are an excellent time to look for the Great Square, as it will be rising in the east after sunset. If not obvious at first, wait for this star pattern to rise a bit above the murky air,

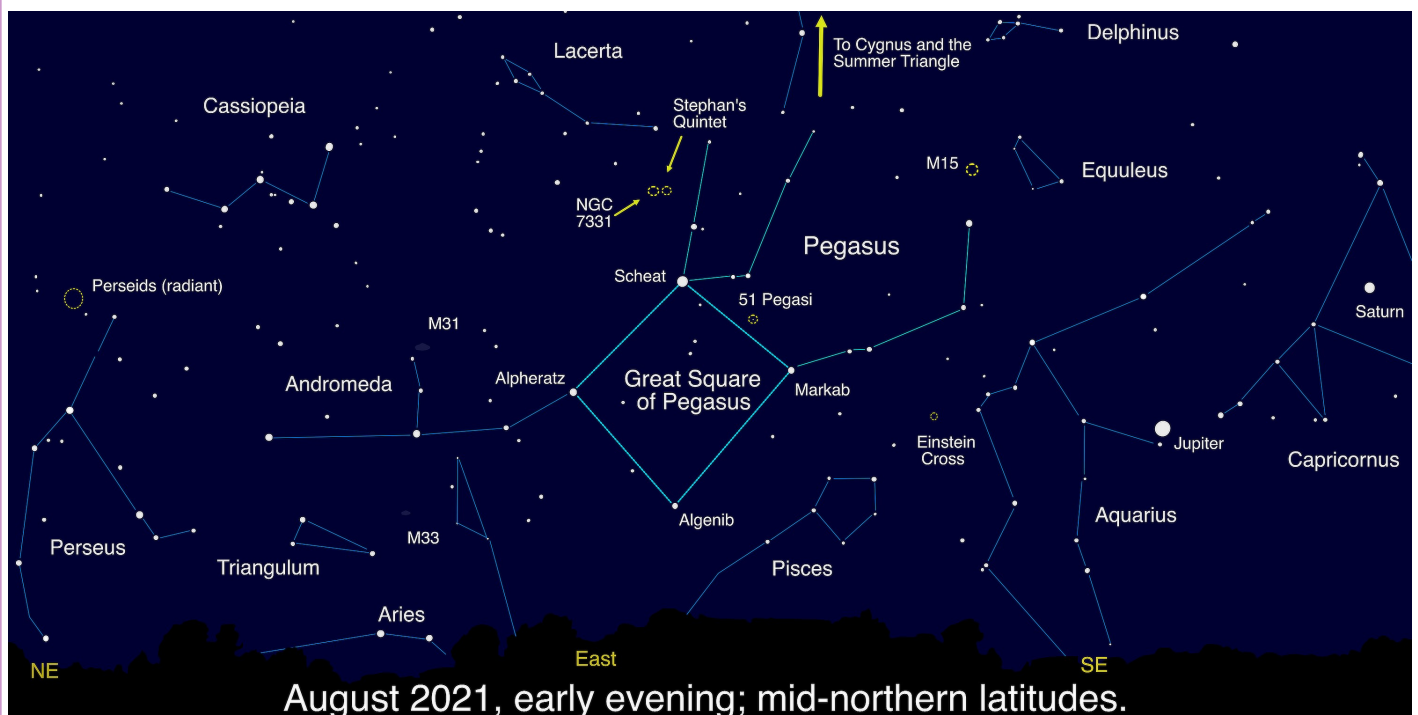


and remember that depending on your point of view, it may appear more like a diamond than a square. Look for it below the Summer Triangle, or to the southeast of nearby Cassiopeia at this time. As the Great Square rises in prominence during autumn evenings, it becomes a handy guidepost to finding more constellations, including some of the dimmer members of the Zodiac: Aries, Pisces, Aquarius, and Capricornus. Like the Sum-

mer Triangle, the Great Square of Pegasus is also huge, but Pegasus itself is even larger; out of the 88 constellations, Pegasus is 7th in size, and feels larger as the stars in its neighboring constellations are much dimmer.

