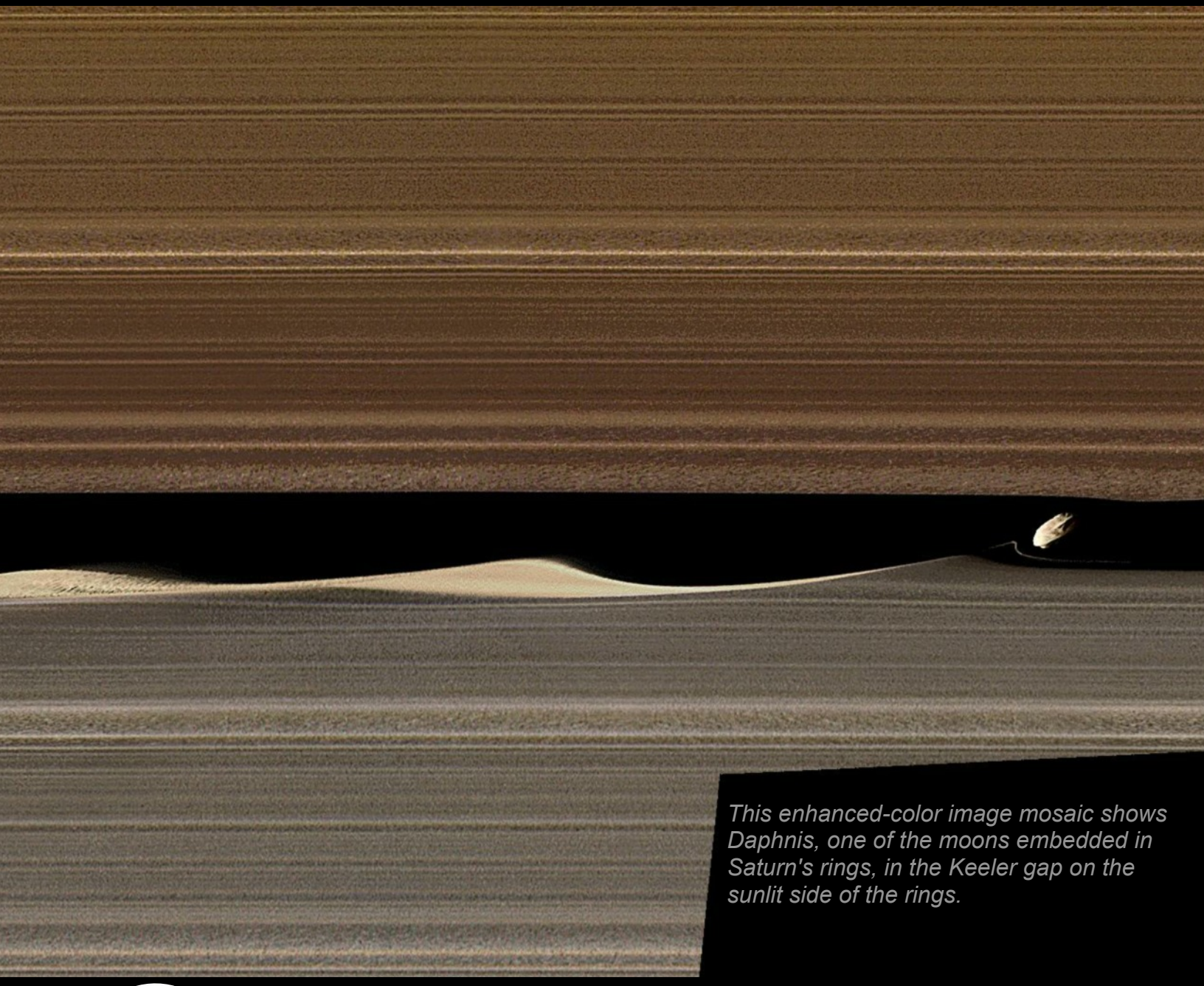
The Prairie Astronomer

June 2019 Volume 60, Issue #6

Embedded Moons Sculpt Saturn's Rings



This enhanced-color image mosaic shows Daphnis, one of the moons embedded in Saturn's rings, in the Keeler gap on the sunlit side of the rings.

The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

NEXT PAC MEETING: June 25 at 6:00pm at Hyde Observatory

PROGRAM

Solar Star Party for the public. We'll setup scopes at Hyde Observatory at 6:00.

FUTURE PROGRAMS (Tentative)

August: NSP Review
September: to be determined
October: Club Viewing Night
November: How to Buy a Telescope
December: Club Holiday Gathering

Buy the book! The Prairie Astronomy Club: Fifty Years of Amateur Astronomy.
Order online from Amazon or lulu.com.

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Cover: NASA's Cassini Reveals New Sculpting in Saturn Rings

A false-color image mosaic shows Daphnis, one of Saturn's ring-embedded moons, and the waves it kicks up in the Keeler gap. Images collected by Cassini's close orbits in 2017 are offering new insight into the complex workings of the rings. Credit: NASA/JPL-Caltech/Space Science Institute

EVENTS

PAC Meeting
Tuesday June 25, 2019, 7:30pm
Program: Solar Star Party

Outreach Events -See President's Message

Rick Johnson Memorial Gathering
July 26 9-11am at Hyde Observatory

NO MEETING IN JULY

Nebraska Star Party
Merritt Reservoir, Valentine, Nebraska
July 28 - August 2, 2019

PAC Meeting
Tuesday August 27, 2019, 7:30pm
Program: NSP Review

2019 STAR PARTY DATES

Photo by Brian Sivill

	Star Party Date	Star Party Date
January	Dec 28	**Jan 4**
February	Jan 25	**Feb 1**
March	Mar 1	**Mar 8**
April	Mar 29	**Apr 5**
May	Apr 26	**May 31**
June	Jun 21	**Jun 28**
July	Jul 26	**Aug 2**
NSP	**July 28 - Aug 2**	
August	Aug 23	**Aug 30**
September	Sep 20	**Sep 27**
October	Oct 18	**Oct 25**
November	Nov 22	**Nov 29**
December	Dec 20	**Dec 27**

Dates in **BOLD** are closest to the New Moon.

