



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 29, No. 7 **Three-Time Winner of the Astronomical League's Mabel Sterns Award** ☼ 2006, 2009 & 2016 July 2021

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IC 4592: The Blue Horsehead Reflection Nebula



The source of much of the reflected light in IC 4592 is a star at the eye of the horse. That star is part of Nu Scorpii, one of the brighter star systems toward the constellation of the Scorpion (Scorpius). Image Credit & Copyright: [Adam Block, Steward Observatory, University of Arizona](#)

Membership Renewals Due

07/2021	Barasatian Goss Hockenberry & Miller Hunsinger McGuigan Morgan Piehl Wendel
08/2021	Barker Bogard Borowski Force Johnston & Stein Knabb Family Krus Lurcott, L. Manigly Tiedmann Tredinnick Trunk
09/2021	Atmore Holloway Lee Reilly Squire

July 2021 Dates

- 1st** • Last Quarter Moon, 5:10 p.m. EDT
- 9th** • New Moon, 9:16 p.m. EDT
- 12th** • Venus and Mars are close in during evening twilight
- 17th** • First Quarter Moon and the Lunar Straight Wall is visible, 6:10 a.m. EDT
- 19th-20th** • The Moon is near Antares, the "Heart of the Scorpion"
- 23rd** • Full Moon, the Full Thunder Moon or the Full Birds Shed Feathers Moon, 10:36 p.m. EDT



Membership Dues Increase

CCAS membership dues increased in March 2021. They hadn't changed in 18 years, so it was time to increase the dues to cover increases in the Society's operating costs. All membership types went up \$5 except for the Student membership, which remained unchanged.

Here are the old and new rates:

Type	Old Rate	New Rate
Regular	\$25	\$30
Senior	\$10	\$15
Student	\$5	\$5
Family	\$35	\$40

Summer Society Events

July 2021

22nd • The von Kármán Lecture Series: [Science + Art: Picturing Discovery](#), 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 August 2021 edition of [Observations](#).

26th • Deadline for newsletter submissions for the August 2021 edition of [Observations](#).

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](#).

Quasars

by CCAS Member Avni Dhargalkar

Quasars are celestial objects that are extremely far away from us, and very bright. When astronomers first started looking at them in the 1950s and 60s, they seemed like stars. But they aren't stars. Now we define them as newly formed galaxies.

We believe that supermassive black holes are in the centers of quasars, and that they spew out huge amounts of radiation. When material surrounding the black hole in an accretion disk gets extremely hot (around a few million degrees), the radiation is created and then emitted.

In conclusion, a quasar is far away and bright. They release large amounts of radiation because of things going on near the black hole in the center of them.



This artist's impression shows how ULAS J1120+0641, a very distant quasar powered by a black hole with a mass two billion times that of the Sun, may have looked. This quasar is the most distant yet found and is seen as it was just 770 million years after the Big Bang. This object is by far the brightest object yet discovered in the early Universe. Credit: ESO/M. Kornmesser

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.

The Center of the Milky Way Might Not Be a Black Hole After All

by Caroline Delbert, *Prevention.com*



*The center of the Milky Way might not be a black hole after all, according to new research.
Image Credit: © Pakin Songmor - Getty Images*

The center of the Milky Way could be dark matter instead of a supermassive black hole, according to a new study. The study is based on observations of the objects that orbit closest to

the center. If it's true, this could help explain how supermassive black holes originate.

What if the center of our galaxy isn't a supermassive black

hole after all, but instead, a massive amount of dark matter? That would flip our long-held understanding of the Milky Way, but in a new study, scientists from Italy, Argentina, and Colombia say the evidence stacks up.

The idea of a supermassive black hole at the center of the Milky Way is well-established, based partly on the orbit of specific stars like S0-2. Scientists study these objects in orbit as a way to extrapolate what they're actually orbiting around—in this case, “a supermassive black hole 4 million times the mass of the Sun,” ScienceAlert explains.

