September 2010

THE SPECTROGRAM

Newsletter for the Society of Telescopy, Astronomy, and Radio

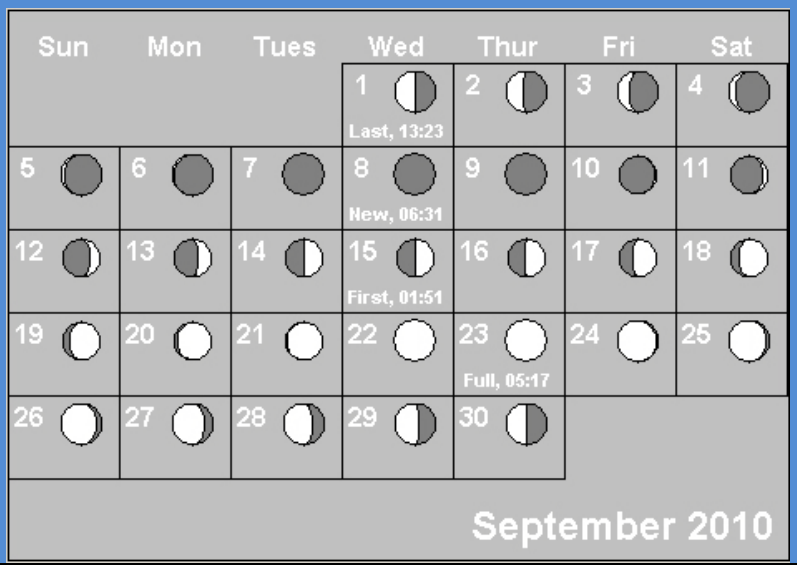
Inside this Issue:

September Meeting

The next meeting of S*T*A*R will be on Thursday, September 2nd, 2010 and will feature Dr. Steve Walters who will speak about "A Long Time Ago – The 3C273 Story". All are welcome. The meeting will begin promptly at 8:00pm at the Monmouth Museum on the Brookdale Community College campus.

Calendar

- Sep 2, 2010 – "A Long Time Ago – The 3C273 Story" presented by Dr. Steve Walters
- Oct 7, 2010 – TBA
- Nov 4, 2010 – "Teeter and His Telescopes: 8 years, 72 Scopes, and a Thousnad Stories" presented by Rob Teeter



October Issue

Please submit articles and contributions for the next *Spectrogram* by September 26. Please email to fowler@verizon.net.

June Meeting Minutes

The June 3rd, 2010 meeting of S*T*A*R Astronomy Club began at 8:05 p.m. This was the annual business meeting. There were 26 members in attendance. President Nancy McGuire chaired the meeting.

The evening began with Robert Katz presenting "Object of the Month." Robert presented the Leo Trio, the Virgo Cluster and Comma Cluster.

Nancy began by urging members to assist with finding speakers for the upcoming year or personally doing a presentation.

She then continued by reviewing the State of Star. She noted the following:

- Star has 58 members (9 people are part of family memberships)
- The club owned telescopes are in good shape and ready for use.
- The club did 5 star parties
- Members should utilize the 25 inch Obsession more.
- An upcoming meeting will have a tutorial on using the web site.

Nancy then noted her main goals as president are to:

1.) Get members observing more. (She noted the start of the observing committee and use of Doorbrook Park)
2.) Link the club more with Brookdale by getting students and professors aware of our presence.
   - Dave Britz suggested we do a star party for the students

Nancy then did "The Year in Review." She noted our eight speakers, the club picnic, the winter social and star parties.

Dennis O'Leary then gave us the NASA update. Dennis discussed his trip to the JPL open house where 20,000 people attended. He also gave us updates on various NASA missions including one that found water on the moon.

Next up was the Treasury report by Treasurer Rob Nunn. (Copies of the report can be had elsewhere and will not be included here.) During Rob's report a motion was made that the BOD be allowed to approve expenditures for such items as membership in the Astronomical League without a general membership vote. It was passed unanimously, save one.

The club then debated rejoining the IDA. After much discussion it was decided that in September someone would investigate whether the IDA is achieving their goals and worth our contribution.

Dave Britz then presented a video that appeared on public TV about a star party he and other members did in April.

Nancy then handed out Certificates of Appreciation to members who especially contributed to the club and its activities. The awards given were to: Dennis O'Leary-NASA Updates, Frank Loso-Object of the Month, Anne Silverman-refreshments, Steve Fedor-picnic, Bob Fowler-Spectrogram publisher, Gavin Warnes-finding speakers, Jay Respler-refreshments, Mike Lindner-Web Master, Ken Legal-being a guest speaker, Mike Sullivan-Object of the Month, Ahmad Jrad-Observing Committee chair, Rich Gaynor-Outreach committee, Doug Berger-dark cycles, Dave Britz- being a guest speaker. Bob Katz- being a guest speaker, Dan Pontone-member at Large, Steve Fedor-club secretary, Rob Nunn-Club Treasurer, Rich Gaynor-Club V.P., Dennis O'Leary received a MVP award for all his special help and received a book titled "Cosmos Field Guide."

