The Prairie Astronomer

June 2018 Volume 59, Issue #6

M51

Brett Boller

Night Sky Network

The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

NEXT PAC MEETING: June 26 at 6pm

PROGRAM

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

FUTURE PROGRAMS

July: Light Pollution
August: NSP Review
October: Club Viewing Night
November: How to Buy a Telescope
December: To be announced

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

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EVENTS

PAC Meeting
Tuesday June 26, 2018, 6:00pm
Solar Star Party

PAC Meeting
Tuesday July 31, 2018, 7:30pm

Nebraska Star Party
August 5-10, 2018, Merritt Reservoir

PAC meeting
Tuesday August 28, 2018, 7:30pm
Review of Nebraska Star Party

PAC Meeting
Tuesday September 25, 2018, 6:30pm
Club Dinner

2018 STAR PARTY DATES

Photo by Brian Sivill

	Star Party Date	Star Party Date
January	Jan 12th	**Jan 19th**
February	Feb 9th	**Feb 16th**
March	Mar 9th	**Mar 16th**
April	Apr 6th	**Apr 13th**
May	May 4th	**May 11th**
June	Jun 8th	**Jun 15th**
July	Jul 6th	**Jul 13th**
August	Aug 3rd	**Aug 10th**
NSP	**Aug 5th -10th**	
September	**Sep 7th**	Sep 14th
October	**Oct 5th**	Oct 12th
November	Nov 2nd	**Nov 9th**
December	Nov 30th	**Dec 7th**

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

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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

Observatory Update: Cassowary 02L1 or the Cheshire Cat

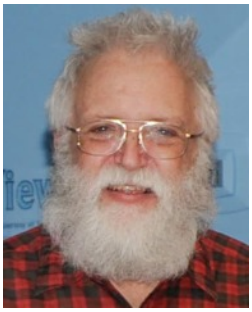
Rick Johnson

This Smiley Face or Happy Face is the result of gravitational lensing of distant galaxies beyond the lensing galaxies. NED gives it the name Cheshire Cat if you are looking it up. An alternate name is Cassowary 02L1. A bird and its hunter. Though I suspect most house cats would end up very dead if they took on a Cassowary. When I was in Australia we were cautioned not to get near one as they were "The most dangerous bird in the world" or something like that. True or not we stayed very clear of the two we saw. They are quite rare so seeing one isn't common. Habitat loss is the problem.

Back to astronomy. NED puts it about 4.5 billion light-years away with a redshift of 0.426. Is that the distance to the lensing galaxies or the lensed galaxies? I think that is the distance to the lensing galaxies. NED has an entry centered on part of the blue arc, CASSOWARY 02G with a distance of 7.65 billion light-years with a redshift of 0.966. NED points two other at 11.37 billion light-years. So the cat is made up of many unrelated galaxies that have the proper geometry when seen from earth to make a smiling face. It is the lens that brightens these very distant galaxies sufficiently that I can see it. I doubt any would be visible in my 14" scope without the foreground lensing galaxies. The CASSOWARY name is an acronym for CAmbridge Sloan Survey Of Wide ARcs in the skY. Someone had to really stretch for that one! Anyone know why the Australian tie?

Using the diameters of the two "eyes" at NED and a distance of 4.5 billion light-years I get a size for these two galaxies of about 110,000 to 120,000 light-years. Not as big as I expect for how bright they are. Their brightness isn't enhanced by the gravitational lens they create for the background galaxies. NED says they are magnitude 20.2 and 20.5 left to right. Normally I find galaxies at this distance to be at least a magnitude dimmer, often 2 magnitudes fainter. Though ASK 186534.0 is magnitude 18.3, 2.18 billion light-years distant and 145,000 light-years across making the two lensing galaxies somewhat smaller and dimmer by comparison.