That supermassive black hole

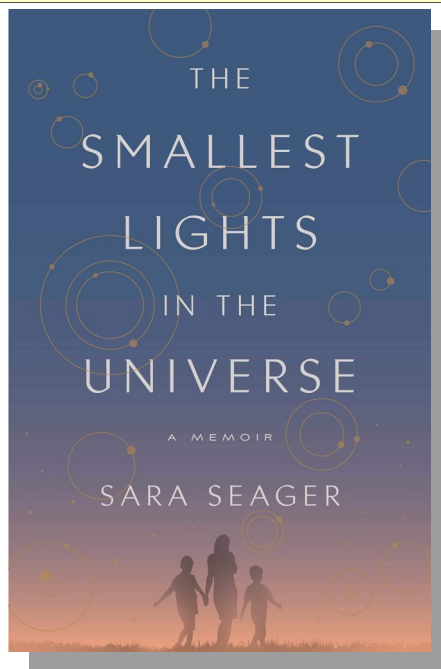
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Book review: *The Smallest Lights in the Universe*, by Sara Seager

by Don Knabb, *CCAS Observation Chair & Treasurer*

For our September 2021 CCAS meeting our program chair, Bruce Ruggeri, somehow performed a miracle and arranged for Professor Sara Seager of the Massachusetts Institute of Technology to present “TESS Exoplanets and Beyond”. Sara Seager is an astrophysicist and a recipient of a MacArthur Foundation “genius” grant. She is a rock star for NASA and is at the forefront of the search for the first Earth-like exoplanets and signs of life on them. She is often called upon by the press for comments on anything related to exoplanets and life beyond our Earth.

I received as a Christmas gift Seager's recent book, *The Smallest Lights in the Universe, a Memoir*. You can find many



reviews of this book on-line and I won't go into great details on the book, but I want to share my

impressions so you can decide if this book is of interest to you.

Firstly, this is not a book about the search for exoplanets. Yes, there is a good bit of discussion about the topic, but it is not the main substance of the book. The clue as to what this book is about is in the title, the little words “A Memoir”. This book is about Sara Seager.

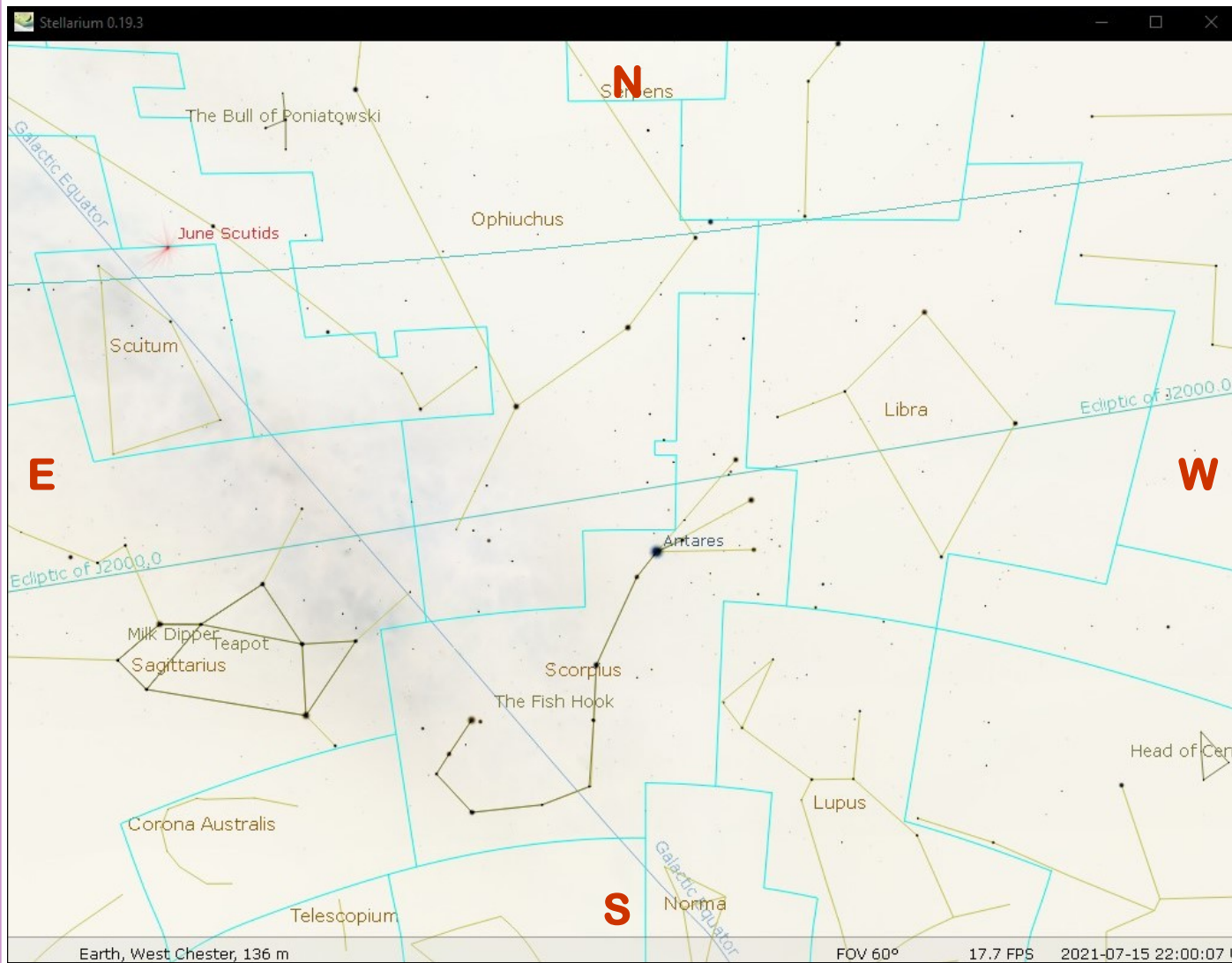
It took a great deal of courage for Seager to write this book. It is a very personal book in which she shares her deepest feelings and most vulnerable moments. It is not a spoiler to tell you that as the book begins Sara has recently lost her husband to cancer. This is revealed on the inside cover and on the third page of the text.

