# SIRIUS ASTRONOMER

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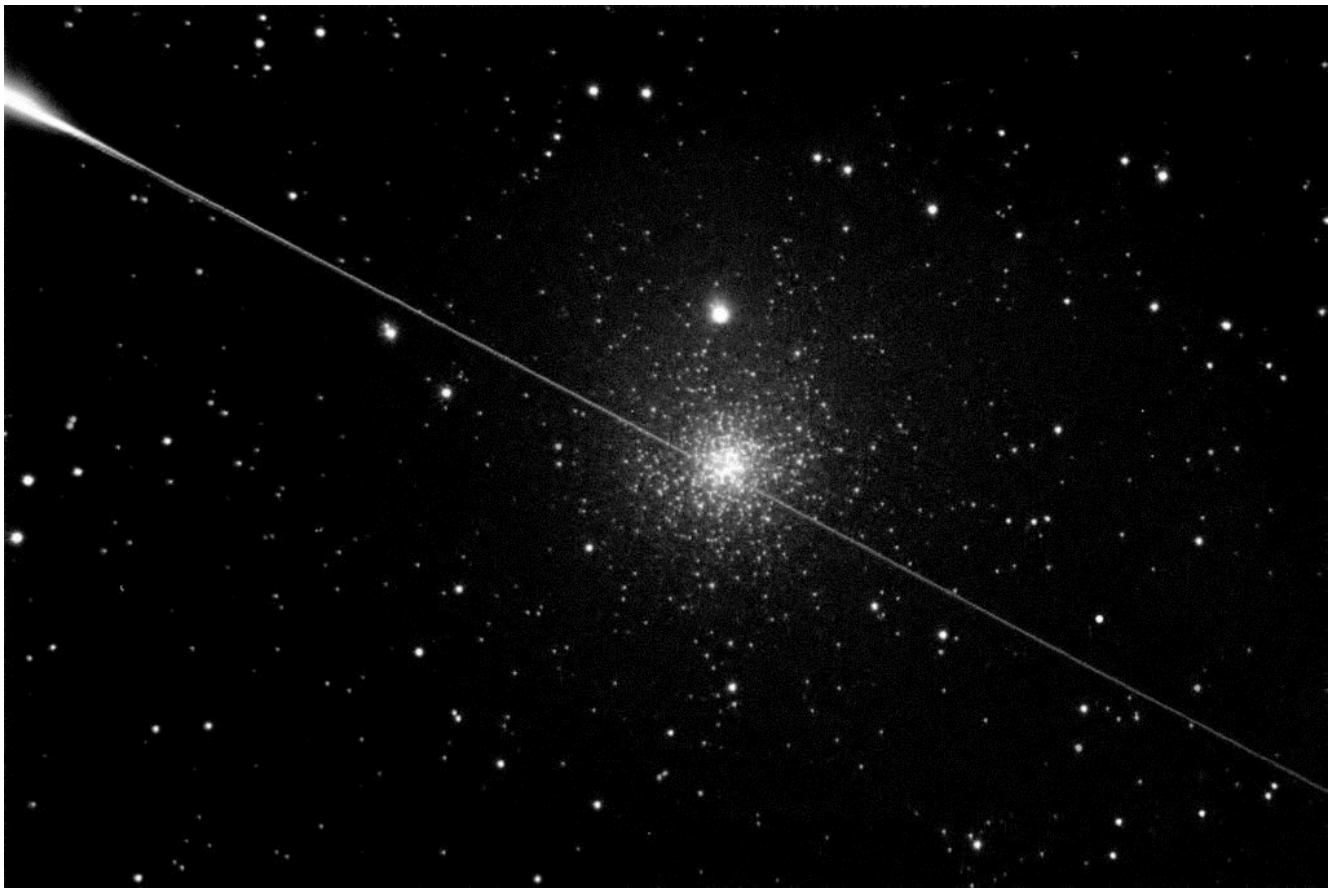
The Newsletter of the Orange County Astronomers

**OCTOBER 2013** *Free to members, subscriptions $12 for 12* **Volume 40, Number 10**


**NOMINATIONS FOR THE 2014 OCA BOARD ARE OPEN! See Page 9**



The tail of a fast-moving transient object, perhaps a bolide, almost perfectly bisects globular cluster NGC 6934 in this image taken on September 18 by Pat Knoll from Kearny Mesa, California. The image consists of a single 2-minute frame taken during a full Moon almost within the light dome of San Diego, thus demonstrating once again that light pollution need not be a barrier to quality astrophotography.

### OCA CLUB MEETING

The free and open club meeting will be held October 11 at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month, Dr. Aaron Barth of UCI will present "Supermassive Black Holes in Active Galaxies: The View from Lick Observatory"

NEXT MEETINGS: November 8, December 13

### STAR PARTIES

The Black Star Canyon site will open on October 26. The Anza site will be open on October 5. Members are encouraged to check the website calendar for the latest updates on star parties and other events.