Nancy then received a hearty round of applause for all her hard work and outstanding accomplishments as our president. THANK YOU Nancy!

Ahmad Jrad then reviewed the successes of the Observing Committee while noting we've been hindered by bad weather.

Gavin Warnes then suggested we consider our options regarding the 25 inch Obsession which included selling it and using the funds for other astro equipment. The issue will be considered further in September.

Next up were the elections for club officers. A quorum was acknowledged. The slate was:

Nancy McGuire-President
Rich Gaynor- Vice president
Rob Nunn- Treasurer
Steve Fedor- Secretary
Dave Britz- Member at Large

Steve Rich made a motion to accept the slate. Dave Britz seconded the motion. The officers were elected unanimously.

The club then voted to keep the spending limit of the board of directors at $250. Bob Katz made the motion. It was seconded by Dave Britz. The motion was passed unanimously.

The club again then discussed whether to rejoin the IDA. Rather than voting, it was again decided to designate someone to investigate the success of the IDA and whether the club should rejoin.

Ahmad Jrad made a motion to have a student membership priced at $15. Ken legal seconded the motion. It was passed unanimously. Rob Nunn noted we would need a change in the by-laws to incorporate this.

Next the club picnic was discussed. A tentative date of July 31 was discussed at the usual Bucks Mills recreation Area in Colts neck. However the parks department is now charging a $50. usage fee. Also the Fire Department requires a $42. permit if we use the grills. Another option is to use the Bayonet Farm site for which the club has done numerous presentations and star parties.

It was decided that Steve Fedor will chair the picnic committee and would investigate. The following members volunteered to be on the picnic committee: Jay Respler, Anne Silverman, Bob Fowler, Russ Drum, Ken Legal, John Armata.

Dan Pontone suggested the club delete the former members from the web site.

Gavin Warnes discussed his trip to the World Science Festival at battery Park in NYC.

The meeting was adjourned at 10:32 p.m.

Are you a S*T*A*R Member?

S*T*A*R is the proud owner of a monstrous 25” Dobsonian Obsession reflector – which members can gain access to!

Meetings are the first Thursday of each month, except July and August, at 8:00 PM at the Monmouth Museum on the Brookdale Community College campus. Meetings generally consist of lectures and discussions by members or guest speakers on a variety of interesting astronomical topics. S*T*A*R is a member of United Astronomy Clubs of New Jersey (UACNJ), the Astronomical League (AL), and the International Dark Sky Association (IDA).

Memberships: ( )Individual....$25 ( ) Family...$35

Name_____

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Make checks payable to: S*T*A*R Astronomy Society, Inc. and mail to P.O. Box 863, Red Bank, NJ 07701

Observing with a Cooled Stellacam 3 Video Camera

By Ernie Rossi

May 10, 2010, at Chiefland Astronomy Village I set up hoping for a great night of observing. I was using my C 11 mounted on a CGEM equatorial mount and using my Stellacam 3 cooled video camera. I use an 80 mm guide scope for guiding plus an 8 x 50 finder and Telrad for alignment. Since the Stellacam 3 has an unlimited exposure setting I use auto-guiding with an Orion Star Shoot camera for exposures over 50 seconds. Instead of the controller with a wire I use the remote controller because it doesn't have a wire and has far better controls. I can dial any amount of seconds or change it while the countdown is going, the same for the gain. I use the Speco 9" monitor with manual controls - which has both black and white and color settings. The monitor delivers very sharp images and the manual brightness and contrast controls are excellent. For the C 11 the Meade 3.3 focal reducer which seems to work best on many deepsky objects. I also observe with a CPC 1100 that has a Hyperstar 3 setup for a focal ratio of F/2 for fast deep wide field views.

For taking images I have attached to the output of my monitor an Aver TV media frame grabber which connects into my laptop. I usually take 5-20 images of an object and later on stack them using Deepsky Stacker and further process them with Image Plus and Photoshop. I've always have had a problem with losing data going from analog to digital and that has not changed. However, because I can guide longer and stack and process my images they have become almost as good as what I see on my monitor. My monitor images are also far deeper and better because the mount and auto-guiding system keep the images pinpoint. I also found that the cooled unit can be set on a higher gain and still have less noise then one that isn't cooled, making it possible to pull in more detail and keep the noise to a minimum.

I started to observe around 9:30 p.m. until about 3:00 am when the sky started to deteriorate. From midnight to about 1:30 a.m. we also had quite a lot of cloud cover but I still managed about 30 objects. M 95, M 96, M 97, M109 M 63, M 64 M 51, M 106, M 100 M 101 M 88, M 90, M 83 M 104 NGC 3396, NGC 4038, NGC 4565, NGC 4568, NGC 4631, NGC 5128 Centaurus A, NGC 5139 Omega Centauri, NGC 5907, M 17, M 20, M 8, M 16, Hickson 79, and Hickson 92.

