FIRST LIGHT

Journal of the South Bay Astronomical Society – February 2018
on line at http://sbastro.net/
On Facebook at facebook.com/SBAstroSociety
On Yahoo Groups at: https://groups.yahoo.com/neo/groups/SBASTRO/info

Monthly General Meeting: Friday February 2nd 7:30 PM

"Report on the Annual Meeting of the American Astronomical Society"

Dr. Steven Morris, Harbor College

The January 5th Meeting

Ken Rossi gaveled the meeting to open at 7:30 PM and asked if there were any visitors or new members present. A few members talked about recent observing sessions and he then reviewed the upcoming events, including 3 elementary school star parties in the next few weeks. After a brief social break, he then introduced the evening's speaker, SBAS member Ken Munson, and his talk on "Evolution of an Astrophotographer".

Ken began with a short highlight of the basic tools one would need to be an Astrophotographer, a telescope, camera and some device for guiding. He then went on through all the stages of his learning experiences, different equipment he tried and the various levels of success or failure he experienced. Surprisingly, in some cases, things that didn't work quite well for the intended application actually worked very well for something different. A case in point was the Meade DSI. Intended as an astrophotography camera, it turned out to actually be better as a guider when paired with PHD Guiding.

He also pointed out the pitfalls of new equipment and the sometime difficult task of getting the equipment to work with a laptop computer. It was very frustrating to finally have a system that worked very well for both deep-sky and planetary/lunar imaging, only to have it all fail after an upgrade of the laptop software! After having to get some new equipment, he now, again, has a system very capable of doing the different types of astrophotography.

It is hoped that this talk served to help educate any younger members of the club who might be interested in doing astrophotography to, first of all, ask a lot of questions of more experience club members. From that they should be well informed to be able to make the best purchases for their needs and budget and avoid wasteful spending that might result in less than desirable results.

- ***Ken Munson***

This article is provided by NASA Space Place.

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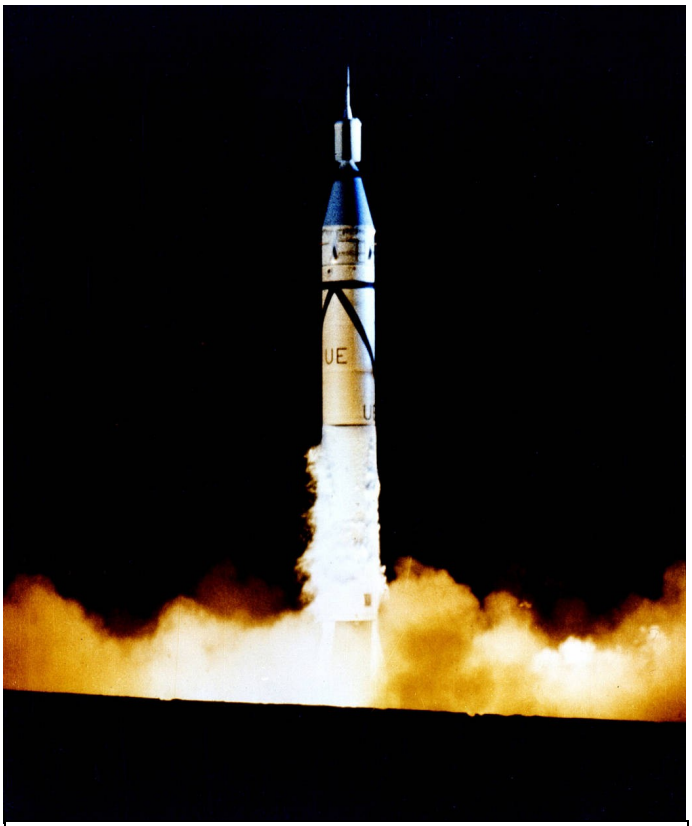
Sixty Years of Observing Our Earth

By Teagan Wall

Satellites are a part of our everyday life. We use global positioning system (GPS) satellites to help us find directions. Satellite television and telephones bring us entertainment, and they connect people all over the world. Weather satellites help us create forecasts, and if there's a disaster—such as a hurricane or a large fire—they can help track what's happening. Then, communication satellites can help us warn people in harm's way.