Please check the website calendar for the outreach events this month! Volunteers are always welcome!

***You are also reminded to check the web site frequently for updates to the calendar of events and other club news.***

### COMING UP

The next session of the Beginners Class will be held at the Heritage Museum of Orange County at 3101 West Harvard Street in Santa Ana on October 4. The following class will be held November 1.

GOTO SIG: TBA
Astro-Imagers SIG: Oct. 15, Nov. 19
Remote Telescopes: TBA
Astrophysics SIG: Sep. 20, Oct. 18, Nov. 15
Dark Sky Group: TBA

# How to hunt for your very own supernova!

By Dr. Ethan Siegel

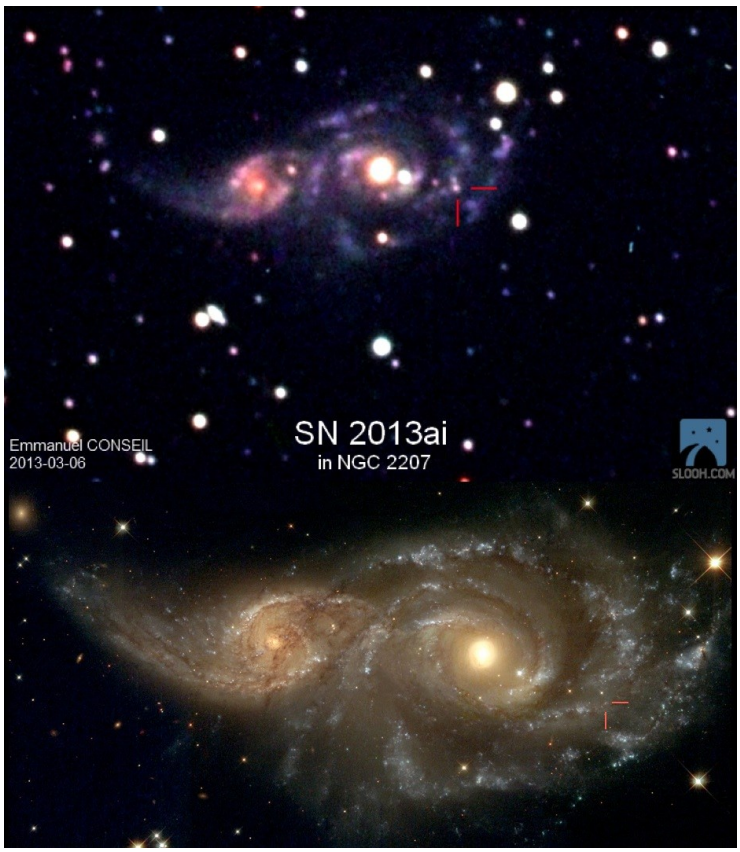
In our day-to-day lives, stars seem like the most fixed and unchanging of all the night sky objects. Shining relentlessly and constantly for billions of years, it's only the long-term motion of these individual nuclear furnaces and our own motion through the cosmos that results in the most minute, barely-perceptible changes.

Unless, that is, you're talking about a star reaching the end of its life. A star like our Sun will burn through all the hydrogen in its core after approximately 10 billion years, after which the core contracts and heats up, and the heavier element helium begins to fuse. About a quarter of all stars are massive enough that they'll reach this giant stage, but the *most* massive ones -- only about 0.1% of all stars -- will continue to fuse leaner elements past carbon, oxygen, neon, magnesium, silicon, sulphur and all the way up to iron, cobalt, and, nickel in their core. For the rare ultra-massive stars that make it this far, their cores become so massive that they're unstable against gravitational collapse. When they run out of fuel, the core implodes.

The inrushing matter approaches the center of the star, then rebounds and bounces outwards, creating a shockwave that eventually causes what we see as a core-collapse supernova, the most common type of supernova in the Universe! These occur only a few times a century in most galaxies, but because it's the most massive, hottest, shortest-lived stars that create these core-collapse supernovae, we can increase our odds of finding one by watching the most actively star-forming galaxies very closely. Want to maximize your chances of finding one for yourself? Here's how.

Pick a galaxy in the process of a major merger, and get to know it. Learn where the foreground stars are, where the apparent bright spots are, what its distinctive features are. If a supernova occurs, it will appear first as a barely perceptible bright spot that wasn't there before, and it will quickly brighten over a few nights. If you find what appears to be a "new star" in one of these galaxies and it checks out, report it *immediately*; you just might have discovered a new supernova!

This is one of the few cutting-edge astronomical discoveries well-suited to amateurs; Australian Robert Evans holds the all-time record with 42 (and counting) original supernova discoveries. If you ever find one for yourself, you'll have seen an exploding star whose light traveled millions of light-years across the Universe right to you, and you'll be the *very first* person who's ever seen it!




SN 2013ai, via its discoverer, Emmanuel Conseil, taken with the Slooh.com robotic telescope just a few days after its emergence in NGC 2207 (top); NASA, ESA and the Hubble Heritage Team (STScI) of the same interacting galaxies prior to the supernova (bottom).