PAC E-MAIL:

info@prairieastronomyclub.org

PAC-LIST:

Subscribe through GoogleGroups.
To post messages to the list, send to the address:

pac-list@googlegroups.com

ADDRESS

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WEBSITES

www.prairieastronomyclub.org
https://nightsky.jpl.nasa.gov
www.hydeobservatory.info
www.nebraskastarparty.org
www.OmahaAstro.com
Panhandleastronomyclub.com
www.universetoday.com/
www.planetary.org/home/
http://www.darksky.org/

Night Sky Network

The President's Message

Bob Kacvinsky

I'm waiting for NASA to announce that the earth's magnetic poles have officially flipped north to south. The world seems to be a little confused. It continues to rain or cloud out our club star parties (now since October), a Canadian Team won the NBA Championship and a central US Hockey Team won the Stanley Cup, and the US Women are favored to win the Futbol World Cup. Makes you wonder if you should buy a piece of land in the Rockies and build yourself a safe shelter. But I digress.

This week Hyde is reopening so all will finally be right in the world. We have a number of great opportunities this summer to enjoy and share our hobby with the general public. If you can help out this summer with any of the following events please drop me a note or text so we can be sure to have enough person power to cover the excitement.

June 21st

Crete Library Star Party in Crete, NE 9:30/duck - 11:00

Mahoney State Park Star Party with OAS - near Ashland - dusk to about 11-ish

June 25th

PAC Meeting - Solar Observing starts at 6:30 PM at Hyde Observatory - come early

July 19th

Mahoney State Park Star Party with OAS - near Ashland - dusk to 11-ish

July 20th

We really need everyone's help to cover these events please.

Lead Up Solar Observing - Historical Museum Downtown Lincoln - 1-4 PM

Mueller Planetarium/Morrill Hall - UNL Campus - Telescope Exhibit - 10 -2:30 PM

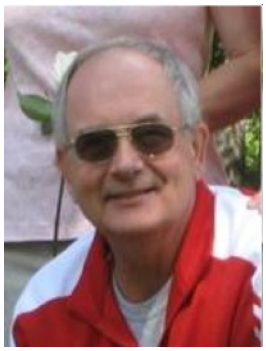
Note: I will bring my Dob, but I need a Schmidt/Cassegrain, refractor and 1 more person ***please***

Homestead Memorial Star Party Display - Beatrice, NE - ~9-11 PM

Indian Caves State Park - near Shubert, NE - dusk till ???? (big public event)

July 28 - August 2

Nebraska Star Party - Merritt Reservoir SW of Valentine, NE



Please note that there is no PAC Meeting in July due to NSP. We could really need some help with the Mahoney Star Parties.

If you have any concerns or would like to offer suggestions on how we can make your experience with PAC better please let us know. PAC is your Club so please help us improve the experience.

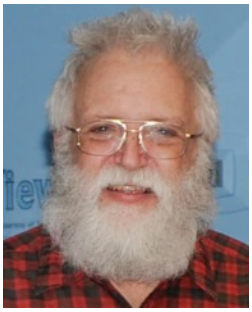
Dark ***CLEAR*** Skies to All,

Bob Kacvinsky
kacvinskyb@yahoo.com
402-499-1816 (cell/text)

The family of Rick Johnson wish to invite Rick's friends to an informal celebration of his life, to be held at Hyde Memorial Observatory on July 26, 2019 from 9 am to 11 am.

Mantrap Skies Image Catalog: ARP 6

Rick Johnson



Rick Johnson, a founding member of the Prairie Astronomy Club, passed away in January, 2019. His legacy lives on through his comprehensive catalog of over 1600 images at www.mantrapskies.com.

NGC 2537 is sometimes known as the Bear's Paw Galaxy. Considering it only has one claw in the center it is a rather deformed bear's paw. To me, a better name would be the Jellyfish Galaxy. It is thought to be two colliding galaxies. If true the bright condensation at about 1 o'clock may be the remains of the other galaxy's nucleus. This is just my guess however. They are located some 26 million light years out. Yet they are very small indicating these are tiny galaxies that have collided. The pair is only about 13 million light years across. In any case this is a tiny pair. The collision has certainly messed things up to where it is impossible just by looking to tell what belongs to what galaxy. Off to the left is distant NGC 2537A at a distance of over a half billion light years. So it is really a much bigger galaxy, just seen from a very great distance.

The galaxy was discovered by William Herschel on February 6 1788 but isn't in either of the Herschel 400 observing programs. NED classifies it as SB(s)m pec HII while the NGC project says Sd and Seligman classifies it as SB(s)m pec/BCD, similar to NED. BCD stands for Blue Compact Dwarf which it certainly is.

Cassini Reveals New Sculpting in Saturn Rings

As NASA's Cassini dove close to Saturn in its final year, the spacecraft provided intricate detail on the workings of Saturn's complex rings, new analysis shows.

Although the mission ended in 2017, science continues to flow from the data collected. A new paper published June 13 in Science describes results from four Cassini instruments taking their closest-ever observations of the main rings.