There are many different types of satellites. Some are smaller than a shoebox, while others are bigger than a school bus. In all, there are more than 1,000 satellites orbiting Earth. With that many always around, it can be easy to take them for granted. However, we haven't always had these helpful eyes in the sky.

The United States launched its first satellite on Jan. 31, 1958. It was called Explorer 1, and it weighed in at only about 30 pounds. This little satellite carried America's first scientific instruments into space: temperature sensors, a microphone, radiation detectors and more.



This photo shows the launch of Explorer 1 from Cape Canaveral, Fla., on Jan. 31, 1958. Explorer 1 is the small section on top of the large Jupiter-C rocket that blasted it into orbit. With the launch of Explorer 1, the United States officially entered the space age.
Image credit: NASA

Explorer 1 sent back data for four months, but remained in orbit for more than 10 years. This small, relatively simple satellite kicked off the American space age. Now, just 60 years later, we depend on satellites every day. Through these satellites, scientists have learned all sorts of things about our planet.

For example, we can now use satellites to measure the height of the land and sea with instruments called altimeters. Altimeters bounce a microwave or laser pulse off Earth and measure how long it takes to come back. Since the speed of light is known very accurately, scientists can use that measurement to calculate the height of a mountain, for example, or the changing levels of Earth's seas.

Satellites also help us to study Earth's atmosphere. The atmosphere is made up of layers of gases that surround Earth. Before satellites, we had very little information about these layers. However, with satellites' view from space, NASA scientists can study how the atmosphere's layers interact with light. This tells us which gases are in the air and how much of each gas can be found in the atmosphere. Satellites also help us learn about the clouds and small particles in the atmosphere, too.

When there's an earthquake, we can use radar in satellites to figure out how much Earth has moved during a quake. In fact, satellites allow NASA scientists to observe all kinds of changes in Earth over months, years or even decades.

Satellites have also allowed us—for the first time in civilization—to have pictures of our home planet from space.

Earth is big, so to take a picture of the whole thing, you need to be far away. Apollo 17 astronauts took the first photo of the whole Earth in 1972. Today, we're able to capture new pictures of our planet many times every day.

Today, many satellites are buzzing around Earth, and each one plays an important part in how we understand our planet and live life here. These satellite explorers are possible because of what we learned from our first voyage into space with Explorer 1—and the decades of hard work and scientific advances since then.

To learn more about satellites, including where they go when they die, check out NASA Space Place: https://spaceplace.nasa.gov/spacecraft-graveyard

SBAS Executive Board

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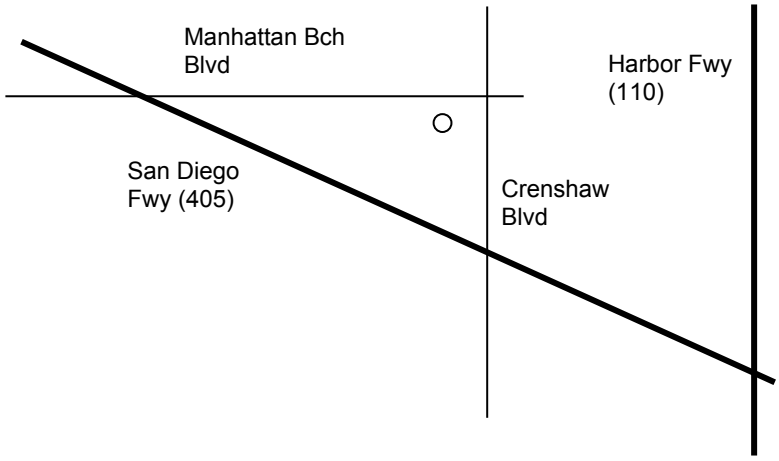
Monthly General Meetings

We normally meet on the first Friday of each month at 7:30 p.m. in the Planetarium at El Camino College (16007 Crenshaw Bl. In Torrance). If the first Friday is on or close to a holiday, we usually defer the meeting until the second Friday of the month. The Planetarium is on the south side of Manhattan Beach Blvd., one block west of Crenshaw Blvd. (near the center of the map at left).