Read more about the evolution and ultimate fate of the stars in our universe: http://science.nasa.gov/astrophysics/focus-areas/how-do-stars-form-and-evolve/. While you are out looking for supernovas, kids can have a blast finding constellations using the Space Place star finder: http://spaceplace.nasa.gov/starfinder/.

# AstroSpace Update

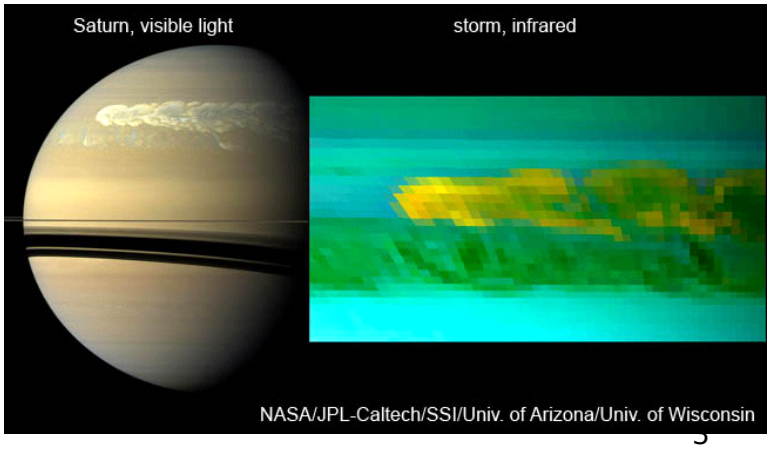
October 2013

Gathered by Don Lynn from NASA and other sources

**Voyager 1** (outer planet mission) has left the solar system, at least has left the solar wind's influence. The Oort Cloud of comets lies beyond this region, which is considered by some to define the edge of the solar system. In fact Voyager left August 25, 2012 (yes, over a year ago), according to scientists' best estimate. The announcement was made on the basis of finding vastly increased densities of plasma (charged particles). This obviously brings up 2 difficult questions: 1. Why was the announcement not based on a change in magnetic field direction, as has been promised in previous predictions regarding leaving the solar system? 2. Why did it take so long to announce this? The answer to the 2nd question is easier: The instrument on Voyager designed to detect plasmas broke in the 1980s. But plasmas can also be detected by the plasma wave instrument, but only when some outside influence makes waves in the plasma. Twice in the last year or so, CMEs (bursts of particles from the Sun) have reached the very distant location of Voyager, and generated waves. Measurements of the waves allow calculation of the density of the plasma through which the wave is traveling. One of the CMEs was so weak that it was at first not noticed. Further, data that is recorded on Voyager's tape recorder has in recent years only been dumped to Earth twice a year. It took a few months to analyze the data and to get it published. All these contributed to the delay in announcing. As for the magnetic field, it definitely did not change direction about August 25, but did change strength. The direction change was predicted on the basis of IBEX observations. The ribbon of particles discovered by IBEX was found by computer simulation to match only one direction of interstellar magnetic field, which was definitely different from the direction being measured by Voyager inside the range of the Sun's influence, so the magnetic direction was predicted to change. But it didn't. Further measurements and further work on the IBEX observations are called for to try to explain the failure to find a change in magnetic field direction. Voyager 1 is nearly 12 billion miles from Earth, and has taken 36 years to get there. This is the farthest any human-made object has been sent. It takes over 17 hours (at the speed of light) for radio reports from Voyager to reach Earth. It took 13 months for CMEs to reach Voyager from the Sun. Voyager 1 is losing power over the years as its Plutonium power source decays, but it should have enough power to keep the particles and fields instruments turned on until about 2020, and then will have to turn off instruments one by one until about 2025, when it will have insufficient power for any instruments beyond the controller and radio. Voyager 2 is not as far from the Sun, and leaving in a different direction, but estimates are that it may leave the solar system in roughly 3 more years. Its plasma detection instrument is still working.

**IBEX** (particle imaging spacecraft) has measured the direction from which neutral particles from interstellar space are entering the solar system, and it differs from previous measures. It had been thought that the direction of flow of these particles, the interstellar wind, would not change over the years. Ulysses and other spacecraft have made previous measures. The astronomers involved believe that the change in direction could be explained by turbulence in the interstellar cloud around the Sun.