Findings include fine details of features sculpted by masses embedded within the rings. Textures and patterns, from clumpy to strawlike, pop out of the images, raising questions about the interactions that shaped them. New maps reveal how colors, chemistry and temperature change across the rings.

Like a planet under construction inside a disk of protoplanetary material, tiny moons embedded in Saturn's rings (named A through G, in order of their discovery) interact with the particles around them. In that way, the paper provides further evidence that the rings are a window into the astrophysical disk processes that shape our solar system.

The observations also deepen scientists' understanding of the complex Saturn system. Scientists conclude that at the outer edge of the main rings, a series of similar impact-generated streaks in the F ring have the same length and orientation, showing that they were likely caused by a flock of impactors that all struck the ring at the same time. This shows that the ring is shaped by streams of material that orbit Saturn itself rather than, for instance, by cometary debris (moving around the Sun) that happens to crash into the rings.

"These new details of how the moons are sculpting the rings in various ways provide a window into solar system formation, where you also have disks evolving under the influence of masses embedded within them," said lead author and Cassini scientist Matt Tiscareno of the SETI Institute in Mountain View, California.

Enduring Mysteries

At the same time, new puzzles have arisen and old mysteries have deepened with the latest research. The close-up ring images brought into focus three distinct textures - clumpy, smooth and streaky - and made it clear that these textures occur in belts with sharp boundaries. But why? In many places the belts aren't connected to any ring characteristics that scientists have yet identified.

"This tells us the way the rings look is not just a function of how much material there is," Tiscareno said. "There has to be something different about the characteristics of the particles, perhaps affecting what happens when two ring particles collide and bounce off each other. And we don't yet know what it is."

The data analyzed were gathered during the Ring Grazing Orbits (December 2016 to April 2017) and the Grand Finale (April to September 2017), when Cassini flew just above Saturn's cloud tops. As the spacecraft was running out of fuel, the mission team deliberately plunged it into the planet's atmosphere in September 2017.

Cassini's Visible and Infrared Mapping Spectrometer (VIMS) uncovered another mystery. The spectrometer, which imaged the rings in visible and near-infrared light, identified unusually weak water-ice bands in the outermost part of the A ring. That was a surprise, because the area is known to be highly reflective, which usually is a sign of less-contaminated ice and thus stronger water ice bands.

The new spectral map also sheds light on the composition of the rings. And while scientists already knew that water ice is the main component, the spectral map ruled out detectable ammonia ice and methane ice as ingredients. But it also doesn't see organic compounds - a surprise, given the organic material Cassini has

discovered flowing from the D ring into Saturn's atmosphere.

"If organics were there in large amounts - at least in the main A, B and C rings - we'd see them," said Phil Nicholson, Cassini VIMS scientist of Cornell University in Ithaca, New York. "I'm not convinced yet that they are a major component of the main rings."

The research signals the start of the next era of Cassini science, said NASA's Ames Research Center's Jeff Cuzzi, who's been studying Saturn's rings since the 1970s and is the interdisciplinary scientist for rings on the Cassini mission.

"We see so much more, and closer up, and we're getting new and more interesting puzzles," Cuzzi said. "We are just settling into the next phase, which is building new, detailed models of ring evolution - including the new revelation from Cassini data that the rings are much younger than Saturn."

The new observations give scientists an even more intimate view of the rings than they had before, and each examination reveals new complexities, said Cassini Project Scientist Linda Spilker, based at NASA's Jet Propulsion Laboratory in Pasadena, California.

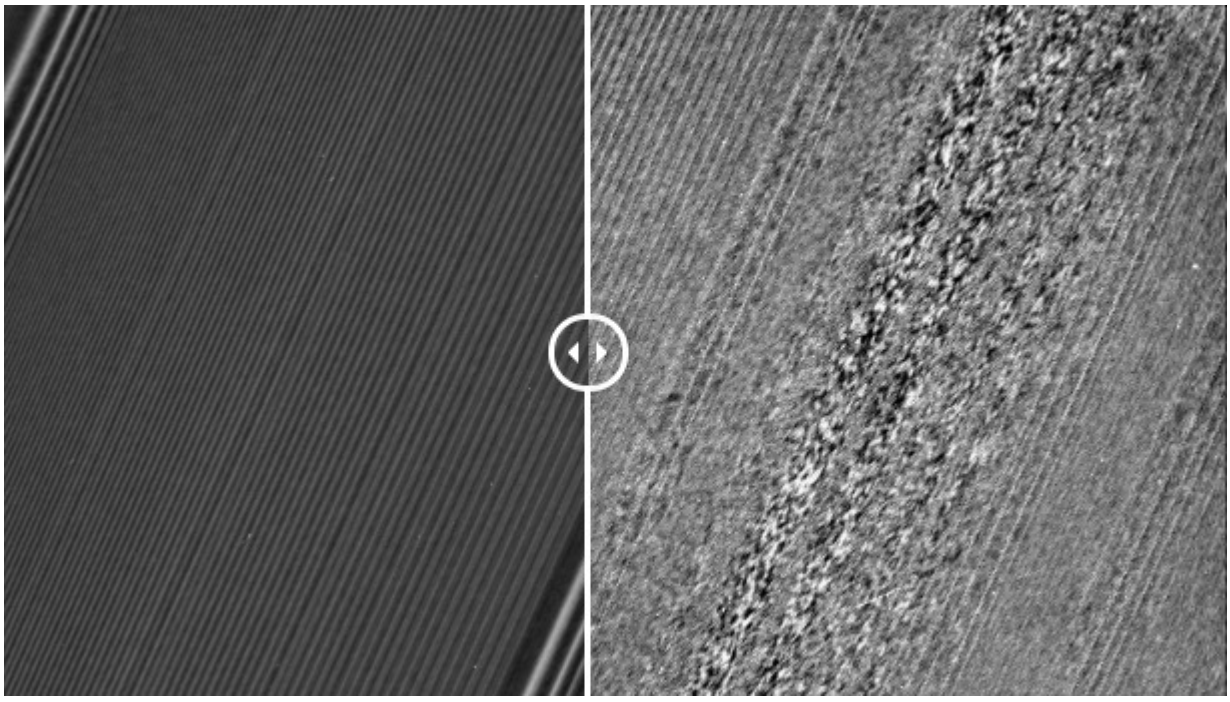
"It's like turning the power up one more notch on what we could see in the rings. Everyone just got a clearer view of what's going on," Spilker said. "Getting that extra resolution answered many questions, but so many tantalizing ones remain."