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The Sky Over Chester County

July 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
07/01/2021	5:04 a.m. EDT	5:37 a.m. EDT	8:34 p.m. EDT	9:07 p.m. EDT	14h 57m 19s
07/15/2021	5:14 a.m. EDT	5:46 a.m. EDT	8:29 p.m. EDT	9:01 p.m. EDT	14h 43m 18s
07/31/2021	5:29 a.m. EDT	6:00 a.m. EDT	8:16 p.m. EDT	8:47 p.m. EDT	14h 16m 27s

Moon Phases					
Last Quarter	07/01/2021	5:10 p.m. EDT	New Moon	07/09/2021	9:16 p.m. EDT
First Quarter	07/17/2021	6:10 a.m. EDT	Full Moon	07/23/2021	10:36 p.m. EDT

July 2021 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

1	Last Quarter Moon, 5:10 p.m. EDT
2	Venus passes the Beehive Cluster low in the west at nightfall
9	New Moon, 9:16 p.m. EDT
12	Venus and Mars are close in during evening twilight
17	First Quarter Moon and the Lunar Straight Wall is visible, 6:10 a.m. EDT
19/20	The Moon is near Antares, the "Heart of the Scorpion"
23	Full Moon, the Full Thunder Moon or the Full Birds Shed Feathers Moon, 10:36 p.m. EDT
25	The Moon, Jupiter and Saturn form a large triangle just before dawn
28/29	The Southern Delta Aquariid meteor shower peaks

The best sights this month: On July 13th look low in the west to see Mars and Venus very close in the sky and a thin crescent Moon not far away. My favorite part of the July sky is the collection of Messier objects in the southern sky in the constellations Scorpius and Sagittarius. One can spend hours viewing the many open clusters, globular clusters and nebulas in this region of the sky.

Mercury: Mercury is visible in the predawn sky and is at its highest on July 9th and 10th.

Venus: If you have a good view of the western horizon look for Venus next to M44, the Beehive Cluster, just as the sky darkens on July 2nd. For the rest of the month enjoy the "evening star" as it gets higher in the evening sky as July progresses.

Mars: As the red planet falls further behind Earth in our race around the Sun it continues to fade in brightness. But it will have a close encounter with Venus on July 12th and 13th and a thin crescent Moon will join them to make a beautiful scene in the west not long after sunset.

Jupiter: The king of the planets peaks above the eastern horizon a bit after 11 p.m. early in the month

but around 9:15 p.m. by month's end. The best viewing will be when it is high in the sky during the wee small hours of the night.

Saturn: The ringed planet rises around 9 p.m. early in the month and is high enough for telescopic observing around midnight. For early risers, Jupiter, Saturn and the Moon form a nice group in the predawn sky on July 24th.

Uranus and Neptune: Neptune is best placed for viewing around 2 a.m. for those who can't sleep. Uranus viewing is for the early risers since it is best viewed in the hour before dawn. I'll wait a few months to seek out these inhabitants of the outer solar system.

The Moon: The Moon is full on July 23rd. Native Americans called this the Full Buck Moon because July is normally the month when the new antlers of buck deer push out of their foreheads with coatings of velvety fur. It was also often called the Full Thunder Moon since thunderstorms are most frequent during this time of year. This Full Moon has also been called the Full Hay Moon. Native Canadians called this the Birds Shed Feathers Moon.