I've had this one on my to-do list since February 2015 when it was first announced. The complex passes less than 2 degrees of my zenith so I expected it easy to get good enough seeing for long enough that I could catch it. I figured on a minimum of 2 hours of luminance, three times my typical exposure time. But seeing has never cooperated. Finally this March the night met my specifications and I started in with near 0.5" resolution for one frame. After 4 (each 10 minutes) seeing had deteriorated so much I had to stop. Since color data can survive such seeing I started in on that and got one round of 2 frames each before seeing then said no way and besides clouds moved in. I had to throw out one green frame as it was too cloud hit to be used. I had several more clear nights but seeing just wasn't good enough. Ditto for April. Now it is too far west and low for the seeing I need for this super tough object. Even though I had no more data than I use for most of my imaging I went ahead and processed it. The better than normal transparency for the first 3 frames allowed me to get something, just not what I wanted. It doesn't compare to Josh Smith's fantastic image using over 32 hours of luminance. Adjusting for aperture that's 5 hours at 14 inches or 7.5 times the photons I was able to grab. Josh send me your seeing and clear skies. I was surprised I got as much as I did though the resolution was poor due to the low signal to noise ratio and deteriorating seeing. After I picked up the smile and the arc on the west I noticed the eastern side of the arc was missing. But it is pretty well lost in Josh's image as well.



If I get needed skies next year I'll try and add more photons. In the meantime Josh's image is a good example that small aperture can do as well as larger if you put in the additional time to catch enough photons.

Since the image didn't do what I wanted I did annotate everything with redshift data at NED. Also, here's the link to the Hubble version. It's a bit better than mine but is it billions of dollars better?

Full image at 1" per pixel

July Observing: What to View

Jim Kvasnicka

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

Planets

Venus: Low in the west at magnitude -4.3 with its disk 57% lit.
Mercury: Look for Mercury 15º to the lower right of Venus.
Jupiter: Dims to magnitude -2.1 with a disk 38" wide.
Saturn: In Sagittarius within a few degrees of M8 and M20.
Mars: Reaches opposition on the night of July 26-27 reaching a magnitude of -2.8 with a disk 24" wide.
Uranus and Neptune: In the south during dawn.

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

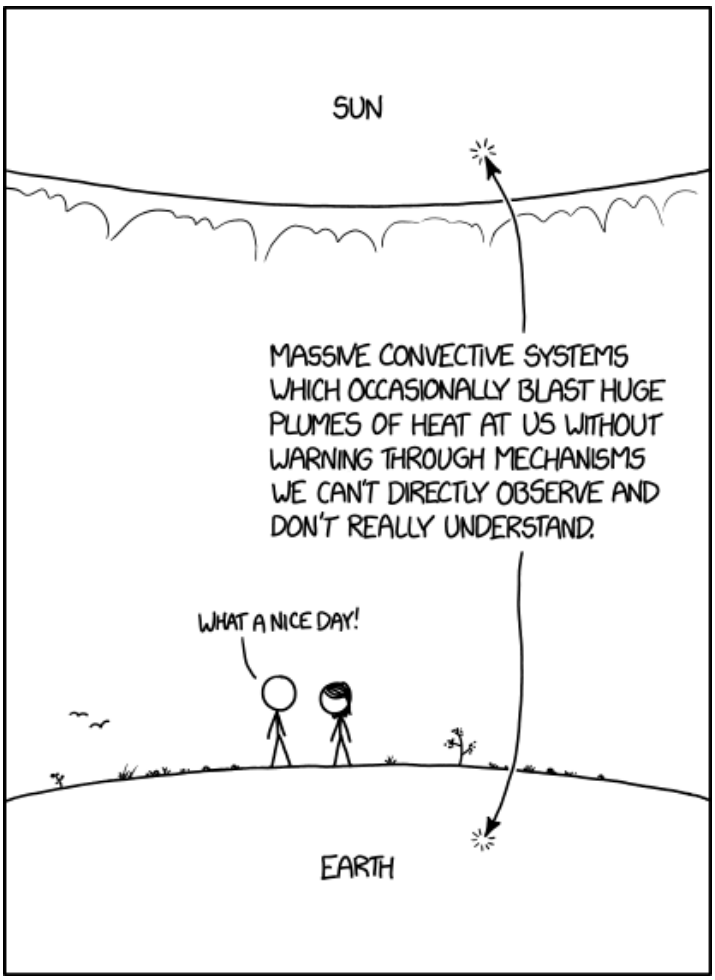
NGC 5907: Edge on galaxy in Draco.
NGC 5921: Galaxy in Serpens Caput.
NGC 6309: The Box Nebula in Ophiuchus.
NGC 6369: The Little Ghost Nebula in Ophiuchus.
NGC 6543: The Cat's Eye Nebula in Draco.