For the bright easy objects, I didn't need much exposure to really bring that object out like M 17, 8, 16, 20, Omega Centauri. M 63 the Sun flower galaxy was just amazing showing the spiral arms with all the petals and I have some excellent images. Instead of long exposures taking hours, this only took seconds to show great detail. M 104 the Sombrero galaxy in Virgo was just like a CCD image one of the best I've seen and it only took a minute. I was going past 60 seconds on this object. The object I did over 60 second exposures like M 83, Hickson 79, and Hickson 92 I would auto-guide for better tracking.

M 101 is a very large spiral galaxy, but visually difficult to detect many arms. C 11, 5 30 second exposures, Stellacam3.

In Hickson 79 all 6 galaxies were not only visible but showing detail. Two are at magnitude 16.7, but far dimmer galaxies were also visible. On Hickson 92 also known as Stephan Quintet all 5 galaxies were visible showing swirls and clouds of gas around them. On M 83 the more exposure I dialed in the more depth and detail popped out, I just kept saying WOW.

M 51 just looked incredible; the face on spiral arms, bridge, NGC 5194 companion and intricate detail were so easy to see. This is probably one of the most beautiful galaxies to observe and viewing it on a monitor with good tracking and 45-60+ seconds will knock you off your feet, it's like a Hubble photo. Not only did this galaxy NGC 4565 cover my screen from end to end but lots of detail could be seen in the dark dust lane and I've only seen this with larger telescopes with long exposures.

My usual processing technique is pretty simple and fast especially since this in black and white.

1.) I usually take 5-20 images and vary my exposure times depending on the object. For dim objects and to pull out more detail I will auto-guide 90-180 seconds or more since tracking is never perfect without it. Going several minutes makes a big difference in performance.
2.) I use Deepsky Stacker for stacking all my images. I can use Image Plus but I find Deepsky Stacker for me is easier.
3.) Photoshop I will use Levels and curves and maybe brightness and contrast.
4.) Image Plus- I use Background contrast and stretch selecting exp (darker) if needed.
5.) Image Plus- Local select standard smoothing and noise reduction (neighborhood).
6.) Image Plus- Multi resolution sharpening just slightly on finest level.
7.) Image Plus – Under Point click on “Star size and halo reduction. Enable all sliders and move them to the right until you think your stars are small enough. The Stellacam bloats the stars somewhat and reducing them improves the image.

Many video observers just view on their monitors and don’t do imaging for various reasons, but even though data can be lost from analog to digital to me, it’s still worth it. My images I believe are as good as many starters CCD images that take far longer imaging and processing. If you want to see deepsky images that far surpass your visible images through an eyepiece in any given telescope, the Stellacam 3, can certainly do it. You can also do some great photography if you so chose.

Video astronomy I believe is closer to observing visually compared to using a DSLR or CCD camera. So for those observers who want to see a lot more without spending a fortune on a much larger telescope and don’t care about color, I can wholeheartedly recommend the Stellacam 3.

WISE Captures the Unicorn's Rose

By Whitney Clavin, Jet Propulsion Laboratory

Unicorns and roses are usually the stuff of fairy tales, but a new cosmic image taken by NASA's Wide-field Infrared Explorer (WISE) shows the Rosette nebula located within the constellation Monoceros, or the Unicorn.

This flower-shaped nebula, also known by the less romantic name NGC 2237, is a huge star-forming cloud of dust and gas in our Milky Way galaxy. Estimates of the nebula's distance vary from 4,500 to 5,000 light-years away.

At the center of the flower is a cluster of young stars called NGC 2244. The most massive stars produce huge amounts of ultraviolet radiation, and blow strong winds that erode away the nearby gas and dust, creating a large, central hole. The radiation also strips electrons from the surrounding hydrogen gas, ionizing it and creating what astronomers call an HII region.

Although the Rosette nebula is too faint to see with the naked eye, NGC 2244 is beloved by amateur astronomers because it is visible through a small telescope or good pair of binoculars. The English astronomer John Flamsteed discovered the star cluster NGC 2244 with a telescope around 1690, but the nebula itself was not identified until John Herschel (son of William Herschel, discoverer of infrared light) observed it almost 150 years later.

The streak seen at lower left is the trail of a satellite, captured as WISE snapped the multiple frames that make up this view.

This image is a four-color composite created by all four of WISE's infrared detectors. Color is representational: blue and cyan represent infrared light at wavelengths of 3.4 and 4.6 microns, which is dominated by light from stars. Green and red represent light at 12 and 22 microns, which is mostly light from warm dust.