Constellations: I love the warm July nights! Settle back in a lounge chair on a clear July night and enjoy the wonderful stars of summer! In the west is bright Arcturus in Boötes with the beautiful Corona Borealis, the Northern Crown, just to its east. Then we pass through Hercules to the Summer Triangle with the Milky Way filling the spaces within the triangle. Lean back with a pair of binoculars and gaze into the triangle and you will see thousands of stars!

Messier/deep sky: While the southern constellations of summer, Sagittarius and Scorpius, are visible don't miss the chance to gaze into the heart of the Milky Way. M4, a globular cluster near red Antares in Scorpius is a nice sight in binoculars or a telescope. Two of my favorite open clusters are low in the south: M6 and M7. These are easy to find if you use the tail of Scorpius as a guide. Then head north to find M22, a nice globular cluster, and continue north to find the Swan Nebula, M17. Open clusters, a globular cluster and a nebula all in one area of the sky, and that is just scratching the surface of the southern summer sky!

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Center of the Universe (Cont'd)

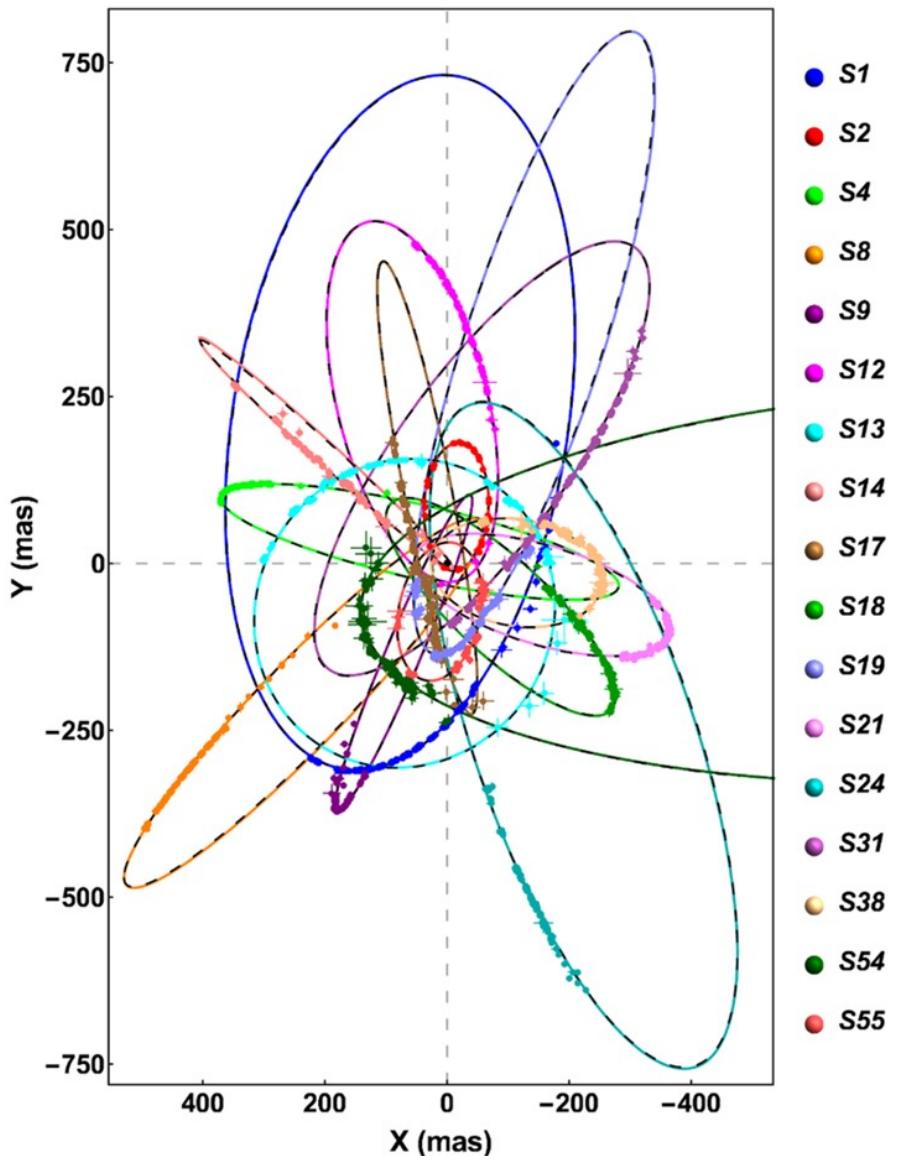
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is called Sagittarius A*. S0-2 and other established stars are pulled every which way in their orbits around Sagittarius A*, into extreme orbits that scientists measure in order to get some idea of what the supermassive black hole is all about. Think about how soap suds behave as water swirls down your drain and what that tells you about what the drain is doing. Even if you couldn't see the drain directly, the behaviors around it would give you clues.