The Cassini-Huygens mission is a cooperative project of NASA, ESA (European Space Agency) and the Italian Space Agency. JPL, a division of Caltech in Pasadena, manages the mission for NASA's Science Mission Directorate in Washington. JPL designed, developed and assembled the Cassini orbiter. The radio antenna was built by JPL and the Italian Space Agency, working with team members from the U.S. and several European countries.

More information about Cassini can be found here:

https://solarsystem.nasa.gov/cassini

Read more online



New images of Saturn's rings show how textures differ even in close proximity of one another. The image on the right has been filtered so that the newly visible strawlike textures and clumps are more visible. Credit: NASA/JPL-Caltech/Space Science Institute

July Observing: What to View

Jim Kvasnicka

This is a partial list of objects visible for the upcoming month.

Planets

Mars: Lost is the Sun's afterglow the second week of July.
Mercury: Low in the WNW to start July and then lost from view.
Jupiter: Shines at magnitude -2.6 with a disk 45.5" wide.
Saturn: Reaches opposition on July 9th.
Neptune and Uranus: Best seen in the early morning hours.
Venus: Low in the bright dawn sky becomes lost from view around July 22nd.

Messier List

M3: Class VI globular cluster in Canes Venatici.

M4: Class IX globular cluster in Scorpius.
M5: Class V globular cluster in Serpens Caput.
M53: Class V globular cluster in Coma Berenices.
M68: Class X globular cluster in Hydra.
M80: Class II globular cluster in Scorpius.
M83: Galaxy in Hydra.

Last Month: M58, M59, M60, M84, M86, M87, M88, M89, M90, M91, M98, M99, M100
Next Month: M6, M7, M8, M9, M10, M12, M19, M20, M21, M23, M62, M107

NGC and other Deep Sky Objects

NGC 5907: Edge on galaxy in Draco.
NGC 6229: Class IV globular cluster in Hercules.
NGC 6231: Open cluster in Scorpius.
NGC 6302: The Bug Nebula in Scorpius.
NGC 6369: The Little Ghost Nebula in Ophiuchus.
IC 4703: The Eagle Nebula, open cluster M16 is embedded within.

Double Star Program List

Nu Draconis: Equal pair of white stars.
Psi Draconis: Pair of light yellow stars.
40/41 Draconis: Equal pair of light yellow stars.
Xi Scorpii: Yellow and light blue stars.
Struve 1999: Two yellow-orange stars.
Beta Scorpii: Bluish white primary with a light blue secondary.
Nu Scorpii: Yellow and light blue pair.
Delta Serpentis: Pair of pale yellow stars.
Theta Serpentis: Blue-white pair of stars.

Challenge Object

NGC 6207: Galaxy 28' NNE of M13.

Globular Cluster Observing Program

Jim Kvasnicka

The Globular Cluster Observing Program is designed to introduce you to some of the finest globular clusters in the sky. You can use any telescope but an 8 inch scope is recommended. This program is meant to allow you to enjoy comparing different globular clusters to each other, not to test your equipment.

To perform the Globular Cluster Observing Program you will need to purchase the Guide to the Globular Cluster Observing Program from the AL Bookstore on line. The guide was specifically written to support this observing program. The cost for the guide is $14.00 dollars.

The observing guide explains in detail the Regular and Challenge Observing Lists. There are 190 galactic and extra-galactic globular clusters included in the guide.

This program is more than just observing globular clusters. You need to apply a concentration classification to each globular cluster you observe. The concentration classification is called the Shapley-Sawyer Concentration Class. The guide provides reference pictures of globular clusters and their concentration class.

For the Globular Cluster Observing Program the observer is required to observe 50 globular clusters with at least one globular cluster from the challenge list. You can choose any 50 globular clusters that you want to observe. The majority of the globular clusters in the Milky Way are located near the galactic center, which means the summer is the best time to do the program. In just the three constellations Scorpius, Ophiuchus, and Sagittarius there are 56 globular clusters with a magnitude of 12.5 or brighter. If you wanted you can complete this program fairly quickly.

The usual data is required by the Astronomical League for your observing logs along with your estimate for the concentration class for each globular cluster observed. Since you will be comparing globular clusters all observations should be made with the same telescope and magnification. You can use any method to find the objects including GO-TO and PUSH-TO.

When you complete the Globular Cluster Observing Program you will need to submit a copy of your observing logs to me for review. If your logs are accurate and complete I will submit your name to the Globular Cluster Observing Program chair for approval. The chair will mail to me your Globular Cluster certificate and pin which I will present to you at our monthly PAC meeting.