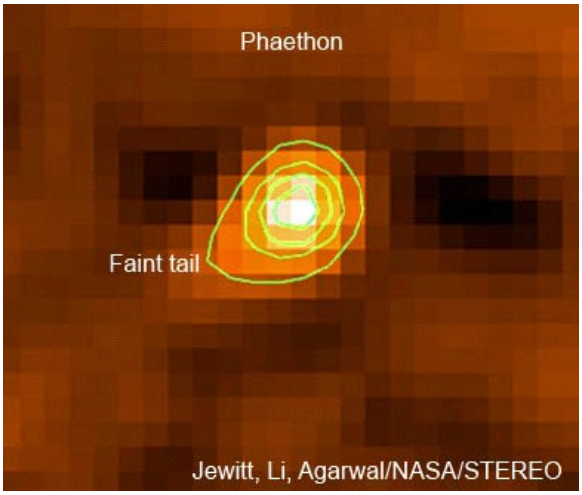
**Curiosity** (Mars rover) has used autonomous navigation for the 1st time. The software to do this was adapted from the rover Opportunity. A segment of the ground to be traversed could not be seen in images taken from the starting point, so the rover was commanded to find its own way across that area. The rover takes stereo images of the area, then plans a route to avoid any hazard or rough terrain found in the images. The 1st use involved 33 ft (10 m) of autonomous driving within a drive of 141 ft (43 m). Further use of this capability should speed Curiosity's travel to Mt. Sharp, where the rock layers hold much of the history of Mars.




**Cassini** (Saturn orbiter) – The monster storm that erupted on Saturn in late 2010 was found in Cassini infrared spectrometer data to have churned up water ice from great depths. This is the 1st detection of water ice on Saturn. It is believed that water normally should exist about 100 miles (160 km) below the cloud tops, so the storm dredged material from at least this depth. Also found were ammonia ice and a constituent not positively identified that may be ammonium hydrosulfide. Probably these other materials coated the water ice crystals when they were churned up.

**More Cassini** – Analysis of gravity data from Cassini flybys of Saturn's moon Titan has revealed small features on the icy surface appear to have large icy roots under the icy shell. Below that shell is a liquid layer into which the roots protrude. The icy shell must be thick (estimated as at least 25 mile [40 km]) and rigid to hold the roots in place. How the roots formed is being debated.

**Comet rotation** – Researchers have discovered a way to predict the changes in the rotation of comets. Such changes were found to be a function of a comet's size, period, and the solar energy it receives, but surprisingly not a function of the fraction of a comet's surface that is active (that is, venting material). Since changes in rotation are believed to be strongly affected by jetting of material by the comet, it was a surprise that active area did not affect rotation changes in this study. Larger changes in rotation correlate with smaller size, long rotation periods, and large solar energy received. These results applied to approaching Comet ISON show that it will spin up and begin tumbling as it nears the Sun.

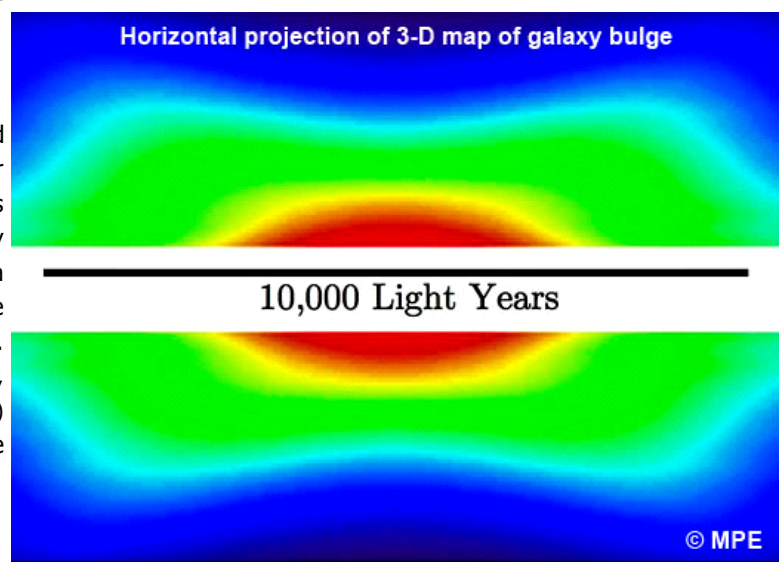



**Phaethon**, a Sun-grazing asteroid, has been found by the STEREO Sun-observing spacecraft to grow a head and tail when close to the Sun. Because of Phaethon's comet-like orbit, astronomers had been looking for these comet features for years, but had failed until now. But the temperature at the time of emitting the tail particles was much too high for the usual comet emissions of water, carbon dioxide, and similar materials. It appears the extreme heat (over 1300°F = 700°C) cracks and crumbles Phaethon's rocky surface, and it throws off rock particles.

**Don Quixote**, the 3rd largest known near-Earth object, has for 3 decades been known as an asteroid. It has long been debated whether it is really an asteroid, or really a comet that had used up all its volatile materials, so no longer formed a head and tail. Spitzer infrared space telescope observed Don Quixote when it was farthest from the Sun and when it was closest (5 years later), and found it really did form a faint head and tail. The surface was found to contain silicate dust, a common coating found on comets, and it has the typical reflectivity of a comet. So it's a comet, though not very active.

**Dark matter** – Astronomers have debated for 20 years how dark matter is distributed in small (dwarf) galaxies. Theory said it should be concentrated at the galaxy center and decrease in density steadily with distance from the center. But observations often did not agree, often finding the same density of dark matter throughout the galaxy. A new study of many satellite galaxies of our Milky Way has found that on average the dark matter is distributed according to theory, but individual galaxies differ enough from average that some have the constant distribution. More observations, particularly of extreme outlying regions, are planned.