There are many notable deep-sky objects found within the stars of Pegasus - ranging from easily spotted to expert level targets - making it a great constellation to revisit as your observing skills improve. Notable objects include the densely-packed stars of globular cluster M15, a great first target. The potential "Milky Way look-alike" galaxy NGC 7331 is a fun target for more advanced observers, and expert observers can hop nearby to try to tease out the much dimmer interacting galaxies of Stephan's Quintet. A fascinating (but extremely difficult to ob-

(Continued on page 13)



While the stars of the Great Square of Pegasus are not as bright as those of the Summer Triangle, they still stand out compared to their neighbors, and make a great foundation for exploring this area of the night sky. Note that the brightness of the stars near the horizon is exaggerated in this picture.

Night Sky Notes (Cont'd)



*Stephan's Quintet is one of the most famous deep-sky objects in Pegasus. First discovered in 1877, it contains the first galaxy group discovered (which includes 4 of the 5 galaxies making up the Quintet) – and has been studied extensively ever since. One day this group will merge into one supergalaxy! While famous, these galaxies are hard to spot in all but the largest backyard telescopes – but are a favorite target of astrophotographers. Take a virtual flyby of these galaxies with a tour created from Hubble data at: bit.ly/quintetflyby
Credit: NASA, ESA, and G. Bacon, J. DePasquale, F. Summers, and Z. Levay (STScI)*

(Continued from page 12)

serve) object is a gravitationally-lensed quasar famously known as the Einstein Cross. Pegasus has quite a storied history in the field of exoplanet research: 51 Pegasi was the first Sun-like star

discovered to be host to a planet outside our solar system, now officially named Dimidium.

While observing Pegasus and its surroundings, keep your eyes relaxed and ready to catch some

Perseids, too! August 2021 promises an excellent showing of this annual meteor shower. The crescent Moon sets early on the evening of the shower's peak on August 11-12, but you can spot stray Perseids most of the month. If you trace the path of these meteors, you'll find they originate from one point in Perseus - their radiant. Giant planets Jupiter and Saturn will be up all evening as well. Look south - they easily stand out as the brightest objects in the faint constellations Aquarius and Capricornus.

Pegasus truly holds some fantastic astronomical treasures! Continue your exploration of the stars of Pegasus and beyond with NASA at nasa.gov.

Voyager (Cont'd)

(Continued from page 7)