A new image taken by NASA's Wide-field Infrared Explorer (WISE) shows the Rosette nebula located within the constellation Monoceros, or the Unicorn. This flower-shaped nebula, also known by the less romantic name NGC 2237, is a huge star-forming cloud of dust and gas in our Milky Way galaxy. Estimates of the nebula's distance vary from 4,500 to 5,000 light-years away. Image credit: NASA/JPL-Caltech/UCLA

JPL manages the Wide-field Infrared Survey Explorer for NASA's Science Mission Directorate, Washington. The principal investigator, Edward Wright, is at UCLA. The mission was competitively selected under NASA's Explorers Program managed by the Goddard Space Flight Center, Greenbelt, Md. The science instrument was built by the Space Dynamics Laboratory, Logan, Utah, and the spacecraft was built by Ball Aerospace & Technologies

Corp., Boulder, Colo. Science operations and data processing take place at the Infrared Processing and Analysis Center at the California Institute of Technology in Pasadena. Caltech manages JPL for NASA. More information is online at http://www.nasa.gov/wise and http://wise.astro.ucla.edu .

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Pulverized Planet Dust May Lie Around Double Stars

By Whitney Clavin , Jet Propulsion Laboratory

PASADENA, Calif. -- Tight double-star systems might not be the best places for life to spring up, according to a new study using data from NASA's Spitzer Space Telescope. The infrared observatory spotted a surprisingly large amount of dust around three mature, close-orbiting star pairs. Where did the dust come from? Astronomers say it might be the aftermath of tremendous planetary collisions.

"This is real-life science fiction," said Jeremy Drake of the Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass. "Our data tell us that planets in these systems might not be so lucky -- collisions could be common. It's theoretically possible that habitable planets could exist around these types of stars, so if there happened to be any life there, it could be doomed."

Drake is the principal investigator of the research, published in the Aug.19 issue of the Astrophysical Journal Letters.

The particular class of binary, or double, stars in the study are about as snug as stars get. Named RS Canum Venaticorums, or RS CVns for short, they are separated by only about two million miles (3.2 million kilometers), or two percent of the distance between Earth and our sun. The stellar pairs orbit around each other every few days, with one face on each star perpetually locked and pointed toward the other.

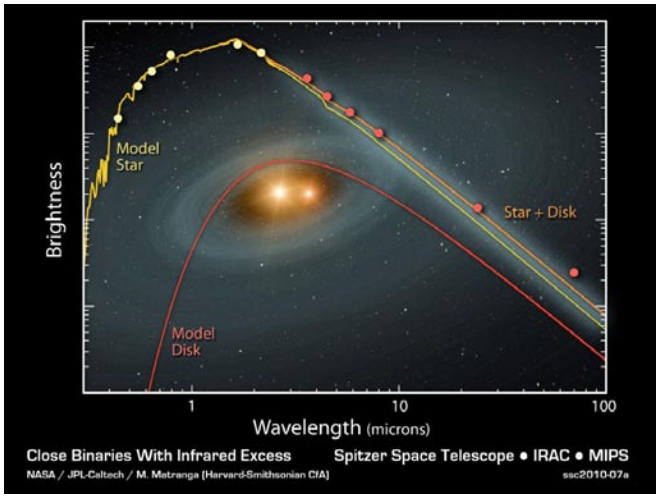
The close-knit stars are similar to the sun in size and are probably about a billion to a few billion years old -- roughly the age of our sun when life first evolved on Earth. But these stars spin much faster, and, as a result, have powerful magnetic fields, and giant, dark spots. The magnetic activity drives strong stellar winds -- gale-force versions of the solar wind -- that slow the stars down, pulling the twirling duos closer over time. And this is where the planetary chaos may begin.

As the stars cozy up to each other, their gravitational influences change, and this could cause disturbances to planetary bodies orbiting around both stars. Comets and any planets that may exist in the systems would start jostling about and banging into each other, sometimes in powerful collisions. This includes planets that could theoretically be circling in the double stars' habitable zone, a region where temperatures would allow liquid water to exist. Though no habitable planets have been discovered around any stars beyond our sun at this point in time, tight double-star systems are known to host planets; for example, one system not in the study, called HW Vir, has two gas-giant planets.

Before the Smashup
This artist's concept illustrates an imminent planetary collision around a pair of double stars. NASA's Spitzer Space Telescope found evidence that such collisions could be common around a certain type of tight double, or binary, star system, referred to as RS Canum Venaticorums or RS CVns for short. The stars are similar to the sun in age and mass, but they orbit tightly around each other. With time, they are thought to get closer and closer, until their gravitational influences change, throwing the orbits of planetary bodies circling around them out of whack. Astronomers say that these types of systems could theoretically host habitable planets, or planets that orbit at the right distance from the star pairs to have temperatures that allow liquid water to exist. If so, then these worlds might not be so lucky. They might ultimately be destroyed in collisions like the impending one illustrated here, in which the larger body has begun to crack under the tidal stresses caused by the gravity of the approaching smaller one. Spitzer's infrared vision spotted dusty evidence for such collisions around three tight star pairs. In this artist concept's, dust from ongoing planetary collisions is shown circling the stellar duo in a giant disk. Image credit: NASA/JPL-Caltech

"These kinds of systems paint a picture of the late stages in the lives of planetary systems," said Marc Kuchner, a co-author from NASA Goddard Space Flight Center in Greenbelt, Md. "And it's a future that's messy and violent."