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 primary with a light blue secondary.
Struve 1999: Two yellow orange stars.
Beta Scorpii: Blue white primary with a light blue secondary.
Nu Scorpii: Yellow and light blue stars.
Delta Serpentis: Yellow stars.
Theta Serpentis: Light blue pair of stars.

Challenge Object

NGC 6207: Lens shaped galaxy located 28' NNE of M13 in Hercules.



xkcd.com

Above: Owl Nebula. Below: M81-M82. Images by Brett Boller.

Most images were obtained via modified T3i on Skywatcher Esprit 150. 5 minute images guided. no dark frames are anything like that. Most were 30 minutes of obtained photons.

M51, by Brett Boller

25th Nebraska Star Party - August 5-10, 2018

The early registration deadline is July 15th!

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

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

Friday: public star party at 9pm.

For more information see the NSP website.

Register online!

Perfect Storm

One of the thickest dust storms ever observed on Mars has been spreading for the past week and a half. The storm has caused NASA's Opportunity rover to suspend science operations, but also offers a window for four other spacecraft to learn from the swirling dust.

NASA has three orbiters circling the Red Planet, each equipped with special cameras and other atmospheric instruments. Additionally, NASA's Curiosity rover has begun to see an increase in dust at its location in Gale Crater.

"This is the ideal storm for Mars science," said Jim Watzin, director of NASA's Mars Exploration Program at the agency's headquarters in Washington. "We have a historic number of spacecraft operating at the Red Planet. Each offers a unique look at how dust storms form and behave -- knowledge that will be essential for future robotic and human missions."

Dusty With a Chance of Dust

Dust storms are a frequent feature on Mars, occurring in all seasons. Occasionally, they can balloon into regional storms in a matter of days, and sometimes even expand until they envelop the planet. These massive, planet-scaled storms are estimated to happen about once every three to four Mars years (six to eight Earth years); the last one was in 2007. They can last weeks, or even months at the longest.

The current storm above Opportunity, which is still growing, now blankets 14 million square miles (35 million square kilometers) of Martian surface -- about a quarter of the planet.

All dust events, regardless of size, help shape the Martian surface. Studying their physics is critical to understanding the ancient and modern Martian climate, said Rich Zurek, chief scientist for the Mars Program Office at NASA's Jet Propulsion Laboratory in Pasadena, California.

"Each observation of these large storms brings us closer to being able to model these events -- and maybe, someday, being able to forecast them," Zurek said. "That would be like forecasting El Niño events on Earth, or the severity of upcoming hurricane seasons."

The thin atmosphere makes these storms vastly different from anything encountered on Earth: Despite the drama of "The Martian," the most powerful surface winds encountered on Mars would not topple a spacecraft, although they can sand-blast dust particles into the atmosphere.

Teamwork

Members of NASA's spacecraft "family" at Mars often help each other out. The agency's orbiters regularly relay data from NASA's rovers back to Earth. Orbiters and rovers also offer different perspectives on Martian terrain, allowing their science to complement one another.

The Mars Reconnaissance Orbiter has a special role, acting as an early warning

These two views from NASA's Curiosity rover, acquired specifically to measure the amount of dust inside Gale Crater, show that dust has increased over three days from a major Martian dust storm. The left-hand image shows a view of the east-northeast rim of Gale Crater on June 7, 2018 (Sol 2074); the right-hand image shows a view of the same feature on June 10, 2018 (Sol 2077). The images were taken by the rover's Mastcam. Credit: NASA/JPL-Caltech/MSSS

system for weather events such as the recent storm. It was the orbiter's wide-angle camera, called the Mars Color Imager, that offered the Opportunity team a heads up about the storm. This imager, built and operated by Malin Space Science Systems in San Diego, can create daily global maps of the planet that track how storms evolve, not unlike weather satellites that track hurricanes here on Earth.