The planetarium is the only round, domed building on campus. There is on-street parking, and we can often use campus parking: check inside to see if you need a FREE parking permit for your car.

We enjoy the planetarium facilities through the courtesy of the El Camino College



Administration, and have several faculty members of the Astronomy Department as members of our Club. Our meetings always include an informal opening, when new attendees are invited to introduce themselves and let us know about their interests in astronomy. Members share their latest news and observations at this time. The rest of the evening is devoted to guest speakers, who range from amateur astronomers to professional astronomers to representatives from local aerospace companies to college professors. We are fortunate to have all these talented people in our area, willing to come and talk to us.

Monthly Planning Meeting

Committee members (and anyone else with an interest in Society activities) meet each month, usually on the Monday following the general meeting. Meetings are sometimes rescheduled due to travel and other circumstances. Exact date and time of each month's meeting will be announced in the monthly meeting. The February planning meeting will be held at the home of TBD.

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SBAS Dues

Month Join/Due	Member (Family) Email Only	Student	Expires
February	$40.00	$25.00	Dec
February	$36.67	$22.92	Dec
March	$33.33	$18.75	Dec
April	$30.00	$20.83	Dec
May	$26.67	$18.75	Dec
June	$23.33	$16.67	Dec
July	$20.00	$14.58	Dec
August	$16.67	$12.50	Dec
September	$13.33	$10.42	Dec
October	$10.00	$8.33	Dec
February	$6.67	$6.25	Dec
February	$3.33	$4.17	Dec

Note to Current U.S. Mail Members: The SBAS Board has decided that it is no longer cost effective to publish and mail out hard copies of the First Light. Since this decision was made after some 2016 renewals for U.S. Mail memberships were received, we will either refund the difference or extend your full 2015 membership though March of 2016.

To simplify the dues, we suggest that all membership expire in December. Dues are $40.00/year ($25.00/year for students) and expire on February 31, of the current year. The First Light is now only available via Email notification and on our web site. New members use Month Join, and current members select your expiring Month to calculate the amount. Members that expire in October or February may wish to write one check and include next year's membership. Make checks payable to the South Bay Astronomical Society. Dues may be paid at the general meeting or mailed to:

South Bay Astronomical Society
Attn: Greg Benecke
P.O. Box 1937
Redondo Beach, CA 90278

SBAS Membership Benefits

Contact Greg Benecke for magazine subscriptions at club rates: "Sky & Telescope" $32.95 and "Astronomy" $34.00/1 year or $60.00/2 years!
Note: S&T subscribers at the club rate renew their subscriptions by mailing their renewal notice and check or calling the 800# on the renewal notice.
Only new subscribers or subscribers converting their subscription to the club rate need to contact Arnie or send a check to the PO Box. Astronomy subscriptions and renewals still go through Arnie or via the PO Box.

Astronomy Technology Today has become a digital only magazine. They have stated that current print subscribers will continue to be able to access digital issues without any cost. New subscribers should check their website for ordering details and subscription costs (www.astronomytechnologytoday.com).

Online Subscribe/Renew Instructions Astronomy Magazine

US Subscription Rate: 1 year/12 Issues…..$34.00
2 years/24 issues….$60.00
3 years/36 Issues….$85.95

This year, there is an additional option for club member to order or renew. If you prefer, you can complete your individual transaction online with a credit card. Please follow the instructions below:

1) Go to www.astronomy.com/promo
2) When prompted for the promotion code, type in your club's unique offer code "RCLUB165" and click the "Get Offer" button.
3) Select the order term (1 year, 2 years, or 3 years).
4) Enter your name, address and credit card information. Please note: you do not need to enter the promotion code a second time on this order page. That entry field can be disregarded.
5) Click on the "Submit" button. You will receive a confirmation page immediately. Please print this page for your records.