Spitzer spotted the infrared glow of hot dusty disks, about the temperature of molten lava, around three such tight binary systems. One of the systems was originally flagged as having a suspicious excess of infrared light in 1983 by the Infrared Astronomical Satellite. In addition, researchers using Spitzer recently found a warm disk of debris around another star that turned out to be a tight binary system.



Spectral Signatures of Planetary Doom
This plot of data from NASA's Spitzer Space Telescope tells astronomers that a dusty planetary smashup probably occurred around a pair of tight twin, or binary, stars. The stars are similar to the sun in mass and age, but they orbit very closely around each other. With time, they get closer and closer, until the gravitational harmony in the system is thrown out of whack. Planetary bodies -- planets, asteroids and comets -- are thought to migrate out of their stable orbits, and smash together. Spitzer's cameras, which take pictures at different infrared wavelengths, observed the signatures of dust around three close binary systems. Data for one of those systems are shown here in orange. Models for the stars and a surrounding dusty disk are shown in yellow and red, respectively. The disk reveals that some sort of chaotic event -- probably a planetary collision -- must have generated the dusty disk. Image credit: NASA/JPL-Caltech/Harvard-Smithsonian CfA

The astronomy team says that dust normally would have dissipated and blown away from the stars by this mature stage in their lives. They conclude that something -- most likely planetary collisions -- must therefore be kicking up the fresh dust. In addition, because dusty disks have now been found around four, older binary systems, the scientists know that the observations are not a fluke. Something chaotic is very likely going on.

If any life forms did exist in these star systems, and they could look up at the sky, they would have quite a view. Marco Matranga, first author of the paper, from the Harvard-Smithsonian Center for Astrophysics and now a visiting astronomer at the Palermo Astronomical Observatory in Sicily, said, "The skies there would have two huge suns, like the ones above the planet Tatooine in 'Star Wars.'"

Other authors include V.L. Kashyap of the Harvard-Smithsonian Center for Astrophysics; and Massimo Marengo of Iowa State University, Ames.

The Spitzer observations were made before it ran out of its liquid coolant in May 2009, officially beginning its warm mission.

NASA's Jet Propulsion Laboratory, Pasadena, Calif., manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology, also in Pasadena. Caltech manages JPL for NASA. For more information about Spitzer, visit http://spitzer.caltech.edu/ and http://www.nasa.gov/spitzer .

The Infrared Astronomical Satellite, known commonly by its acronym, IRAS, was a joint project between NASA, the Netherlands and the United Kingdom.

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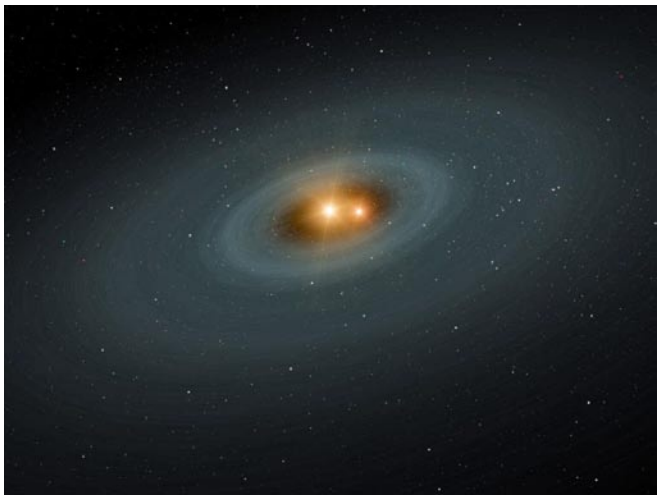

Circle of Planetary Ashes
This artist's concept illustrates a tight pair of stars and a surrounding disk of dust -- most likely the shattered remains of planetary smashups. Using NASA's Spitzer Space Telescope, the scientists found dusty evidence for such collisions around three sets of stellar twins (a class of stars called RS Canum Venaticorum's or RS CVns for short). The stars, which are similar to our sun in mass and age, orbit very closely around each other. They are separated by just two percent of the Earth-sun distance. As time goes by, the stars get closer and closer, and this causes the gravitational harmony in the systems to go out of whack. Comets and any planets orbiting around the stars could jostle about and collide. Image credit: NASA/JPL-Caltech