**Milky Way bulge** – Scientists have produced the 1st detailed 3-dimensional map of the stars of the inner bulge of our Milky Way. It confirms that our galaxy has a bar, and shows more detail of its shape. The 3rd dimension was provided by finding distances to so-called "red clump" giant stars in a survey of the central Milky Way made in infrared by the VISTA telescope in Chile. Such stars act as standard candles. Though infrared penetrates the dust permeating the bulge, the scientists still had to compensate (by means of star color) for dimming due to dust. Because the map is 3-D, it can be rotated and viewed from different directions.

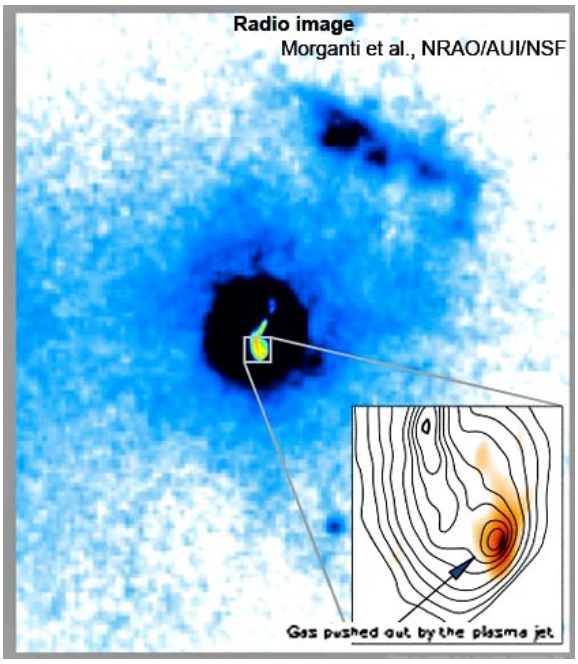


**Chandra** (X-ray space telescope) has imaged the center of our Milky Way galaxy and observed that about 99% of the material that falls toward the black hole is ejected before it gets near the black hole event horizon, while only about 1% actually falls into the black hole. The new findings are the result of one of the longest observations ever performed by Chandra. The spacecraft collected 5 weeks' worth of data. The researchers found that the new data did not support theoretical models in which the X-rays are emitted from a concentration of smaller stars around the black hole. The data showed that the gas near the black hole likely originates from stellar winds produced by a disk-shaped grouping of young massive stars. This gas would just orbit the black hole, not fall in, unless it loses a great deal of heat and momentum. Apparently only 1% of the gas experiences this loss, and so falls in.

**Hubble Space Telescope** has uncovered the largest known population of globular star clusters, an estimated 160,000, swarming inside the crowded core of the cluster of galaxies known as Abell 1689. Such groupings of globulars can be used as reliable tracers for dark matter, since they have been shown to be correlated when distance from a galaxy center is taken into account. Almost 95% of globular cluster formation occurred within the 1st 1 or 2 billion years after the Big Bang. The new discovery is twice the size of any other known grouping of globulars, and is farther away (at 2.25 billion light-years) than any other group of globulars yet studied. Hubble detected the glow of 10,000 globulars, some as dim as 29th magnitude, but taking into account that only the brightest globulars could seen at that distance, the total was estimated at 160,000.

**More Hubble** – Astronomers have assembled from 400 Hubble observations made over 13 years, time-lapse movies of the jet being emitted by the supermassive black hole in the galaxy M87. Evidence is found in the movie of spiral motion created by a helix-shaped magnetic field. The jet structure is very clumpy. This could be due to firing material sequentially like cannon balls or a magnetically driven shock bunching up material. Evidence for both explanations is seen in the movie. Hubble will be used to study at least 3 more jets to see if the M87 jet is typical.

**Galaxy evolution** – Astronomers using a worldwide network of radiotelescopes have found strong evidence that a powerful jet propelled to nearly light speed by a galaxy's central black hole is blowing massive amounts of gas out of the galaxy. This process is limiting the growth of the black hole and the rate of star formation. Scientists have proposed 2 mechanisms to limit black hole growth and star formation: violent stellar winds or powerful black hole jets. Massive clumps of cold gas were observed being pushed away by the jet in a galaxy called 4C12.50, nearly 1.5 billion light-years away. The galaxy was chosen for observation because it is believed that its jets are just starting to turn on. The observations showed that the jets expand their pushing effect beyond the narrow width of the jets themselves. It is believed that the jets may turn on periodically and repeat the process of removing gas from the galaxy. Recent other observations, of galaxy NGC 253, have seen gas being pushed out by strong stellar winds. So it appears that both of the theoretical mechanisms for limiting black hole growth and star formation can occur.