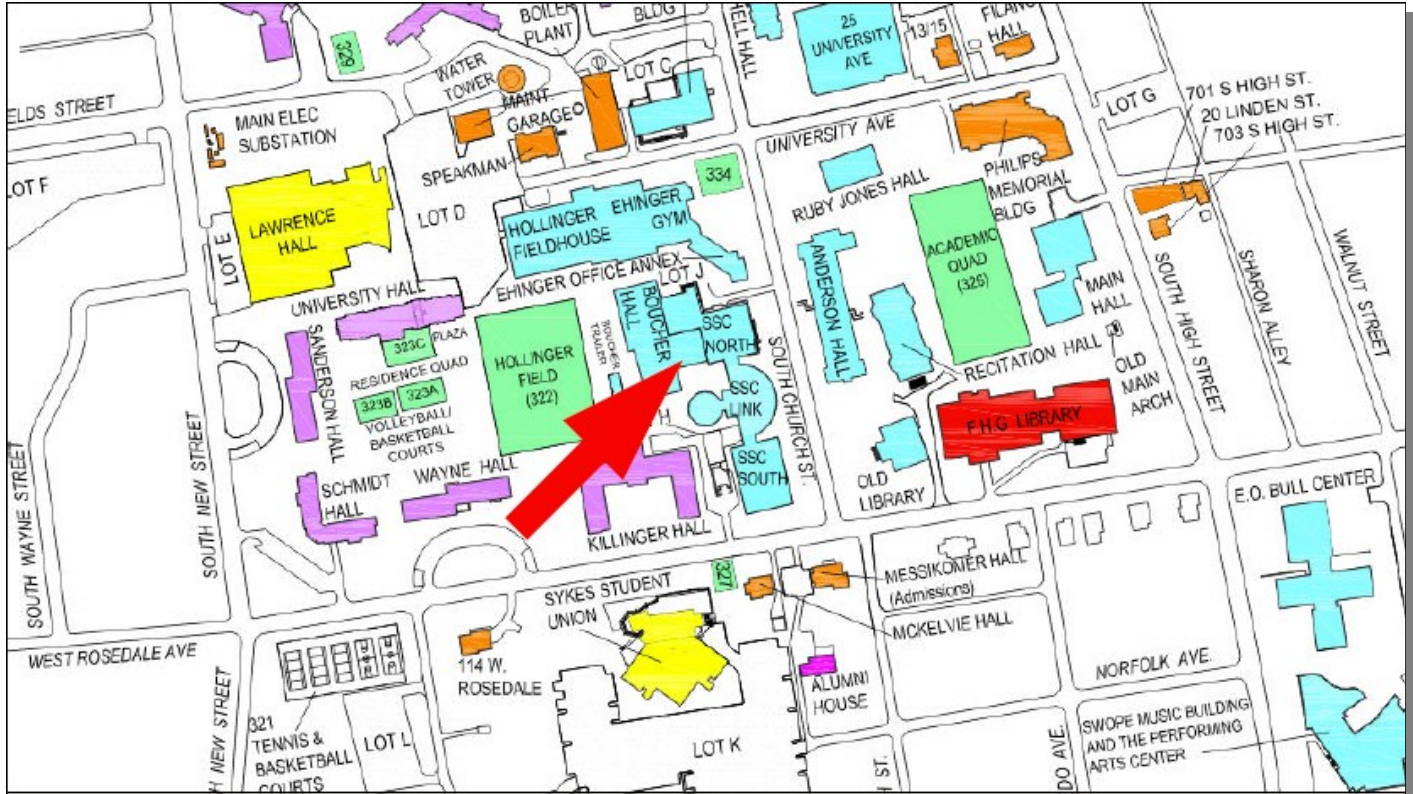
new study instead reveals the steady vibrations unrelated to solar activity that could be a constant feature in interstellar space. This hum has a frequency of about 3 kilohertz (kHz). "When the plasma oscillations are converted to an audio signal, it sounds like a tone that varies. It's a bit eerie," said Cornell University astronomy professor and study co-author James Cordes.

After 44 years of travel, Voyager 1 is the most distant human-made object in space. "Voyager 1 will keep going but its power supply will run out most likely this decade after up to 50 years of service," Cordes said. "There are conceptual designs being made for future probes whose intended purpose is to reach further than the Voyager spacecraft. That is the message I find appealing: our reach is expanding into interstellar space."

CCAS Directions

West Chester University Campus

The monthly meetings (September through May) are held in Room 112 in Merion Science Center (formerly the Boucher Building), attached to the Schmucker Science Center. The Schmucker Science Center is located at the corner of S. Church St & W. Rosedale Ave. Parking is generally available across Rosedale in the Sykes Student Union parking lot (Lot K).



Eyepiece (Cont'd)

(Continued from page 5)

Comets: There are no bright comets visible during August

Meteor showers: It is again time for the most popular meteor shower of the year, the Perseid meteor shower! The Moon will set around midnight on the night of August 11/12, so it will not interfere with seeing “shooting stars”. But my favorite part of this shower is just as the sky darkens in the evening when you will see fewer shooting stars, but you have a good chance of seeing an “Earth grazer” that travels nearly all the way across the sky. Do not miss this shower! When you see a fireball fly cross the sky you will never forget it.