If you have any questions, call one of our Customer Service Representatives at 1-800-533-6644, Monday – Friday 8:30 AM – 4:30 PM CT. Outside the US and Canada, please call 262-796-8776.

Astronomical League Observing Clubs

All SBAS members in good standing are also members of the Astronomical League and are eligible to participate in the League's Observing Clubs. The Astronomical League provides many different observing programs (clubs). These programs are designed to provide a direction for your observations and to provide a goal. The programs have certificates and pins to recognize the observers' accomplishments and for demonstrating their observing skills with a variety of instruments and objects. For more information, go to:
http://www.astroleague.org/observing.html.

New Free Astronomy Technology Today Subscription Offer

Astronomy Technology Today offers a free 12-month online subscription for members. Go to the following URL for instructions on how to subscribe: http://www.cnyo.org/2016/02/01/12-free-months-of-astronomy-technology-today-tellem-cnyo-or-your-own-club-sent-you/

Useful and Interesting Astronomy Websites

Website	Description
http://www.calsky.com/	A useful site for planning an evening's star gazing if you don't have your own planetarium software.
https://www.aavso.org/	Information for observers with an interest in tracking variable stars.
http://www.cleardarksky.com/csk/prov/California_clocks.html	Good site to check to know what the weather will be like where you might be planning on going.
http://ssd.jpl.nasa.gov/horizons.cgi	Great site to use when you want to find a new comet or asteroid that isn't already in your planetarium software's list. See the Ephemeris Generator file on the SBAS Yahoo group site for instructions.
http://heavens-above.com	Check this site to find out what satellites may be visible in your sky.
http://www.lunar-occultations.com/iota/iotandx.htm	Website for the International Occultation Timing Association. Good place to find information on asteroid occultations of background stars.
http://pictures.ed-morana.com/ISSTransits/predictions/	Find out when the ISS will transit in front of the Sun or Moon as seen from your location.
http://www.aerith.net/comet/weekly/current.html	Weekly information on bright comets. Good place to learn where there are bright comets to be seen. Refer to the Horizons website above to generate ephemerides.
http://sohowww.nascom.nasa.gov/	See the sun in ways you might never have imagined! You can even create your own movies of the sun in different the different frequencies imaged by the SOHO spacecraft.

Outreach Event

Victor Elementary – Torrance – The day didn't look very promising, with the sky covered in thick heavy clouds throughout most of it. However, satellite imagery showed clear skies coming in behind the clouds. It appeared that the clouds would be mostly gone by sundown. So, club members Larry Kinney, Adam Litman, Greg Benecke, Steve Pedersen, Ken Rossi and Ken Munson set up their scopes on the playground at Victor Elementary. The very brisk cold wind made things a bit uncomfortable but parents and children still braved it for a look through the scopes.

As anticipated, the skies did indeed get mostly cleared by the time the sun set and we were able to give the kids and their families a good tour of the universe. The moon was an obvious early target and many kids expressed whoops of amazement at what it looked like under magnification. As the sky grew darker, more targets became available. Uranus made a nice target for a while, in spite of it not really being very impressive to look at. Most kids were just amazed to be able to see something in our solar system that was so far away.

Other targets included the Great Nebula of Orion, the Double Cluster and some double stars. I set my scope on Iota Cancri, a nice colored double. It was low on the horizon at first and a bit watery but quickly cleared the murk and shone clearly with its blue and orange stars. It was amazing that some people, mostly the children, could see the different colors very clearly while others could not. Many adults were amazed at the idea of stars being gravitationally bound to each other.

The International Space Station made a surprise appearance rising in the west and making a very high pass overhead for about 7 or 8 minutes. Most families were still inside the gym doing some science projects with the kids and so didn't get to see it but those who did really enjoyed it. None had ever seen it before.

In the end it was a very successful star party on a day that didn't look at all promising to begin with.