**Solar twins** – A team of astronomers has used the Very Large Telescope in Chile to identify and study the oldest twin of our Sun known. We can construct the history of a Sun-like star by finding older and younger stars that share the same mass, temperature and chemical abundances. The new discovery is located 250 light-years away in Capricornus, is designated HIP 102152, and most closely matches the Sun of any known star, except it is nearly 4 billion years older. Study of this star has already made significant discoveries. It has long been known that the Sun has far less lithium than Big Bang theory predicts was produced, and so the Sun should have been supplied with. HIP 102152 has even less lithium, implying that Sun-like stars slowly destroy lithium by some process. The star also has less of the elements that are most common on Earth than do many similar stars. The Sun also has this deficiency. It is thought that the formation of planets prevented these elements from ending up in the Sun. This may imply the solar twin also has planets. Another star, 18 Scorpii, found in the same study to also be a solar twin, is only 5/8 the Sun's age.

**Stars' gravity** – Astronomers have found a new way to measure the strength of gravity at the surface of a star. Other physical properties of the star, including mass and size, can be calculated from the surface gravity. There are already 3 other ways to determine a star's surface gravity, but the new method is more precise than 2 of those, and is more easily applied to more stars than the 3rd. The new method observes the flicker of the star, changes in brightness that occur over hours. The flicker frequency depends on the size of granulations on the stars surface, and that size depends on the surface gravity. The amount and complexity of flicker changes during the life of a star, so flicker observations can also tell the stage of life of a star.

**Magnetar** – I reported here in July that the magnetic field of a magnetar, designated SGR 0418, had been measured by means of how the field was slowing rotation and found to be about 100 times lower than other magnetars. Neutron stars with extremely strong magnetic fields are known as magnetars, and can be distinguished from ordinary neutron stars by their distinctive X-ray blasts. A different way of measuring the magnetic field by means of the field's effect on variations in the X-ray spectrum over extremely short time intervals was performed using the XMM-Newton X-ray space telescope. The result was one of the strongest magnetic fields ever measured. The new method is sensitive to fields that exist in very concentrated areas, so the implication is that the strong field appears only in small areas of the magnetar, probably areas only a few hundred yards (m) across. SGR 0418 lies about 6500 light-years away in Camelopardalis and rotates every 9.1 seconds.

**Planetaries aligned** – Astronomers using the New Technology Telescope in Chile and the Hubble Space Telescope have observed about 130 planetary nebulas in the central bulge of our galaxy and found that butterfly-shaped ones (but not the other shapes) tend to be aligned. Planetary nebulas form in the final stages of life for a star like our Sun, when it blows its outer layers out into space. The long axes of the butterfly-shaped planetaries, also known as bipolar planetaries, in the new study tended to be aligned along the plane of our galaxy. The long axis of a bipolar planetary is thought to be perpendicular to the rotation plane of the central star. So if the general rotation of the galaxy affected the rotation direction of stars, then the observed alignment of the planetaries is perpendicular to what might be expected. It may be that magnetic fields cause this, but it would require a stronger field than thought across the entire galactic bulge, at least at the time of the bulge forming. The other shapes of planetaries, elliptical and elliptical with internal structure, were found, as expected, to be completely randomly aligned.

**Spitzer** (infrared space telescope) has observed some free-floating (not orbiting) cool brown dwarfs, and found that they are not quite as cold as expected. Surface temperatures were found to range 250-350°F (125-175°C). They are the coldest free-floating bodies known. Their distances are 20-50 light years away, as measured by parallax. Their masses were estimated from their temperatures and the time that they have had to cool since formation. They are 5-20 times the mass of Jupiter. The smaller end of this range would be considered by many astronomers as being planets rather than brown dwarfs. But because they are not orbiting a star, and appear to have formed as a star forms, not in a disk like planets form, they are being called brown dwarfs. The observations present new questions to be investigated, including why do the observable properties not correlate well with temperature, like warmer brown dwarfs do?

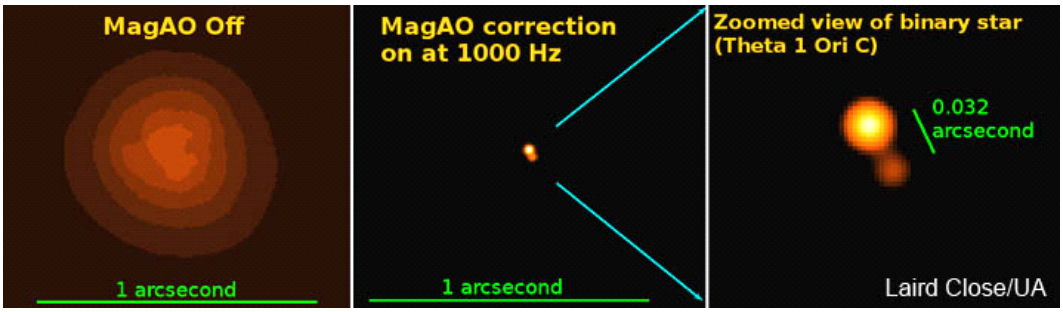
**More free-floating bodies** – Another study has determined that tiny cold clouds in space have the right properties to form planet-sized bodies with no parent star. Free-floating planets, those without stars, have been observed, and it had been surmised that these were the product of normal planet formation about a star followed by gravitationally tossing some of the planets out of the system. But the new study shows there is another way to form these free-floating planets. The observations of the cold clouds were made in the Rosette Nebula using a radiotelescope and an infrared telescope in Chile. The density, size and temperature of the clouds should allow them to collapse under their own gravity to form planet-sized bodies. The clouds are thought to have broken off from the tall, dusty pillars of gas which were sculpted by intense radiation from young stars. There are so many of these clouds that they could be a significant source of free-floating planets. Scientists have estimated from the few free-floating planets found that there must be roughly 200 billion of them throughout our galaxy.