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

July 2021 Financial Summary

Beginning Balance	\$1165
Deposits	\$1121
Disbursements	-\$1766
Ending Balance	\$520

New Member Welcome!

Welcome new CCAS members Gary Hodson, from West Chester, PA, and the John Lindtner family from West Grove, PA. We're glad you decided to join us under the stars! Clear skies to you!

Membership Renewals

You can renew your CCAS membership by writing a check payable to “Chester County Astronomical Society” and sending it to our Treasurer:

Don Knabb
988 Meadowview Lane
West Chester PA 19382

The current dues amounts are listed in the *CCAS Information Directory*. Consult the table of contents for the directory's page number in this month's edition of the newsletter.

Join the Fight for Dark Skies!



You can help fight light pollution, conserve energy, and save the night sky for everyone to use and enjoy. Join the nonprofit International Dark-Sky Association (IDA) today. Individual memberships start at \$30.00 for one year. Send to:

International Dark-Sky Association
 3225 North First Avenue
 Tucson, AZ 85719
 Phone: 520-293-3198
 Fax: 520-293-3192
 E-mail: ida@darksky.org

For more information, including links to helpful information sheets, visit the IDA web site at:

<http://www.darksky.org>

Dark-Sky Website for PA



The Pennsylvania Outdoor Lighting Council has lots of good information on safe, efficient outdoor security lights at their web site:

<http://www.POLCouncil.org>

Find out about Lyme Disease!

Anyone who spends much time outdoors, whether you're stargazing, or gardening, or whatever, needs to know about Lyme Disease and how to prevent it. You can learn about it at:

<http://www.LymePA.org>

Take the time to learn about this health threat and how to protect yourself and your family. It is truly "time well spent"!

Good Outdoor Lighting Websites

One of the biggest problems we face in trying to reduce light pollution from poorly designed light fixtures is easy access to good ones. When you convince someone, a neighbor or even yourself, to replace bad fixtures, where do you go for good lighting fixtures? Check out these sites and pass this information on to others. Help reclaim the stars! And save energy at the same time!



Light pollution from poor quality outdoor lighting wastes billions of dollars and vast quantities of valuable natural resources annually. It also robs us of our heritage of star-filled skies. Starry Night Lights is committed to fighting light pollution. The company offers the widest selection of ordinance compliant, night sky friendly and neighbor friendly outdoor lighting for your home or business. Starry Night Lights is located in Park City, Utah.

Phone: 877-604-7377
 Fax: 877-313-2889

<http://www.starrynightlights.com>



Lighthouse Outdoor Lighting is a dedicated lifetime corporate member of the [International Dark-Sky Association](#). Lighthouse's products are designed to reduce or eliminate the negative effects outdoor lighting can have while still providing the light you need at night.

Phone: 484-291-1084

<https://www.lighthouse-lights.com/landscape-lighting-design/pa-west-chester/>

Local Astronomy-Related Stores

Listing retail sites in this newsletter does not imply endorsement of any kind by our organization. This information is provided only as a service to our members and the general public.



Skies Unlimited is a retailer of telescopes, binoculars, eyepieces and telescope accessories from Meade, Celestron, Televue, Orion, Stellarvue, Takahashi, Vixen, Losmandy and more.

Skies Unlimited
Suburbia Shopping Center
 52 Glocker Way
 Pottstown, PA 19465

Phone: 610-327-3500 or 888-947-2673
 Fax: 610-327-3553

<http://www.skiesunlimited.net>



Located in Manayunk, Spectrum Scientifics educates and entertains customers with an array of telescopes, microscopes, binoculars, science toys, magnets, labware, scales, science instruments, chemistry sets, and much more.

4403 Main Street
Philadelphia, PA 19127

Phone: 215-667-8309
 Fax: 215-965-1524

Hours:
 Tuesday thru Saturday: 10AM to 6PM
 Sunday and Monday: 11AM to 5PM

<http://www.spectrum-scientifics.com>

CCAS Information Directory

CCAS Lending Telescopes

Contact Don Knabb to make arrangements to borrow one of the Society's lending telescopes. CCAS members can borrow a lending telescope for a month at a time; longer if no one else wants to borrow it after you. Don's phone number is 610-436-5702.