Scientists are still conducting that kind of research, but a new-to-us class of space objects is casting a shadow over the black hole theory. These objects "look like gas but behave like stars," physicist Andrea Ghez told ScienceAlert in 2020. There are six "G" objects of this kind, with orbits ranging from 170 to 1,600 years long. Recently, their wonky orbits have led to a new, competing theory to describe the center of the Milky Way.

In 2014, scientists observed object G2 pass its closest point to Sagittarius A* and become stretched out and distorted—a phenomenon known as drag. This, scientists from the International Center for Relativistic Astrophysics in Italy say, is a sign that Sagittarius A* might be something other than a supermassive black hole.

In 2020, the same research team published findings that G2 and S2 might be experiencing the same different kind of gravitational pull near Sagittarius A*. They say the way these objects behave is more consistent with a specific kind of dark matter. In their side-by-side analysis of



chart, diagram: Best-fit orbits for the 17 best-resolved S-stars orbiting Sagittarius A*. © Becerra-Vergara, et al. Best-fit orbits for the 17 best-resolved S-stars orbiting Sagittarius A*.

black hole versus dark matter as the explanation, dark matter was a better statistical fit.

Dark matter is matter that we can't see, but we can measure it through its effect on gravity and objects around it. Dark matter makes up 30 percent of the mass of our universe, yet it's invisible and, so far, not directly observed. But its presence, along with the related idea of dark energy, makes up a total of 99.5

percent of the mass of the universe around us and provides the missing piece to a ton of questions in physics and cosmology.

Dark matter can and does turn into black holes, but the scientists posit that Sagittarius A* is instead a blob-like mass that will require a lot more material in order to turn into a black hole. For now, it could just be a dense blob that still attracts nearby ob-

(Continued on page 7)

Center of the Universe (Cont'd)

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jects as a black hole does. And if it is a kind of proto future black hole, that could explain how supermassive black holes form in the first place—something scientists have been puzzled by for decades.

In this new study, accepted for publication by MNRAS Letters, the Italian, Argentinian, and Colombian scientists explain that

not just the directly affected G2 and S2 space objects line up with the dark matter theory. They've expanded their study to the closest, most well-understood stars orbiting Sagittarius A* and found those stars also behave consistently with a dark matter model.

So, what do these findings mean? Well, when it comes to the swirling mysteries at the

heart of the galaxy, all news is good news. These scientists have put out an ambitious new theory, and subsequent work will either back them up or respectfully disagree, citing different analysis and observation. That will continue to lead toward a better understanding of supermassive black holes and of Sagittarius A* in particular, and could help to solve the mystery.

Moons of Free-Floating Planets Can Possess Enough Water for Life to Evolve and Thrive

by Ludwigg Maximillian, University of Munich, SciTechDaily.com

The moons of planets that have no parent star can possess an atmosphere and retain liquid water. Astrophysicists at LMU have calculated that such systems could harbor sufficient water to make life possible – and sustain it.

Water – in liquid form – is the elixir of life. It made life possible on Earth and is indispensable for the continuing existence of living systems on the planet. This explains why scientists are constantly on the lookout for evidence of water on other solid bodies in the Universe. Up to now, however, the existence of liquid water on planets other than Earth has not been directly proven. However, there are indications that several moons in the outer reaches of our own solar system – more specifically, Saturn's Enceladus and three of Jupiter's moons (Ganymede, Callisto, and Europa) may possess subterranean oceans. What then are the prospects for the detection of water on the moons of planets beyond our solar system?

In cooperation with colleagues at the University of Concepción

in Chile, LMU physicists Prof. Barbara Ercolano and Dr. Tommaso Grassi (both of whom are members of ORIGINS, a Cluster of Excellence) have now used mathematical methods to model the atmosphere and gas-phase chemistry of a moon in orbit around a free-floating planet (FFP). An FFP is a planet that is not associated with a star.

FFPs are of interest mainly because the evidence indicates that there are plenty of them out there. Conservative estimates suggest that our own galaxy hosts at least as many Jupiter-sized orphan planets as there are stars – and the Milky Way itself is home to well over 100 billion stars.