If you have any questions regarding the Globular Cluster Observing Program or any other observing program, or need help getting started please contact me and I will be glad to help.

Below: M3 is a globular star cluster in Canes Venatici. Photo by Rick Johnson

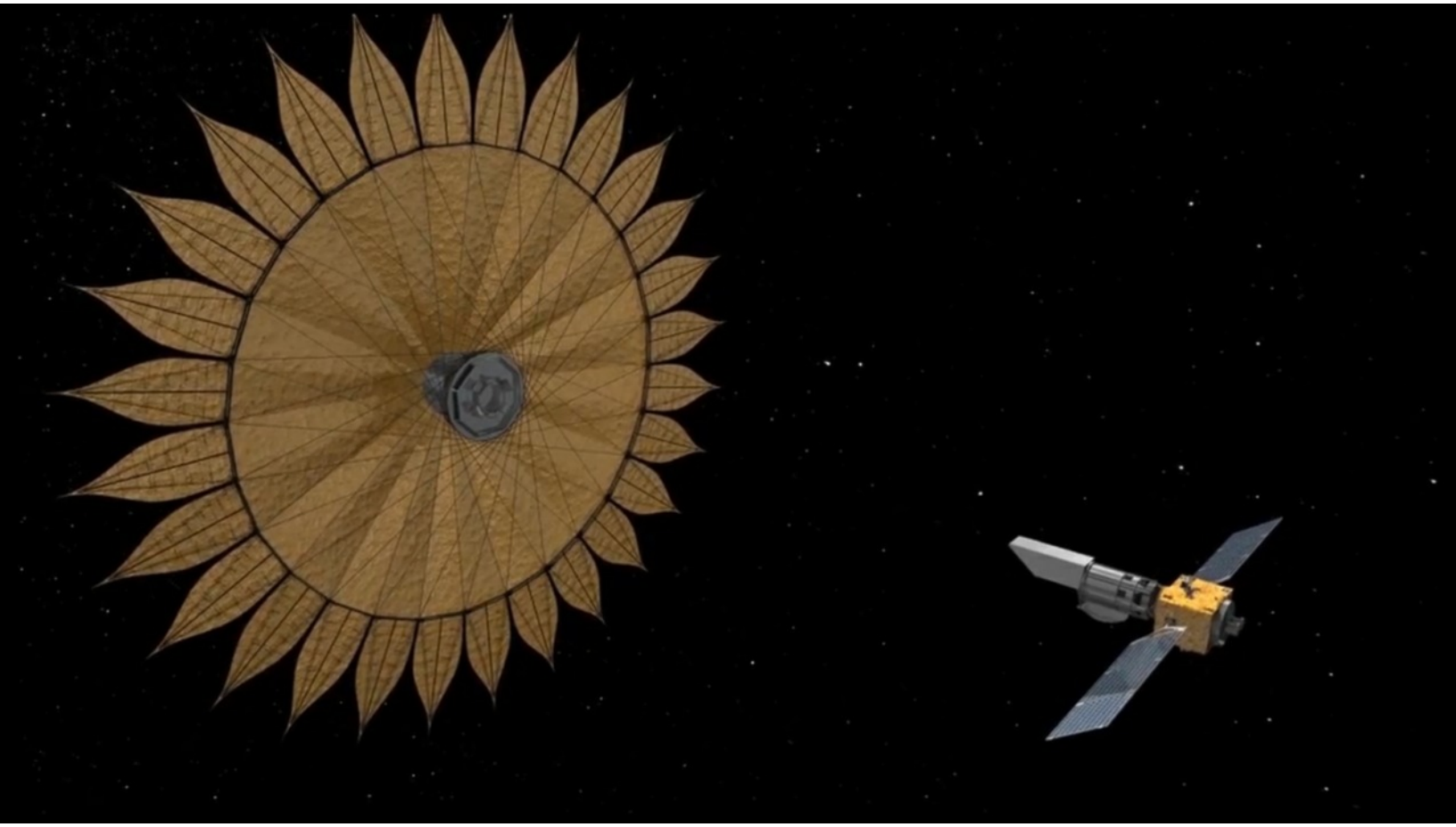
Starshade Would Take Formation Flying to Extremes

Anyone who's ever seen aircraft engaged in formation flying can appreciate the feat of staying highly synchronized while airborne. In work sponsored by NASA's Exoplanet Exploration Program (ExEP), engineers at the Jet Propulsion Laboratory in Pasadena, California, are taking formation flying to a new extreme.

Their work marks an important milestone within a larger program to test the feasibility of a technology called a starshade. Although starshades have never flown in space, they hold the potential to enable groundbreaking observations of planets beyond our solar system, including pictures of planets as small as Earth.

A future starshade mission would involve two spacecraft. One would be a space telescope on the hunt for planets orbiting stars outside of our solar system. The other spacecraft would fly some 25,000 miles (40,000 kilometers) in front of it, carrying a large, flat shade. The shade would unfurl like a blooming flower - complete with "petals" - and block the light from a star, allowing the telescope to get a clearer glimpse of any orbiting planets. But it would work only if the two spacecraft were to stay, despite the great distance between them, aligned to within 3 feet (1 meter) of each other. Any more, and starlight would leak around the starshade into the telescope's view and overwhelm faint exoplanets.

"The distances we're talking about for the starshade technology are kind of hard to imagine," said JPL engineer Michael Bottom. "If the starshade were scaled down to the size of a drink coaster, the telescope would be the size of a pencil eraser and they'd be separated by about 60 miles [100 kilometers]. Now imagine those two objects are free-floating in space. They're both experiencing these little tugs and nudges from gravity and



other forces, and over that distance we're trying to keep them both precisely aligned to within about 2 millimeters."