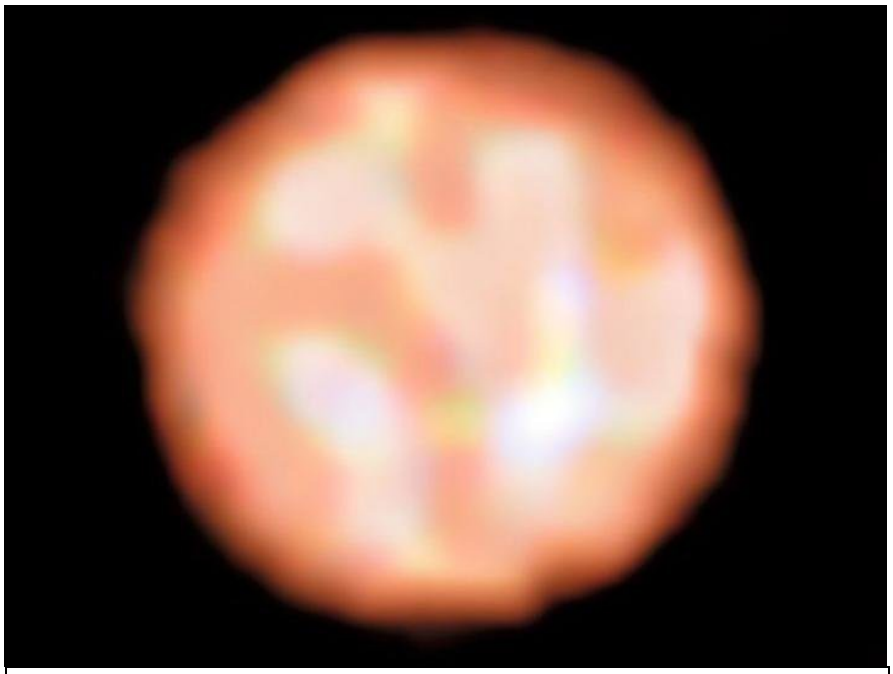
- ***Ken Munson***

Astronomers produce first detailed images of surface of giant star

Science Daily – 23 January 2018 - An international team of astronomers has produced the first detailed images of the surface of a giant star outside our solar system, revealing a nearly circular, dust-free atmosphere with complex areas of moving material, known as convection cells or granules, according to a recent study.

The giant star, named π1Gruis, is one of the stars in the constellation Grus (Latin for the crane, a type of bird), which can be observed in the southern hemisphere. An evolved star in the last major phase of life, π1Gruis is 350 times larger than the Sun and resembles what our Sun will become at the end of its life in five billion years. Studying this star gives scientists insight about the future activity, characteristics and appearance of the Sun.

Convection, the transfer of heat due to the bulk movement of molecules within gases and liquids, plays a major role in astrophysical processes, such as energy transport, pulsation and winds. The Sun has about two million convective cells that are typically 2,000 kilometers across, but theorists believe giant and supergiant stars should only have a few large convective cells because of their low surface gravity. Determining the convection properties of most evolved and supergiant stars, such as the size of granules, has been challenging because their surfaces are frequently obscured by dust.



This is the giant star, 1Gruis. *Credit European Southern Observatory*

In this study, the researchers discovered the surface of the giant star π1Gruis had a complex convective pattern and the typical granule measured 1.2 x 10^11 meters horizontally or 27 percent of the diameter of the star. The findings are published in the journal *Nature*.

"This is the first time that we have such a giant star that is unambiguously imaged with that level of details," said Dr. Fabien Baron, assistant professor in the Department of Physics and Astronomy at Georgia State University. "The reason is there's a limit to the details we can see based on the size of the telescope used for the observations. For this paper, we used an interferometer. The light from several telescopes is combined to overcome the limit of each telescope, thus achieving a resolution equivalent to that of a much larger telescope."

The star π1Gruis was observed with the PIONIER instrument, which has four combined telescopes, in Chile in September 2014. Baron, who specializes in making images, used interferometric data, image reconstruction software and algorithms to compose images of the star's surface. Interferometry is relatively new to astronomy, and Georgia State's Center for High Angular Resolution Astronomy array was the first facility to use interferometry to image a star similar to the Sun in 2007.