**Exoplanet atmosphere** – A team of astronomers used the Subaru Telescope in Hawaii with a blue filter to observe transits of the exoplanet Gliese 1214b across its star. Changes in the spectrum of a star during a planetary transit give information about the planet's atmosphere. Blue light is strongly affected by scattering of light in an atmosphere. The result was that scattering was not apparent in this planet's atmosphere, which rules out a clear hydrogen atmosphere. The other 2 likely types of atmosphere would be water-rich and hydrogen with thick clouds. But previous observations showed that a cloudy atmosphere was unlikely, making it proba-

ble that 1214b's atmosphere is water-rich. This planet is known to be a super-Earth, that is, a planet with a mass and diameter larger than Earth, but smaller than Neptune. It is 40 light-years away in Ophiuchus.

**Fast exoplanet** – Researchers have discovered in Kepler (planet-finding space telescope) data evidence of an exoplanet that orbits its star every 8.5 hours, one of the shortest planet's years known. Because it is so close to its star, 40 times closer than Mercury is to our Sun, its surface temperature may be as high as 5000°F (2700°C). The top layer of the planet is likely completely melted, creating an ocean of lava. Scientists hope to measure the gravitational influence of the planet on its star, which should be large because they are close, and thereby determine the planet's mass. They were able to detect light emitted by the planet, by how the starlight changed when the planet went behind the star, and this is the smallest planet for which that is true. The planet is designated Kepler-78b. Plans are being made to analyze that light with a large ground-based telescope.

**Unusual disk** – Scientists have used the Subaru Telescope to observe in infrared a disk around the young star RY Tauri and found a fluffy (semitransparent) layer above this disk. Computer simulations reveal that this layer appears to be a remnant of material from an earlier phase, when dust and gas were falling onto the disk. RY is 460 light-years away and is around a half million years old. The disk is more than twice the size of Neptune's orbit in our solar system. The observations used a mask to block out the light of the central star, which is roughly a million times as bright. Unlike many other protoplanetary (possibly planet forming) disks, RY's disk is offset from the center of the star. The amount of material in the fluffy layer was estimated to be about half the mass of our Moon. The scientists believe that this disk has the fluffy layer while others do not because the star is too young to have dissipated the material yet.




**MagAO**, an adaptive optics system installed on the 6.5-meter (21 ft) Magellan Telescope in Chile, has achieved resolution of .02 arc seconds in visible light, nearly the theoretically limit for this size telescope. This is more than twice as good as the Hubble Space Telescope, and is the best ever achieved in visible light. Most adaptive optics systems on large telescopes have only been able to work in infrared light, and because of the longer wavelength, cannot achieve as good resolution. The new system uses a thin (1/16 inch = 2 mm) curved glass mirror as a secondary mirror, and its shape is adjusted by 585 actuators 1000 times per second to counteract the motions of the atmosphere. It resolved for the 1st time Theta 1 Ori C, the double star that floods the Orion Nebula with visible and ultraviolet light.

**LADEE** (lunar orbiter) was launched in early September using a Minotaur V rocket from Wallops Island, Virginia, to begin studying the extremely thin atmosphere of the Moon and its dust. The Moon's atmosphere is about 10 trillion times thinner than Earth's, and is known to contain argon, helium, sodium and potassium. This is the 1st space probe launched from Virginia, though it has a long history of suborbital launches. This is the 1st use of a Minotaur V, which is a converted Peacekeeper missile. LADEE (pronounced laddie, not lady) is the 1st use of a new modular spacecraft design that should be flexible enough for many types of future missions, and will reduce costs by eliminating redesign for different missions. It is also the 1st use of laser communication from beyond Earth orbit, which has the potential to vastly increase the amount of data over that sent by radio. It will orbit quite low over the Moon for about 100 days, then will be crashed. Among the mission goals is to explain several Apollo observations that seem likely to have been caused by dust lifting off the surface of the Moon. It is also hoped to characterize the thin atmosphere before its gets polluted by possible future activity on the Moon.