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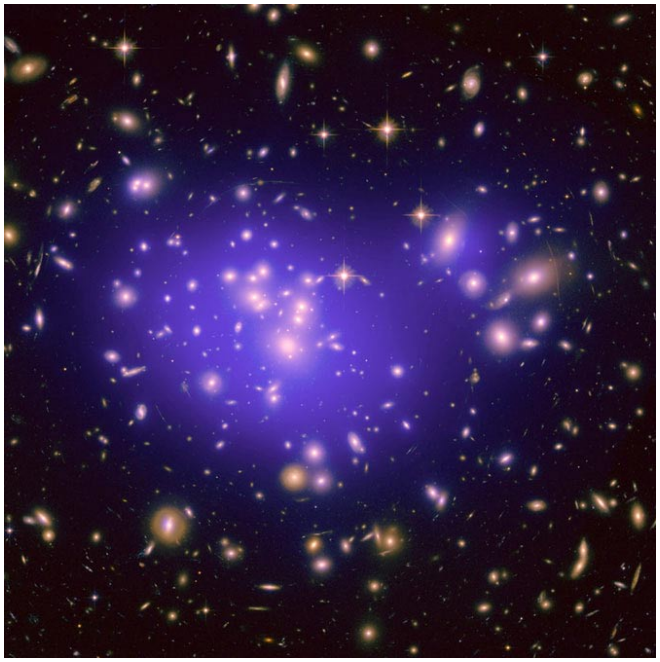
Cosmic Lens Used to Probe Dark Energy for First Time

For the first time, astronomers using NASA's Hubble Space Telescope were able to take advantage of a giant magnifying lens in space -- a massive cluster of galaxies -- to narrow in on the nature of dark energy. Their calculations, when combined with data from other methods, significantly increase the accuracy of dark energy measurements. This

may eventually lead to an explanation of what the elusive phenomenon really is.

"We have to tackle the dark energy problem from all sides," said Eric Jullo, an astronomer at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "It's important to have several methods, and now we've got a new, very powerful one." Jullo is lead author of a paper on the findings appearing in the Aug. 20 issue of the journal Science.

Scientists aren't clear about what dark energy is, but they do know that it makes up a large chunk of our universe -- about 72 percent. Another chunk, about 24 percent, is thought to be dark matter, also mysterious in nature but easier to study than dark energy because of its gravitational influence on matter that we can see. The rest of the universe, a mere four percent, is the stuff that makes up people, planets, stars and everything made up of atoms.



This image from NASA's Hubble Space Telescope shows the inner region of Abell 1689, an immense cluster of galaxies located 2.2 billion light-years away. The cluster's gravitational field is warping light from background galaxies, causing them to appear as arcs. The effect is similar to what happens when you look into a fun house mirror. Dark matter in the cluster, which represents about 80 percent of its mass, is mapped by plotting these arcs. Dark matter cannot be photographed, but its distribution is shown in the blue overlay. The dark matter distribution is then used to better understand the nature of dark energy, a pressure that is accelerating the expansion of the universe. The natural-color photo was taken with Hubble's Advanced Camera for Surveys.

In their new study, the science team used images from Hubble to examine a massive cluster of galaxies, named Abell 1689, which acts as a magnifying, or gravitational, lens. The gravity of the cluster causes galaxies behind it to be imaged multiple times into distorted shapes, sort of like a fun house mirror reflection that warps your face.

Using these distorted images, the scientists were able to figure out how light from the more distant, background galaxies had been bent by the cluster -- a characteristic that depends on the nature of dark energy. Their method also depends on precise ground-based measurements of the distance and speed at which the background galaxies are traveling away from us. The team used these data to quantify the strength of the dark energy that is causing our universe to accelerate.

"What I like about our new method is that it's very visual," said Jullo. "You can literally see gravitation and dark energy bend the images of the background galaxies into arcs."

According to the scientists, their method required multiple, meticulous steps. They spent the last several years developing specialized mathematical models and precise maps of the matter -- both dark and "normal" -- constituting the Abell 1689 cluster.

"We can now apply our technique to other gravitational lenses," said co-author Priya Natarajan, a cosmologist at Yale University, New Haven, Conn. "We're exploiting a beautiful phenomenon in nature to learn more about the role that dark energy plays in our universe."

Other authors of the paper include Jean-Paul Kneib and Carlo Schimd of the Université de Provence, France; Anson D'Aloisio of Yale University; Marceau Limousin of Université de Provence and University of Copenhagen, Denmark; and Johan Richard of Durham University, United Kingdom.

The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency. NASA's Goddard Space Flight Center in Greenbelt, Md., manages the telescope. The Space Telescope Science Institute, operated for NASA by the Association of Universities for Research in Astronomy, Inc. in Washington, conducts Hubble science operations. More information is online at http://www.nasa.gov/hubble .

The California Institute of Technology in Pasadena manages JPL for NASA. More information is at http://www.jpl.nasa.gov .

NASA's Kepler Mission Discovers Two Planets Transiting Same Star

WASHINGTON -- NASA's Kepler spacecraft has discovered the first confirmed planetary system with more than one planet crossing in front of, or transiting, the same star.

The transit signatures of two distinct planets were seen in the data for the sun-like star designated Kepler-9. The planets were named Kepler-9b and 9c. The discovery incorporates seven months of observations of more than 156,000 stars as part of an ongoing search for Earth-sized planets outside our solar system. The findings will be published in Thursday's issue of the journal Science.