NASA's two other orbiters -- 2001 Mars Odyssey and MAVEN (Mars Atmosphere and Volatile Evolution) -- also provide unique science views. Odyssey has an infrared camera called THEMIS (Thermal Emission Imaging System) that can measure the amount of dust below it; MAVEN is designed to study the behavior of the upper atmosphere and the loss of gas to space.

Science happens on the ground as well, of course. Despite being on the other side of the planet from the evolving dust storm, NASA's Curiosity rover is beginning to detect increased "tau," the measure of the veil of dusty haze that blots out sunlight during a storm. As of Tuesday, June 12, the tau inside Gale Crater was varying between 1.0 and 2.0 -- figures that are average for dust season, though these levels usually show up later in the season.

Fortunately, Curiosity has a nuclear-powered battery. That means it doesn't face the same risk as the solar-powered Opportunity.

The Next Big One?

Since 2007, Mars scientists have been patiently waiting for a planet-encircling dust event -- less precisely called a "global" dust storm, though the storms never truly cover the entire globe of Mars. In 1971, one of these storms came close, leaving just the peaks of Mars' Tharsis volcanoes poking out above the dust.

The most recent dust storm is the earliest ever observed in the northern hemisphere of Mars, said Bruce Cantor of Malin Space Science Systems, deputy principal investigator for the Mars Color Imager. But it could take several more days before anyone can tell whether the storm is encircling the planet.

If it does "go global," the storm will offer a brand new look at Martian weather. Four spacecraft stand ready to collect the science that shakes out.

Fine Print

JPL, a division of Caltech in Pasadena, California, manages the Mars Exploration Rover mission; the Mars Science Laboratory/Curiosity rover; the Mars Reconnaissance Orbiter Project; and the 2001 Mars Odyssey orbiter for NASA's Science Mission Directorate, Washington.

NASA's Goddard Space Flight Center in Greenbelt, Maryland, manages the MAVEN project for NASA's Science Mission Directorate, Washington. MAVEN's principal investigator is based at the University of Colorado Boulder's Laboratory for Atmospheric and Space Physics.

Lockheed Martin Space Systems, Denver, is the prime contractor for the Odyssey, MRO and MAVEN projects, having developed and built all three orbiters. Mission operations are conducted jointly from Lockheed Martin and from JPL for Odyssey and MRO, and jointly with the GSFC for MAVEN.

The Thermal Emission Imaging System (THEMIS) was developed by Arizona State University, Tempe, in collaboration with Raytheon Santa Barbara Remote Sensing. The THEMIS investigation is led by Philip Christensen at Arizona State University.

For more updates about the Martian dust storm visit:

https://mars.nasa.gov/weather

For more information about NASA's Mars missions, visit:

https://mars.nasa.gov/

Focus on Constellations: Draco

Jim Kvasnicka

Draco the Dragon is a circumpolar constellation. Its stars are not very bright; therefore its 108º long reverse S pattern can be difficult to see. The tail of the Dragon stretches between the two Dippers. Draco with 1,083 square degrees is the eighth largest constellation. Being off the Milky Way it is rich in galaxies; but the constellation contains several beautiful double stars and bright planetary nebulae including NGC 6543 the Cat's Eye Nebula.