Researchers have found thousands of exoplanets without the use of a starshade, but in most instances scientists have discovered these worlds indirectly. The transit method, for example, detects the presence of a planet as it passes in front of its parent star and causes a temporary drop in the star's brightness. Only in relatively few cases have scientists taken direct images of exoplanets.

Blocking out starlight is key to performing more direct imaging and, eventually, to carrying out in-depth studies of planetary atmospheres or finding hints about the surface features of rocky worlds. Such studies have the potential to reveal signs of life beyond Earth for the first time.

Seeking Shade

The idea of using a space-based starshade to study exoplanets was initially proposed in the 1960s, four decades before the discovery of the first exoplanets. And while the ability to point a single spacecraft steadily at a distant object is not new, either, keeping two spacecraft aligned with each other toward a background object represents a different kind of challenge.

Researchers working on ExEP's Starshade Technology Development, known as S5, have been tasked by NASA with developing starshade technology for possible future space telescope missions. The S5 team is addressing three technology gaps that would need to be closed before a starshade mission could be ready to go to space.

The work done by Bottom and fellow JPL engineer Thibault Flinois closes one of those gaps by confirming that engineers could realistically produce a starshade mission that met these stringent "formation sensing and control" requirements. Their results are described in the S5 Milestone 4 report, available on the ExEP website.

Get Into Formation

The specifics of a particular starshade mission - including the exact distance between the two spacecraft and the size of the shade - would depend on the size of the telescope. The S5 Milestone 4 report looked primarily at a separation range of between 12,500 to 25,000 miles (20,000 to 40,000 kilometers), with a shade 85 feet (26 meters) in diameter. These parameters would work for a mission the size of NASA's Wide Field Infrared Survey Telescope (WFIRST), a telescope with a 2.4-meter-diameter primary mirror set to launch in the mid-2020s.

WFIRST will carry a different starlight-blocking technology, called a coronagraph, that sits inside the telescope and offers its own unique strengths in the study of exoplanets. This technology demonstration will be the first high-contrast stellar coronagraph to go into space, enabling WFIRST to directly image giant exoplanets similar to Neptune and Jupiter.

Starshade and coronagraph technologies work separately, but Bottom tested a technique by which WFIRST could detect when a hypothetical starshade drifted subtly out of alignment. A small amount of starlight would inevitably bend around the starshade and form a light-and-dark pattern on the front of the telescope. The telescope would see the pattern by using a pupil camera, which can image the front of the telescope from inside - akin to photographing a windshield from inside a car.

Previous starshade investigations had considered this approach, but Bottom made it a reality by building a computer program that could recognize when the light-and-dark pattern was centered on the telescope and when it had drifted off-center. Bottom found that the technique works extremely well as a way to detect the starshade's movement.

"We can sense a change in the position of the starshade

down to an inch, even over these huge distances," Bottom said.

But detecting when the starshade is out of alignment is an entirely different proposition from actually keeping it aligned. To that end, Flinois and his colleagues developed a set of algorithms that use information provided by Bottom's program to determine when the starshade thrusters should fire to nudge it back into position. The algorithms were created to autonomously keep the starshade aligned with the telescope for days at a time.

Combined with Bottom's work, this shows that keeping the two spacecraft aligned is feasible using automated sensors and thruster controls. In fact, the work by Bottom and Flinois demonstrates that engineers could reasonably meet the alignment demands of an even larger starshade (in conjunction with a larger telescope), positioned up to 46,000 miles (74,000 kilometers) from the telescope.

"With such an unusually large range of scales at play here, it can be very counterintuitive that this would be possible at first glance," Flinois said.

A starshade project has not yet been approved for flight, but one could potentially join WFIRST in space in the late 2020s. Meeting the formation-flying requirement is just one step toward demonstrating that the project is feasible.

"This to me is a fine example of how space technology becomes ever more extraordinary by building upon its prior successes," said Phil Willems, manager of NASA's Starshade Technology Development activity. "We use formation flying in space every time a capsule docks at the International Space Station. But Michael and Thibault have gone far beyond that, and shown a way to maintain formation over scales larger than Earth itself."

JPL manages ExEP for NASA's Astrophysics Division.

Below: NASA's Juno spacecraft captured this view of an area within a Jovian jet stream showing a vortex that has an intensely dark center. Nearby, other features display bright, high altitude clouds that have puffed up into the sunlight. Read more at NASA JPL. Image credit: NASA/JPL-Caltech/SwRI/MSSS/Gerald Eichstadt/Sean Doran

Observe the Moon and Beyond: Apollo 11 at 50

David Prosper

This article is distributed by NASA Night Sky Network
The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.org to find local clubs, events, and more!