Ercolano and Grassi made use of a computer model to simulate the thermal structure of the atmosphere of an exomoon of the same size as the Earth in orbit around a FFP. Their results suggest that the amount of water present on the moon's surface would be about 10,000 times smaller than the total volume of our planet's oceans, but 100 times larger than that found in Earth's atmosphere. This would

be enough to enable life to evolve and thrive.

The model from which this estimate was derived consists of an Earth-sized moon and a Jupiter-sized FFP. Such a system, which has no stellar companion nearby, is expected to be dark and cold. Unlike our solar system, there is no central star that can serve as a reliable source of energy to drive chemical reactions.

Rather, in the researchers' model, cosmic rays provide the chemical drive necessary to convert molecular hydrogen and carbon dioxide into water and other products. To keep the system stirred up, the authors invoke the tidal forces exerted by the planet on its moon as a source of heat – and assuming that carbon dioxide accounts for 90% of the moon's atmosphere, the resulting greenhouse effect would effectively retain a large part of the heat generated on the moon. Together, these energy sources would suffice to keep water in the liquid state.

Reference: "Presence of water on exomoons orbiting free-floating planets: a case study" by Patricio Javier Avila, Tommaso Grassi, Stefano Bovino, Andrea Chiavassa, Barbara Ercolano, Sebastian Oscar Danielache and Eugenio Simoncini. 8 June 2021, *International Journal of Astrobiology*. DOI: 10.1017/S1473550421000173

Through the Eyepiece: Messier 6 and Messier 7, The Butterfly Cluster and Ptolemy's Cluster

by Don Knabb, CCAS Treasurer & Observing Chair



Star chart created with Stellarium planetarium software

During the summer months I find myself irresistibly drawn to the southern sky. This part of the sky is visible to us for only a few months, and it is full of incredible objects to gaze upon. Two of my favorite objects of the entire sky are visible in this area: the open cluster Messier 6, also known as the Butterfly Cluster and the open cluster Messier 7, also known as Ptolemy's Cluster.

From a dark sky site, both clusters are detectable with the naked eye, close to the "stinger" of Scorpius. At Cherry Springs State Park both M6 and M7 can easily be seen with the naked eye as fuzzy areas between the tail of Scorpius and the "teapot" of Sagittarius.

The bright star that represents the 'stinger' on the tail of the Scorpion is Shaula. With binoc-

ulars or a telescope with a low power eyepiece, scan to the northeast, up and to the left slightly. Here you will find both clusters looking like a scattering of salt crystals on a dark plate.

In binoculars, Messier 6 stars all appear to be around the same brightness and the 'butterfly' asterism will be unmistakable. In a telescope, many more stars will be revealed – making the namesake a bit harder to recognize, but more interesting because more stars are seen and color is distinguished. However, watch this cluster on nights when there is a little fine cloud in the sky or moonlight. You'll see the shape in a telescope quite clearly then! Be sure to stay at minimum magnification when using a telescope, because this is a large open star cluster.

M6 is estimated to contain

about 80 stars, all moving through space together in an area spanning about 12 to 25 light years across – and may have formed anywhere from 51 to 95 million years ago.

It is commonly believed that the first astronomer to record the Butterfly Cluster's position in the sky was Giovanni Battista Hodierna in 1654. However, Robert Burnham, Jr. has suggested in the "Celestial Handbook" that Ptolemy may have seen it while noting the Ptolemy Cluster M7.

Charles Messier observed M6 on May 23, 1764. He commented on the cluster: "In the same night of May 23 to 24, 1764, I have determined the position of a cluster of small stars between the bow of Sagittarius and the tail of Scorpius: At simple view

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Eyepiece (Cont'd)



Image credit: Ole Nielsen <https://commons.wikimedia.org/wiki/File:M6a.jpg>. This file is licensed under the Creative Commons Attribution-Share Alike 2.5 Generic license.



Image credit: ESO (European Southern Observatory) licensed under a Creative Commons Attribution 4.0 International License

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[with the naked eye], this cluster appears to form a nebula without stars, but the slightest instrument which one employs to examine it makes one see that it is nothing but a cluster of small stars.”

Robert Burnham, Jr. comments “The present author regards this as one of the most attractive clusters in the heavens for small instruments, a completely charming group whose arrangement suggests the outline of a butterfly with open wings.”