This study was also the first to confirm theories about the characteristics of granules on giant stars.
"These images are important because the size and number of granules on the surface actually fit very well with models that predict what we should be seeing," Baron said. "That tells us that our models of stars are not far from reality. We're probably on the right track to understand these kinds of stars."

The detailed images also showed different colors on the star's surface, which correspond to varying temperatures. A star doesn't have the same surface temperature throughout, and its surface provides our only clues to understand its internals. As temperatures rise and fall, the hotter, more fluid areas become brighter colors (such as white) and the cooler, more dense areas become darker colors (such as red).
In the future, the researchers would like to make even more detailed images of the surface of giant stars and follow the evolution of these granules continuously, instead of only getting snapshot images.

North, east, south, west: The many faces of Abell 1758

Science Daily – 18 January 2018 - Resembling a swarm of flickering fireflies, this beautiful galaxy cluster glows intensely in the dark cosmos, accompanied by the myriad bright lights of foreground stars and swirling spiral galaxies. A1758N is a sub-cluster of Abell 1758, a massive cluster containing hundreds of galaxies. Although it may appear serene in this NASA/ESA Hubble Space Telescope image, the sub-cluster actually comprises two even smaller structures currently in the turbulent process of merging.

Although often overshadowed by its more famous cousins -- including the Fornax Cluster and Pandora's Cluster -- Abell 1758 contains more than its fair share of intrigue. The cluster was first identified in 1958, and initially logged as a single massive object. However, some 40 years later the cluster was observed again by the ROSAT satellite X-ray telescope, and astronomers spotted something peculiar: the cluster was not a single concentration of galaxies, but two!

This image from the NASA/ESA Hubble Space Telescope shows the northern part of the galaxy cluster Abell 1758, A1758N. The cluster is approximately 3.2 billion light-years from Earth and is part of a larger structure containing two cluster sitting some 2.4 million light-years apart.
Credit: ESA/Hubble, NASA

Abell 1758 has since been observed many more times by various observatories -- Hubble, NASA's Chandra X-ray Observatory, ESA's XMM-Newton, and more -- and is now known to have both a double structure and a complex history. It contains two massive sub-clusters sitting some 2.4 million light-years apart. These components, known as A1758N (North) and A1758S (South), are bound together by gravity but without showing signs of interacting.

In this Hubble image only the northern structure of the cluster, A1758N, is visible. A1758N is further split into two sub-structures, known as East (A1758NE) and West (A1758NW). There appear to be disturbances within each of the two sub-clusters of A1758A -- strong evidence that they are the result of smaller clusters colliding and merging.

Studies have also revealed a radio halo and two radio relics within Abell 1758. Through Hubble's eyes these radio structures are invisible, but radio telescopes reveal an oddly-shaped halo of emission around the cluster. Radio halos are vast sources of diffuse radio emission usually found around the centres of galaxy clusters. They are thought to form when clusters collide and accelerate fast-moving particles to even higher speeds, implying that clusters with radio halos are still forming and merging.

Collisions such as the one A1758N is undergoing are the most energetic events in the Universe apart from the Big Bang itself. Understanding how clusters merge helps astronomers to understand how structures grow and evolve in the Universe. It also helps them to study dark matter, the intracluster medium and galaxies, and to explore how these three components interact -- particularly during mergers.

This image was taken by Hubble's Advanced Camera for Surveys (ACS) and Wide Field Camera 3 (WFC3) as part of an observing programme called RELICS. The programme is imaging 41 massive galaxy clusters, using them as cosmic lenses to search for bright distant galaxies. These will then be studied in more detail using both current telescopes and the future NASA/ESA/CSA James Webb Space Telescope.

Odd behavior of star reveals lonely black hole hiding in giant star cluster

Science Daily – 17 January 2018 - Astronomers using ESO's MUSE instrument on the Very Large Telescope in Chile have discovered a star in the cluster NGC 3201 that is behaving very strangely. It appears to be orbiting an invisible black hole with about four times the mass of the Sun -- the first such inactive stellar-mass black hole found in a globular cluster and the first found by directly detecting its gravitational pull. This important discovery impacts on our understanding of the formation of these star clusters, black holes, and the origins of gravitational wave events.