Showpiece Objects

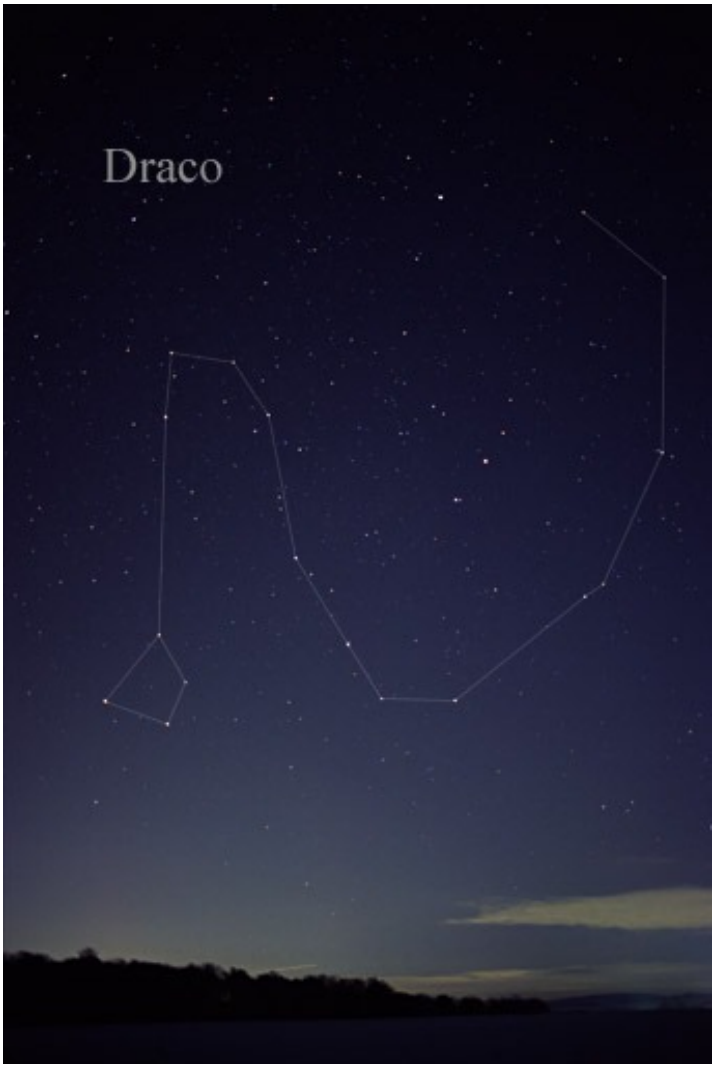
Galaxies: NGC 4125, NGC 4256, NGC 5866, NGC 5907, NGC 5965, NGC 6015, NGC 6140, NGC 6503, NGC 6643
Planetary Nebulae: NGC 6543 (Cat's Eye Nebula)

Mythology

The Greeks has several myths involving dragons. A dragon guarded the Golden Fleece sought by the Argonauts and was put to sleep by a potion given to Jason by the sorceress Medea. During the war between the Titans and the gods Minerva hurled a dragon into the sky. To obtain the golden apples of the Hesperides, one of his Twelve Labors, Hercules has to fight and kill a dragon. Probably the only certain personification of the celestial Dragon in classical mythology is the winged dragon that drew Medea's chariot which was our Big Dipper. A winged Dragon drawing a four wheel Chariot was frequently shown in ancient Mesopotamian art.

Number of Objects Magnitude 12.0 and Brighter

Galaxies: 39
Globular Clusters: 0
Open Clusters: 0
Planetary Nebulae: 1
Dark Nebulae: 0
Bright Nebulae: 0
SNREM: 0



Till Credner - Own work: AlltheSky.com 3.0

Astronomers See Distant Eruption as Black Hole Destroys Star

For the first time, astronomers have directly imaged the formation and expansion of a fast-moving jet of material ejected when the powerful gravity of a supermassive black hole ripped apart a star that wandered too close to the massive monster.

The scientists tracked the event with radio and infrared telescopes, including the National Science Foundation's Very Long Baseline Array (VLBA) and NASA's Spitzer Space Telescope, in a pair of colliding galaxies called Arp 299. The galaxies are nearly 150 million light-years from Earth. At the core of one of the galaxies, a black hole 20 million times more massive than the Sun shredded a star more than twice the Sun's mass, setting off a chain of events that revealed important details of the violent encounter. The researchers also used observations of Arp 299 made by NASA's Hubble space telescope prior to and after the appearance of the eruption.

Only a small number of such stellar deaths, called tidal disruption events, or TDEs, have been detected. Theorists have suggested that material pulled from the doomed star forms a rotating disk around the black hole, emitting intense X-rays and visible light, and also launches jets of material outward from the poles of the disk at nearly the speed of light.