Kepler's ultra-precise camera measures tiny decreases in the stars' brightness that occur when a planet transits them. The size of the planet can be derived from these temporary dips.

The distance of the planet from the star can be calculated by measuring the time between successive dips as the planet orbits the star. Small variations in the regularity of these dips can be used to determine the masses of planets and detect other non-transiting planets in the system.

In June, mission scientists submitted findings for peer review that identified more than 700 planet candidates in the first 43 days of Kepler data. The data included five additional candidate systems that appear to exhibit more than one transiting planet. The Kepler team recently identified a sixth target exhibiting multiple transits and accumulated enough follow-up data to confirm this multi-planet system.

"Kepler's high quality data and round-the-clock coverage of transiting objects enable a whole host of unique measurements to be made of the parent stars and their planetary systems," said Doug Hudgins, the Kepler program scientist at NASA Headquarters in Washington.

Scientists refined the estimates of the masses of the planets using observations from the W.M. Keck Observatory in Hawaii. The observations show Kepler-9b is the larger of the two planets, and both have masses similar to but less than Saturn. Kepler-9b lies closest to the star with an orbit of about 19 days, while Kepler-9c has an orbit of about 38 days. By observing several transits by each planet over the seven months of data, the time between successive transits could be analyzed.

"This discovery is the first clear detection of significant changes in the intervals from one planetary transit to the next, what we call transit timing variations," said Matthew Holman, a Kepler mission scientist from the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass. "This is evidence of the gravitational interaction between the two planets as seen by the Kepler spacecraft."

In addition to the two confirmed giant planets, Kepler scientists also have identified what appears to be a third, much smaller transit signature in the observations of Kepler-9. That signature is consistent with the transits of a super-Earth-sized planet about 1.5 times the radius of Earth in a scorching, near-sun 1.6 day-orbit. Additional observations are required to determine whether this signal is indeed a planet or an astronomical phenomenon that mimics the appearance of a transit.

NASA's Ames Research Center in Moffett Field, Calif., manages Kepler's ground system development, mission operations and science data analysis. NASA's Jet Propulsion Laboratory in Pasadena, Calif., managed Kepler mission development.

Ball Aerospace and Technologies Corp. in Boulder, Colo., developed the Kepler flight system and supports mission operations with the Laboratory for Atmospheric and Space Physics at the University of Colorado in Boulder. The Space Telescope Science Institute in Baltimore archives, hosts and distributes the Kepler science data.

For more information about the Kepler mission, visit: http://www.nasa.gov/kepler

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NASA Telescope Finds Elusive Buckyballs In Space For First Time

WASHINGTON -- Astronomers using NASA's Spitzer Space Telescope have discovered carbon molecules, known as "buckyballs," in space for the first time. Buckyballs are soccer-ball-shaped molecules that were first observed in a laboratory 25 years ago.

They are named for their resemblance to architect Buckminster Fuller's geodesic domes, which have interlocking circles on the surface of a partial sphere. Buckyballs were thought to float around in space, but had escaped detection until now.

"We found what are now the largest molecules known to exist in space," said astronomer Jan Cami of the University of Western Ontario, Canada, and the SETI Institute in Mountain View, Calif. "We are particularly excited because they have unique properties that make them important players for all sorts of physical and chemical processes going on in space."

Cami authored a paper about the discovery that will appear online Thursday in the journal Science.

Buckyballs are made of 60 carbon atoms arranged in three-dimensional, spherical structures. Their alternating patterns of hexagons and pentagons match a typical black-and-white soccer ball. The research team also found the more elongated relative of buckyballs, known as C70, for the first time in space. These molecules consist of 70 carbon atoms and are shaped more like an oval rugby ball. Both types of molecules belong to a class known officially as buckminsterfullerenes, or fullerenes.

The Cami team unexpectedly found the carbon balls in a planetary nebula named Tc 1. Planetary nebulas are the remains of stars, like the sun, that shed their outer layers of gas and dust as they age. A compact, hot star, or white dwarf, at the center of the nebula illuminates and heats these clouds of material that has been shed.

The buckyballs were found in these clouds, perhaps reflecting a short stage in the star's life, when it sloughs off a puff of material rich in carbon. The astronomers used Spitzer's spectroscopy instrument to analyze infrared light from the planetary nebula and see the spectral signatures of the buckyballs. These molecules are approximately room temperature; the ideal temperature to give off distinct patterns of infrared light that Spitzer can detect. According to Cami, Spitzer looked at the right place at the right time. A century from now, the buckyballs might be too cool to be detected.

The data from Spitzer were compared with data from laboratory measurements of the same molecules and showed a perfect match.

"We did not plan for this discovery," Cami said. "But when we saw these whopping spectral signatures, we knew immediately that we were looking at one of the most sought-after molecules."

In 1970, Japanese professor Eiji Osawa predicted the existence of buckyballs, but they were not observed until lab experiments in 1985. Researchers simulated conditions in the atmospheres of aging, carbon-rich giant stars, in which chains of carbon had been detected. Surprisingly, these experiments resulted in the formation of large quantities of buckminsterfullerenes. The molecules have since been found on Earth in candle soot, layers of rock and meteorites.