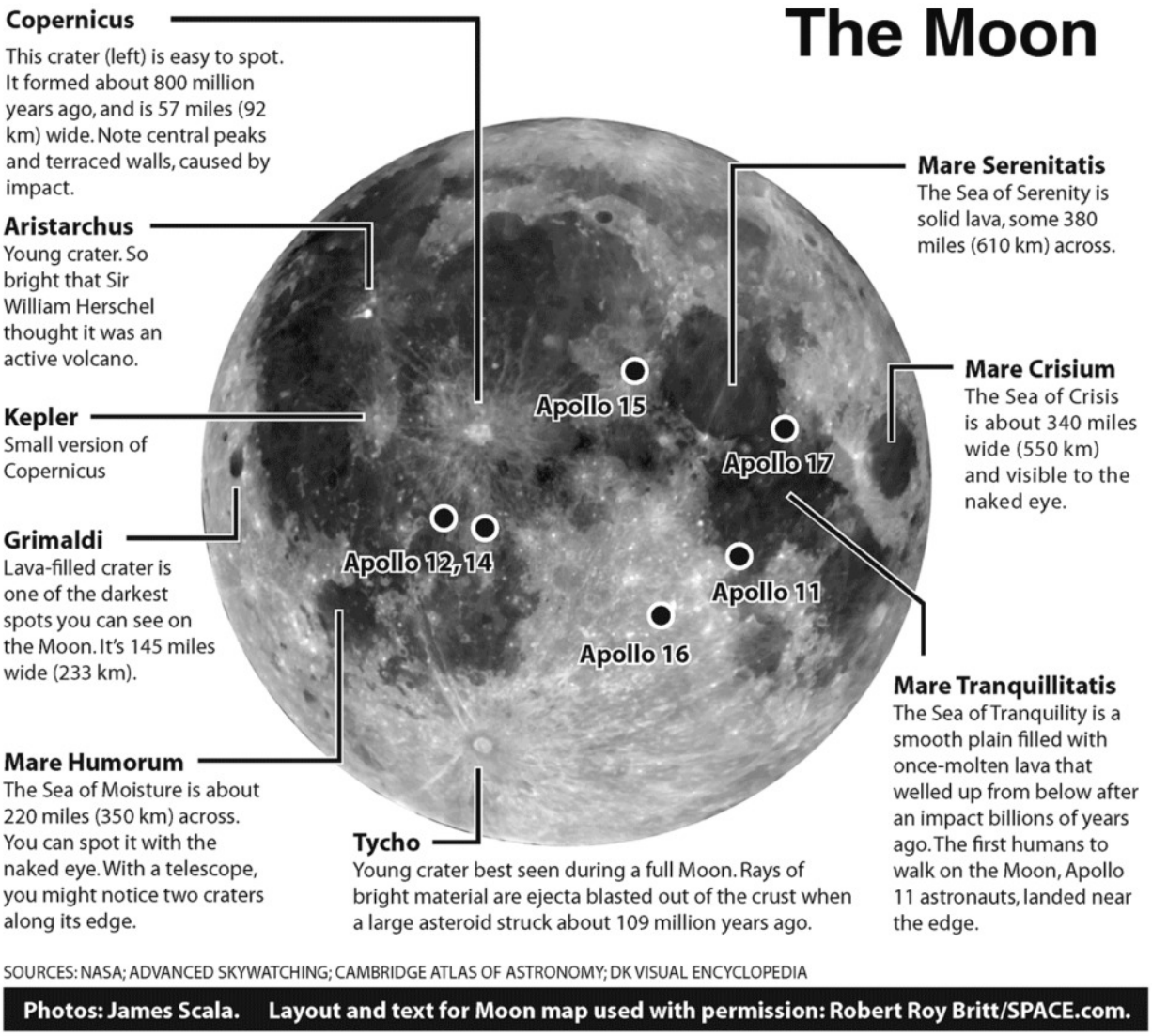
Saturn is at opposition this month, beckoning to future explorers with its beautiful rings and varied, mysterious moons. The **Moon** prominently passes Saturn mid-month, just in time for the 50th anniversary of **Apollo 11**!

Saturn is in opposition on July 9, rising in the east as the Sun sets in the west. It is visible all night, hovering right above the teapot of Sagittarius. Saturn is not nearly as bright as Jupiter, next door in Scorpius, but both giant planets are easily the brightest objects in their constellations, making them easy to identify. A full **Moon** scrapes by the ringed planet late in the evening of the 15th through the early morning of the 16th. Some observers in South America will even see the Moon occult, or pass in front of, Saturn. Observe how fast the Moon moves in relation to Saturn throughout the night by recording their positions every half hour or so via sketches or photos.

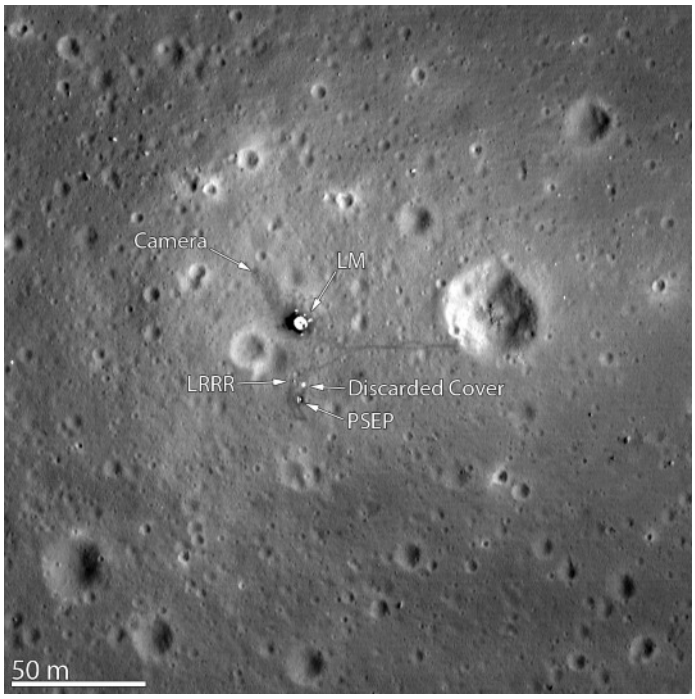
While observing the Saturn-Moon celestial dance the early morning of the 16th, you can also contemplate the 50th anniversary of the launch of the **Apollo 11** mission! On June 16, 1969, Apollo 11 blasted off from Cape Canaveral in Florida on a journey of almost a quarter million miles to our nearest celestial neighbor, a mission made possible by the tremendous power of the Saturn V rocket – still the most powerful rocket ever launched. Just a few days later, on July 21, 1969, Neil Armstrong and Buzz Aldrin set foot on the lunar surface and became the first people in history to walk on another world. The astronauts set up equipment including a solar wind sampler, laser rangefinder, and seismometer and gathered up 22 kilograms (48 pounds) of precious lunar rocks and soil samples. After spending less than a day on the Moon's surface, the duo blasted off and returned to the orbiting Columbia Command Module, piloted by Michael Collins. Just a few days later, on July 24, all three astronauts splashed down safely in the Pacific Ocean. You can follow the timeline of the Apollo 11 mission in greater detail at bit.ly/TimelineApollo11 and dig deep into mission history and science on **NASA's Apollo History Site**: bit.ly/ApolloNASA.