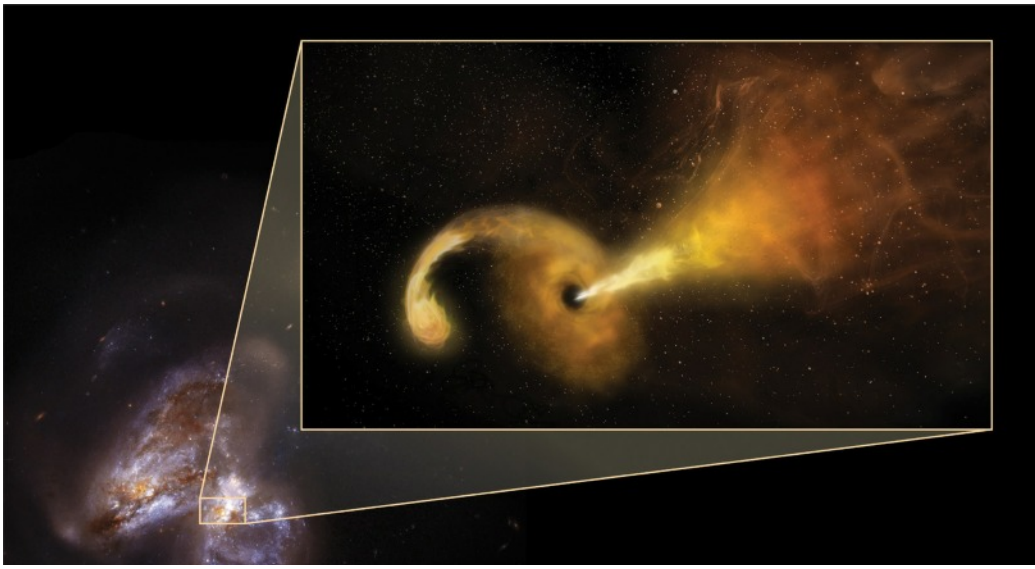
"Never before have we been able to directly observe the formation and evolution of a jet from one of these events," said Miguel Perez-Torres, of the Astrophysical Institute of Andalucia in Granada, Spain, and an author on a paper describing the finding.

Discovery of a jet

The first indication came on January 30, 2005, when astronomers using the William Herschel Telescope in the Canary Islands discovered a bright burst of infrared emission coming from the nucleus of one of the colliding galaxies in Arp 299. On July 17, 2005, the VLBA revealed a new, distinct source of radio emission from the same location.

"As time passed, the new object stayed bright at infrared and radio wavelengths, but not in visible light and X-rays," said Seppo Mattila, of the University of Turku in Finland, another author on the new paper. "The most likely explanation is that thick interstellar gas and dust near the galaxy's center absorbed the X-rays and visible light, then re-radiated it as infrared." The researchers used the Nordic Optical Telescope on the Canary Islands and NASA's Spitzer to follow the object's infrared emission.

Continued observations with the VLBA, the European VLBI Network (EVN), and other radio telescopes, carried out over nearly a decade, showed



An image of the galaxy Arp299B, which is undergoing a merging process with Arp299A (the galaxy to the left), captured by NASA's Hubble space telescope. The inset features an artist's illustration of a tidal disruption event (TDE), which occurs when a star passes fatally close to a supermassive black hole. A TDE was recently observed near the center of Arp299B. Credit: Sophia Dagnello, NRAO/AUI/NSF; NASA, STScI

the source of radio emission expanding in one direction, just as expected for a jet. The measured expansion indicated that the material in the jet moved at an average of one-fourth the speed of light. The radio waves are not absorbed by the dust, but pass through it.

These observations used multiple radio-telescope antennas, separated by thousands of miles, to gain the resolving power, or ability to see fine detail, required to detect the expansion of an object so distant.

Monster appetite

Most galaxies have supermassive black holes, containing millions to billions of times the mass of the Sun, at their cores. In a black hole, the mass is so concentrated that its gravitational pull is so strong that not even light can escape. When those supermassive black holes are actively drawing in material from their surroundings, that material forms a rotating disk around the black hole, and super-fast jets of particles are launched outward. This is the phenomenon seen in radio galaxies and quasars.

"Much of the time, however, supermassive black holes are not actively devouring anything, so they are in a quiet state," Perez-Torres explained. "Tidal disruption events can provide us with a unique opportunity to advance our understanding of the formation and evolution of jets in the vicinities of these powerful objects."

"Because of the dust that absorbed any visible light, this particular tidal disruption event may be just the tip of the iceberg of what until now has been a hidden population," Mattila said. "By looking for these events with infrared and radio telescopes, we may be able to discover many more, and learn from them."