The study of fullerenes and their relatives has grown into a busy field of research because of the molecules' unique strength and exceptional chemical and physical properties. Among the potential applications are armor, drug delivery and superconducting technologies.

Sir Harry Kroto, who shared the 1996 Nobel Prize in chemistry with Bob Curl and Rick Smalley for the discovery of buckyballs, said, "This most exciting breakthrough provides convincing evidence that the buckyball has, as I long suspected, existed since time immemorial in the dark recesses of our galaxy."

Previous searches for buckyballs in space, in particular around carbon-rich stars, proved unsuccessful. A promising case for their presence in the tenuous clouds between the stars was presented 15 years ago, using observations at optical wavelengths. That finding is awaiting confirmation from laboratory data. More recently, another Spitzer team reported evidence for buckyballs in a different type of object, but the spectral signatures they observed were partly contaminated by other chemical substances.

For more information about Spitzer, visit: http://www.nasa.gov/spitzer

2010 Sept. Celestial Events: supplied by J. Randolph Walton (Randy)

Day	Date	Time (EDT)	Event
Wed	1	13:22	**Last Quarter Moon**
		14:16	Moon Set
Sat	4	06:31	Sunrise
		16:52	Moon Set
		19:27	Sunset
		20:10	Jupiter Rises
		20:25	Saturn Sets
		20:55	Venus Sets
		21:05	Mars Sets
Mon	6	Before 06:00	**Zodiacal Light** visible in E before morning twilight for next two weeks
Wed	8	06:30	**New Moon**
		19:10	Moon Set
Sat	11	05:35	Mercury Rises
		06:37	Sunrise
		19:15	Sunset
		19::35	**Spica, Mars, Venus, and Moon in crooked line low in ev. twilight**
		19:40	Jupiter Rises
		20:02	Saturn Sets
		20:35	Venus Sets
		20:45	Mars Sets
		20:51	Moon Set
Wed	15	01:50	**First Quarter Moon**
		14:47	Moon Rise
Thu	16	19:00	**Lunar Straight Wall visible**
Sat	18	05:15	Mercury Rises
		16:40	Moon Rise
		19:04	Sunset
		19:10	Jupiter Rises, Uranus < 1deg. North
		19:35	Saturn Sets
		20:15	Venus Sets
		20:30	Mars Sets
Wed	22	23:09	**Fall Equinox**
Thu	23	05:17	**Full Moon**
		07:04	Moon Set
Sat	25	05:30	Mercury Rises
		06:30	Jupiter Sets
		06:50	Sunrise
		18:52	Sunset
		19:10	Saturn Sets
		19:36	Moon Rise
		19:55	Venus Sets
		20:15	Mars Sets
Mon	27	20:48	**Moon Rise 2 deg S of Pleiades (M45)**
Thu	30	23:31	Moon Rise
		23:52	**Last Quarter Moon**

In the Eyepiece

Here is a list of objects for this month. This is reproduced from www.skyhound.com with the kind permission of its creator and author of SkyTools Greg Crinklaw.

Object(s)	Class	Con	RA	Dec	Mag
Garnet Star	Multiple Star	Cepheus	21h43m30.5s	+58°46'48"	4.2
Zeta Aqr	Multiple Star	Aquarius	22h28m49.9s	-00°01'12"	3.7
LW Cyg	Multiple Star	Cygnus	21h55m13.8s	+50°29'50"	9.2
M2	Globular Cluster	Aquarius	21h33m28.4s	-00°49'39"	7.3
M15	Globular Cluster	Pegasus	21h30m01.0s	+12°10'12"	7.3
Helix	Planetary Nebula	Aquarius	22h29m38.4s	-20°50'13"	7.6
Humason 1-2	Planetary Nebula	Cygnus	21h33m06.6s	+39°38'17"	12.7
NGC 7139	Planetary Nebula	Cepheus	21h46m08.2s	+63°47'59"	13.0
NGC 7139	Planetary Nebula	Cepheus	21h46m08.2s	+63°47'59"	13.0
Cocoon	Diffuse Nebula	Cygnus	21h53m24.0s	+47°16'00"	10.0
IC 5217	Planetary Nebula	Lacerta	22h23m55.7s	+50°58'00"	12.6
NGC 7094	Planetary Nebula	Pegasus	21h36m53.0s	+12°47'19"	13.7
Stephan's Quintet	Galaxy Group	Pegasus	22h36m00.5s	+33°57'57"	12.0
NGC 7354	Planetary Nebula	Cepheus	22h40m20.9s	+61°17'39"	12.9
NGC 7354	Planetary Nebula	Cepheus	22h40m20.9s	+61°17'39"	12.9
Einstein's Cross	Gravitational Lens	Pegasus	22h40m32.5s	+03°21'48"	17.4