Have you ever wanted to see the flag on the Moon left behind by the Apollo astronauts? While no telescope on Earth is powerful enough to see any items left behind the landing sites, you can discover how much you **can** observe with **the Flag on the Moon** handout: bit.ly/MoonFlag

You can catch up on all of NASA's current and future missions at nasa.gov



Above: Observe the larger details on the Moon with help from this map, which also pinpoints the Apollo landing site. Full handout available at bit.ly/MoonHandout



Right: Earth-based telescopes can't see any equipment left behind at the Apollo 11 landing site, but the cameras onboard NASA's Lunar Reconnaissance Orbiter (LRO) can. This is Tranquility Base as seen from the LRO, just 24 kilometers (15 miles) above the Moon's surface, with helpful labels added by the imaging team. Image Credit: NASA Goddard/Arizona State University. See more landing sites at: bit.ly/ApolloLRO

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Due to the absence of some of our members, the following positions will be filled by volenteers until our elections.

Program Chairman- Ed Woerner 466-9234

Newsletter- Brian Dodson- 488-1250

These are the people to contact on any matters concerning these offices.

* * * * * * * * * * *

One of our old-time club members, Rick Johnson, who has served us so well as treasurerm has recently recieved his law degree, and has passed his bar exams. We would like to congratulate him on this achievement. There is, however, an unfortunate side to this achievement, as it means that he will be leaving Lincoln. However, our loss is someone's gain, and that someone is not too far away. Rick is moving to Omaha, which means that the Omaha club will be gaining a fine member. He will still be coming down to meetings as often as he can, but this is our gain. The best of luck, Rick.

* * * * * * * * * * *

QUESTIONS

A number of unanswered questions concerning the convention have come to our attention, and we feel that they should be brought to everyone's attention, in case someone has the answer.

Why did everyone, in spite of Earl's fine directions, set up the telescopes for the first star party in a swamp rather than on the observing site?

Why were more door prizes won by members of the Lincoln and Omaha clubs than by all the rest of the region combined?

Why did a nest of insects decide to build a nest inside the Olin Hall air conditioner?

Will Eric Rudd be able to collect insurance on his schmidt corrector, or will Bob Cox have to pay for it?

* * * * * * * * * * *

CONVENTION

Next year's Mid-States convention will be held in Kansas City. Information concerning this will be given as we recieve it.

26th Nebraska Star Party - July 28-August 2

The early registration deadline is July 1st!

Join us this summer as families from all over the US and around the world gather in the sparsely populated sand hills of North Central Nebraska to spend a good week under a galaxy of stars.

NSP Schedule of Events

Sunday: registration and check-in, optional dinner.

Monday: registration and check-in, field school, optional dinner.

Tuesday: registration and check-in, swap meet, field school, free “Cattle Country” hamburger dinner.

Wednesday: (All at Valentine High School) field school, registration, swap meet, speaker program, children’s program, dinner on your own.

Thursday: Brewer’s Niobrara Canoe or tube float, optional dinner.

Friday: public star party at 9pm.

For more information see the NSP website.

Register online!

CLUB MEMBERSHIP INFO

REGULAR MEMBER - $30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - $35.00 per year. Same as regular member except gets 2 votes at club meetings.

STUDENT MEMBER - $10.00 per year with volunteer requirement.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

CLUB TELESCOPES

To check out one of the club telescopes, please contact a club officer. Scopes can be checked out at a regular club meeting and kept for one month. Checkout can be extended for another month if there are no other requests for the telescope, but you must notify a club officer in advance.

100mm Orion refractor: Available
10 inch Meade Starfinder Dobsonian: Available
13 inch Truss Dobsonian: Needs repair
10 inch Zhumell: Needs mount

CLUB APPAREL

Order club apparel from cafepress.com:

Shop through Amazon Smile to automatically donate to PAC:

amazonsmile

CLUB OFFICERS

President	Bob Kacvinsky kacvinskyb@yahoo.com
Vice President	Rick Brown rickbrown2000@gmail.com
2nd VP (Program Chair)	Christine Parkyn cpparky@gmail.com
Secretary	Bill Lohrberg wmlohrberg89@gmail.com
Treasurer	John Reinert jr6@aol.com
Club Observing Chair	Jim Kvasnicka jim.kvasnicka@yahoo.com
Outreach Coordinator	Mike Kearns mkearns@neb.rr.com
Website and Newsletter Editor	Mark Dahmke mark@dahmke.com

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular $30/yr, Family $35/yr**. Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585**. For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: **Mark Dahmke, P. O. Box 5585, Lincoln, NE 68505 or** mark@dahmke.com**,** no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.