CCAS Lending Library

Contact our Librarian, Barb Knabb, to make arrangements to borrow one of the books in the CCAS lending library. Copies of the catalog are available at CCAS meetings, and on the CCAS website. Barb's phone number is 610-436-5702.

Contributing to *Observations*

Contributions of articles relating to astronomy and space exploration are always welcome. If you have a computer, and an Internet connection, you can attach the file to an e-mail message and send it to: newsletter@ccas.us

Or mail the contribution, typed or handwritten, to:

Dr. John C. Hepler
21 Medinah Drive
Reading, PA 19607

CCAS Newsletters via E-mail

You can receive the monthly newsletter (in full color!) via e-mail. All you need is a PC or Mac with an Internet e-mail connection. To get more information about how this works, send an e-mail request to Dr. John Hepler, the newsletter editor, at: newsletter@ccas.us.

CCAS Website

Dr. John Hepler is the Society's Webmaster. You can check out our Website at:

<http://www.ccas.us>

Dr. Hepler welcomes any additions to the site by Society members. The contributions can be of any astronomy subject or object, or can be related to space exploration. The only requirement is that it is your own work—no copyrighted material! Give your contributions to Dr. Hepler at (410) 639-4329 or e-mail to webmaster@ccas.us

CCAS Purpose

The Chester County Astronomical Society was formed in September 1993, with the cooperation of West Chester University, as a non-profit organization dedicated to the education and enjoyment of astronomy for the general public. The Society holds meetings (with speakers) and observing sessions once a month. Anyone who is interested in astronomy or would like to learn about astronomy is welcome to attend meetings and become a member of the Society. The Society also provides telescopes and expertise for "nights out" for school, scout, and other civic groups.

CCAS Executive Committee

For further information on membership or society activities you may call:

President: Dave Hockenberry
610-558-4248

Vice President: Pete Kellerman
610-873-0162

ALCor, Observing, & Treasurer: Don Knabb
610-436-5702

Secretary: Beatrice Mazziotta
610-933-2128

Librarian: Barb Knabb
610-436-5702

Program: Bruce Ruggeri
484-883-5092

Education: Don Knabb
610-436-5702

Dennis O'Leary
610-701-8042

Webmaster & Newsletter: John Hepler
484-883-0533

Public Relations: Ann Miller
610-558-4248



CCAS Membership Information

The 2021 membership rates are as follows:

REGULAR MEMBER.....\$30/year
SENIOR MEMBER.....\$15/year
STUDENT MEMBER.....\$ 5/year
JUNIOR MEMBER.....\$ 5/year
FAMILY MEMBER.....\$40/year

Membership Renewals

Check the Membership Renewals on the front of each issue of *Observations* to see if it is time to renew. If you need to renew, you can mail your check, made out to "Chester County Astronomical Society," to:

Don Knabb
988 Meadowview Lane
West Chester PA 19382-2178

Phone: 610-436-5702
e-mail: treasurer@ccas.us

Sky & Telescope Magazine

The club membership subscription cost for *Sky and Telescope* magazine has increased to **\$43.95**. This is still a good saving from the regular rate of **\$54.95**.

There is no need to go through the CCAS treasurer for subscriptions or renewals. Just go to the Sky and Telescope website and select "Magazine", then under the FAQs you can subscribe at the club rate.

<https://skyandtelescope.org/subscribe/>

If you have **any** questions call Don Knabb at 610-436-5702.

Astronomy Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **\$34.00** which is much less than the individual subscription price of **\$42.95** (or \$60.00 for two years).

There is no need to go through the CCAS treasurer for subscriptions or renewals. Just call customer service at 877-246-4835 and request the club rate for your new subscription or renewal.