M7 has been known since antiquity. This great open star cluster is most often credited to Ptolemy, who listed it in his ‘Almagest’ as Object Number 567 in 130 AD. From his notes he describes it as “A nebulous cluster following the sting of Scorpius.” Italian astronomer Giovanni Batista Hodierna observed it before 1654 and counted 30 stars in it. In 1764, French astronomer Charles Messier catalogued the cluster as the seventh member in his list of comet-like objects. English astronomer John Herschel described it as “coarsely scattered clusters of stars”.

Telescopic observations of the cluster reveal about 80 stars within a field of view of 1.3° across. One of the easiest ways to find “Ptolemy’s Cluster” is to recognize the two familiar constellation asterisms of Scorpius and Sagittarius. The bright star that represents the ‘stinger’ on the tail of the Scorpion is Lambda. Aim your binoculars three finger widths east (left). Under dark skies it will show as a con-

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Eye-piece (Cont'd)

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spicuous patch in the sky, but do not confuse it with its dimmer, northwestern neighbor, M6, The Butterfly Cluster. In binoculars, Messier 7's stars will appear of varied brightness with no particular pattern and will occupy about 1/3 the field of view in average binoculars.

M7 is easily seen in the finder scope of a telescope. Or, use low magnification when observing with any telescope because of Messier 7's large apparent size. Because it is so bright, this open cluster is a great object on a moonlit night and larger telescopes can fully resolve its members.

This bright collection of about 80 mixed magnitude stars is estimated to be about 800-1000 light years away from Earth. Moving along through space in an area spanning about 18-25 light years across, this group of stars were all born about the same time some 220 million years ago.

An open cluster is a group of up to a few thousand stars that were formed from the same giant molecular cloud and have roughly the same age. More than 1,100 open clusters have been discovered within the Milky Way galaxy, and many more are thought to exist. They are loosely bound to each other by mutual gravitational attraction and become disrupted by close encounters with other clusters and clouds of gas as they orbit the galactic center. Open clusters generally survive for a few hundred million years. In contrast, the more massive globular clusters of stars exert a stronger gravitational attraction

(Continued on page 14)

Seager (Cont'd)



Dr. Sarah Seager. Image credit: Penguin Random House

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Seager tells the story of her life and interweaves her work on exoplanets in an interesting and entertaining way. One thing I can assure you – after reading this book you will never look at your spouse in the same way again. And that's a good thing. Sometimes we need to be reminded of the things that matter the most in our lives, and this book did that for me. One passage from the book that has stayed with me is "...when you lose someone, you don't lose them all at once, and their dying doesn't stop with their death. You lose them a thousand times in a thousand ways. You say a thousand goodbyes. You hold a thousand funerals."

But don't think that the entire book is one sad story after an-

other – it is not – it also full of life with a good dose of astronomy thrown in. One section I enjoyed is the story of Seager and her family in New Mexico to test a new camera for one of her projects. She obtained help from a local club of amateur astronomers. At one point she writes, "I looked up at the stars and felt my childlike wonder return."

(Continued on page 11)

Observing (Cont'd)

(Continued from page 5)

Comets: There are no bright comets visible during July

Meteor showers: The Southern Delta Aquariid meteor shower is active from July 12th to August 23rd with the peak of activity on July 30th.

Seager (Cont'd)

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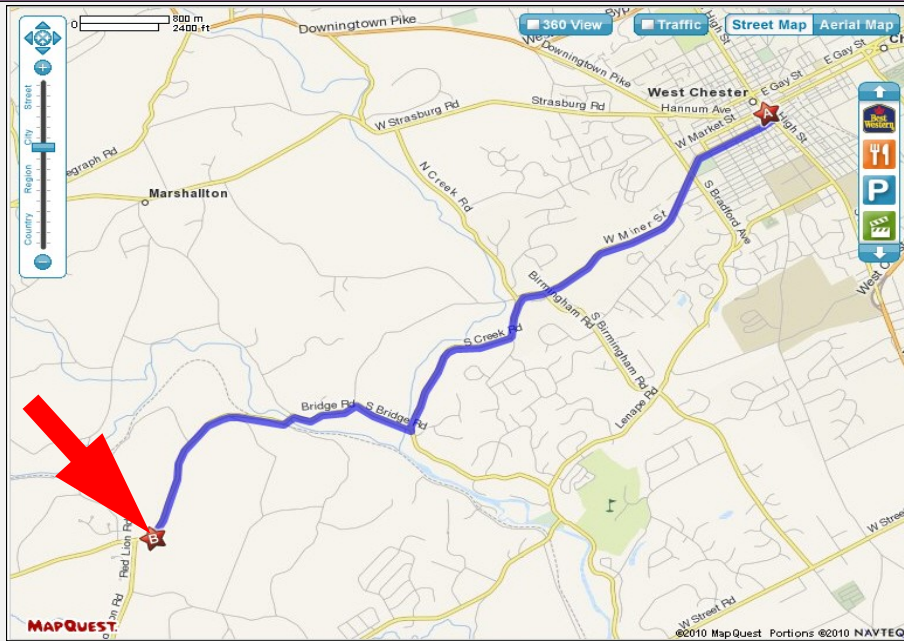
She follows later, "We wanted to stay out there with the stars until the sun began its rise, washing them out one by one until even the brightest disappeared. We would know they are still up there. People talk about the sun and its reliability, how even on the darkest days we know it will come out again. A kind of opposite is also true. Even on the brightest days, beyond blue skies, there are countless stars shining over our heads."