Such events may have been more common in the distant universe, so studying them may help scientists understand the environment in which galaxies developed billions of years ago.

The discovery, the scientists said, came as a surprise. The initial infrared burst was discovered as part of a project that sought to detect supernova explosions in such colliding pairs of galaxies. Arp 299 has seen numerous stellar explosions, and has been dubbed a "supernova factory." This new object originally was considered to be a supernova explosion. Only in 2011, six years after discovery, the radio-emitting portion began to show an elongation. Subsequent monitoring showed the expansion growing, confirming that what the scientists are seeing is a jet, not a supernova.

Mattila and Perez-Torres led a team of 36 scientists from 26 institutions around the world in the observations of Arp 299. They published their findings in the June 14 issue of the journal Science.

The Long Baseline Observatory is a facility of the National Science Foundation, operated under cooperative agreement by Associated Universities, Inc. NASA's Jet Propulsion Laboratory, Pasadena, California, manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at Caltech in Pasadena. Spacecraft operations are based at Lockheed Martin Space Systems Company, Littleton, Colorado. Data are archived at the Infrared Science Archive housed at IPAC at Caltech. Caltech manages JPL for NASA.

The Hubble Space Telescope is a project of international cooperation between NASA and ESA (European Space Agency). NASA's Goddard Space Flight Center in Greenbelt, Maryland, manages the telescope. The Space Telescope Science Institute (STScI) in Baltimore conducts Hubble science operations. STScI is operated for NASA by the Association of Universities for Research in Astronomy, Inc., in Washington.

For more information about NASA's Hubble Space Telescope, visit:

https://www.nasa.gov/hubble

For more information about NASA's Spitzer Space Telescope, visit:

https://www.nasa.gov/spitzer

From the Archives: June, 1976

THE PRAIRIE ASTRONOMER

Volume 16, Number 8 June 29, 1976

PRESIDENT'S REPORT SETS DATE FOR 1976 EDITION OF STAR PARTY/PICNIC

(As told to Lee Thomas)

What with camping club meets, Old Settlers Picnics, and a daughter's wedding, your president hasn't had time to do much more than notice some fine, clear skies from June 18-21. A few club members have been out to take advantage of the superb viewing --and I hope more had an opportunity to take to the telescopes on their own. These nights were some of the best in a season that has so far been a cloud watcher's delight.

(Editor's note: The so - called "drought cycle", which has been theoretically tied to the sunspot cycle is supposedly due to reach its peak this year and next. Did you notice, in an otherwise very dry year, how the solar outburst that produced bright auroral displays in late March was followed by a period of heavy rains in Nebraska--some of the best we've had in several years? And now, that the sun has settled down again, the farmers are back to wondering when the next thunderhead might yield a few drops. Cause and effect? Or just coincidence?)

Dr. Robert Manthey and Earl Moser took their telescopes out to Milford for the Lincoln Police Department boys camp on June 9th. This is a regular yearly affair sponsored by the department for kids with special problems--and it gives some of them their first look through a telescope. Earl reports there was a fine full moon for them to see.

The club picnic and star party is scheduled for Saturday night, August 28. Unlike previous years, this one is to be held a week after the new moon, since the new moon falls during the Astronomy League Convention in Kutztown, Pennsylvania. Since we want to encourage any member who can to attend the convention, we don't want to schedule our club's yearly festival at the same time. Hence, the one- week delay. There will, of course, be more about the picnic in future newsletters. But now you can mark your calendar.

Date for the next Gateway sky show is July 8. We still need more telescopes and their owners to show the public what astronomy is all about.

JUNE MEETING SET FOR THE 29TH

The June meeting will be held at Olin Hall, Nebraska Wesleyan, June 29, at 7:30 p.m.

Program Chairman Jack Dunn is presenting "Spectrum: The Science Fiction Universe", a tape/ slide show. This planetarium program was originally presented about 2 years ago at Mueller Planetarium, but has been updated with many new slides since its debut.

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: David Pennington
10 inch Meade Dobsonian: Lee Taylor
13 inch Truss Dobsonian: Available

CLUB APPAREL

Order club apparel from cafepress.com:

Shop through Amazon Smile to automatically donate to PAC:

CLUB OFFICERS

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