Globular star clusters are huge spheres of tens of thousands of stars that orbit most galaxies. They are among the oldest known stellar systems in the Universe and date back to near the beginning of galaxy growth and evolution. More than 150 are currently known to belong to the Milky Way.

Astronomers using ESO's MUSE instrument on the Very Large Telescope in Chile have discovered a star in the cluster NGC 3201 that is behaving very strangely. It appears to be orbiting an invisible black hole with about four times the mass of the sun -- the first such inactive stellar-mass black hole found in a globular cluster. This important discovery impacts on our understanding of the formation of these star clusters, black holes, and the origins of gravitational wave events. This artist's impression shows how the star and its massive but invisible black hole companion may look, in the rich heart of the globular star cluster.
Credit: ESO/L. Calçada

One particular cluster, called NGC 3201and situated in the southern constellation of Vela (The Sails), has now been studied using the MUSE instrument on ESO's Very Large Telescope in Chile. An international team of astronomers has found that one of the stars [1] in NGC 3201 is behaving very oddly -- it is being flung backwards and forwards at speeds of several hundred thousand kilometres per hour, with the pattern repeating every 167 days.

Lead author Benjamin Giesers was intrigued by the star's behaviour: "It was orbiting something that was completely invisible, which had a mass more than four times the Sun -- this could only be a black hole! The first one found in a globular cluster by directly observing its gravitational pull."

The relationship between black holes and globular clusters is an important but mysterious one. Because of their large masses and great ages, these clusters are thought to have produced a large number of stellar-mass black holes -- created as massive stars within them exploded and collapsed over the long lifetime of the cluster.

ESO's MUSE instrument provides astronomers with a unique ability to measure the motions of thousands of far away stars at the same time. With this new finding, the team have for the first time been able to detect an inactive black hole at the heart of a globular cluster -- one that is not currently swallowing matter and is not surrounded by a glowing disc of gas. They could estimate the black hole's mass through the movements of a star caught up in its enormous gravitational pull.

From its observed properties the star was determined to be about 0.8 times the mass of our Sun, and the mass of its mysterious counterpart was calculated at around 4.36 times the Sun's mass -- almost certainly a black hole.

Recent detections of radio and X-ray sources in globular clusters, as well as the 2016 detection of gravitational-wave signals produced by the merging of two stellar-mass black holes, suggest that these relatively small black holes may be more common in globular clusters than previously thought.

Giesers concludes: "Until recently, it was assumed that almost all black holes would disappear from globular clusters after a short time and that systems like this should not even exist! But clearly this is not the case -- our discovery is the first direct detection of the gravitational effects of a stellar-mass black hole in a globular cluster. This finding helps in understanding the formation of globular clusters and the evolution of black holes and binary systems -- vital in the context of understanding gravitational wave sources."

Schedule of Coming Events

Date	Event
2 February Friday Night 7:30PM	**Monthly General Meeting** **Topic: "**Astronomy Update: The American Astronomical Society Meeting of January 2018**"** **Speaker:** Dr. Steven Morris, Harbor College
5 February Monday Night 7:30 PM	**Monthly Planning Meeting** See directions on Page 4.
7 February	**Last Quarter Moon**
10 February	**In Town Dark Sky Observing Session at Ridgecrest Middle School–** 28915 NortbBay Rd. RPV, Weather Permitting**:** Please contact Greg Benecke to confirm that the gate will be opened.
15 February	**New Moon**
15 February	**Galileo Day** See http://www.galileoday.org/ for information.
17 February	**Out of Town Dark Sky Observing Session** Contact Greg Benecke to coordinate a location.
23 February	**First Quarter Moon**

South Bay Astronomical Society

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Next General Meeting at El Camino College Planetarium

Friday, February 2nd 7:30 PM

"Astronomy Update: The American Astronomical Society Meeting of January 2018"

Dr. Steven Morris, Harbor College

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South Bay Astronomical Society
P.O. Box 1937
Redondo Beach, CA 90278