I highly recommend this book and thoroughly enjoyed the lows and the highs of this very personal story of an amazing woman. And it is even better that she gave a wonderful presentation to our little astronomy club last September!

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: Observe the Milky Way and Great Rift

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.

Summer skies bring glorious views of our own Milky Way galaxy to observers blessed with dark skies. For many city dwellers, their first sight of the Milky Way comes during trips to rural areas - so if you are traveling away from city lights, do yourself a favor and look up!

To observe the Milky Way, you need clear, dark skies, and enough time to adapt your eyes



to the dark. Photos of the Milky Way are breathtaking, but they usually show far more detail and color than the human eye can see – that’s the beauty and quietly deceptive nature of long expo-

sure photography. For Northern Hemisphere observers, the most prominent portion of the Milky Way rises in the southeast as marked by the constellations Scorpius and Sagittarius. Take note that, even in dark skies, the Milky Way isn’t easily visible until it rises a bit above the horizon and the thick, turbulent air which obscures the view. The Milky Way is huge, but is also rather faint, and our eyes need time to truly adjust to the dark and see it in any detail. Try not to check your phone while you wait, as its light will reset your night vision. It’s best to attempt

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The Great Rift is shown in more detail in this photo of a portion of the Milky Way along with the bright stars of the Summer Triangle. You can see why it is also called the “Dark Rift.” Credit: NASA / A.Fujii

Night Sky Notes (Cont'd)



If the Milky Way was shrunk down to the size of North America, our entire Solar System would be about the size of a quarter. At that scale, the North Star, Polaris - which is about 433 light years distant from us - would be 11 miles away! Find more ways to visualize these immense sizes with the Our Place in Our Galaxy activity: bit.ly/galaxyplace

(Continued from page 12)

to view the Milky Way when the Moon is at a new or crescent phase; you don't want the Moon's brilliant light washing out any potential views, especially since a full Moon is up all night.

Keeping your eyes dark adapted is especially important if you want to not only see the haze of the Milky Way, but also the dark lane cutting into that haze, stretching from the Summer Triangle to Sagittarius. This

dark detail is known as the Great Rift, and is seen more readily in very dark skies, especially dark, dry skies found in high desert regions. What exactly is the Great Rift? You are looking at massive clouds of galactic dust lying between Earth and the interior of the Milky Way. Other "dark nebulae" of cosmic clouds pepper the Milky Way, including the famed Coalsack, found in the Southern Hemisphere constellation of Crux. Many cultures celebrate these dark clouds in their

traditional stories along with the constellations and Milky Way.

Where exactly is our solar system within the Milky Way? Is there a way to get a sense of scale? The "Our Place in Our Galaxy" activity can help you do just that, with only birdseed, a coin, and your imagination: bit.ly/galaxyplace. You can also discover the amazing science NASA is doing to understand our galaxy – and our place in it – at nasa.gov.

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)

on their members, and can survive for many billions of years.

Information credits:

- Dickinson, Terence 2006. *Night-watch: a practical guide to viewing the universe*. Buffalo, NY. Firefly Books
- http://en.wikipedia.org/wiki/Butterfly_Cluster
- <http://www.theskyscrapers.org/messier-6-and-messier-7>
- <http://www.universetoday.com/31219/messier-6/>
- <http://www.universetoday.com/31228/messier-7/>
- http://en.wikipedia.org/wiki/Messier_7
- <http://www.eso.org/public/images/eso1406a/>

CCAS Membership Information and Society Financials

Treasurer's Report

by Don Knabb

June 2021 Financial Summary

Beginning Balance	\$1425
Deposits	\$310
Disbursements	-\$570
Ending Balance	\$1165

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.