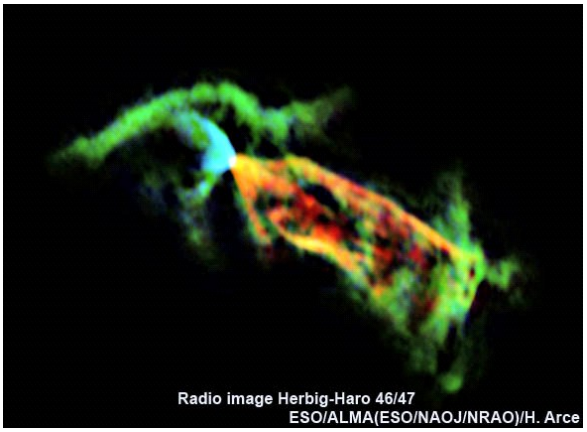
**WISE** (infrared space telescope) is being brought out of hibernation to perform another mission, that of searching for near-Earth objects. Its previous 2 missions were surveying the entire sky in infrared, and monitoring and discovering asteroids. NASA decided to spend more money looking for potentially hazardous objects and potential targets for an asteroid mission, and reviving WISE was the most cost-effective way to do that. Statistically it is expected in the next 3 years to discover 150 previously unknown near-Earth objects, and determine the properties of 2000 known ones.

**NuSTAR** (X-ray space telescope) has discovered its 1st 10 supermassive black holes. It is expected to discover hundreds of these during its 2-year mission. The new ones found were at the hearts of galaxies at distances ranging from 0.3-11.4 billion light-years. The more distant supermassive black holes appear to be in bigger galaxies.

**InSight** (Mars lander) – NASA has narrowed the possible landing sites for the InSight mission to 4 locations, all in an equatorial plain called Elysium Planitia. They were chosen for their smooth terrain, few rocks and little slope for landing safety. Also equatorial latitudes were chosen for high solar power, and low elevation for denser atmosphere to aid the slow-down for landing. The mission is studying Mars as a whole, so a geologically interesting site was not needed. Further images of the 4 sites will be taken to determine which is most likely to not have hard rocks near the surface, as that would impede the drilling experiment. InSight will fly to the red planet in 2016.

**Bruce Murray**, co-founder of the Planetary Society and former Director of JPL, died at the age of 81 after a long illness. Murray saved the Galileo mission to Jupiter in spite of rapidly shrinking NASA budgets. He oversaw the great successes of the Viking missions to Mars and the Voyagers to the outer planets. After leaving JPL, he was a professor of planetary science and geology at Caltech. He published 130 scientific papers, wrote several books, and was a key scientist on 4 space missions, including Mariner 4 which got the 1st close-up images of Mars. Space exploration has lost a true pioneer.

**Instant AstroSpace Updates**

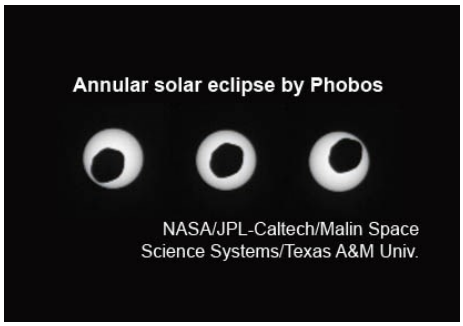



**ALMA** (radiotelescope array) observed Herbig-Haro 46/47, a young star with jets, with higher resolution than previously, and found some of the ejected material in the jets had much higher velocities than earlier measurements. The observation also discovered an outflow from a lower mass companion star.

**Asteroid** 2005 WK4 was **imaged** in radar with quite good resolution (4 yards [m] per pixel) by the Goldstone (California) Deep Space antenna during a close pass (about 8 lunar distances) by Earth. It is 200-300 yards (m) across and rotates in under 3 hours.

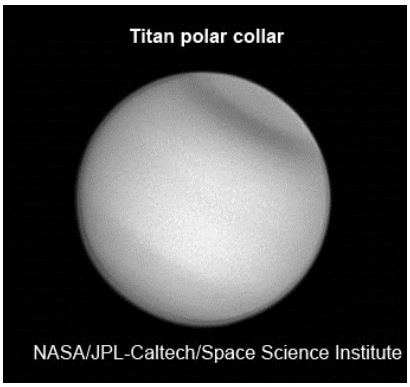
**Juno** (Jupiter mission) flies by the Earth October 9 at only 347 mi (559 km) altitude to get a gravity slingshot toward Jupiter. It should be visible in telescopes briefly from Africa and possibly India.

Mars rover Curiosity observed the moon Phobos causing an annular (ring) **solar eclipse** on August 17. Neither Martian moon ever appears large enough to cause a total eclipse.




**Firestation**, an experiment to observe sprites, gamma rays and electrons which are sometimes emitted from the tops of lightning storms, has been taken to the International Space Station and mounted on the outside to begin a planned year of observations. It is hoped to shed light on how storms can generate the energy to emit gamma rays.

Dark material found about Becquerel Crater on **Mars** appears to have come from volcanic activity, but was probably blown there from somewhere else by winds.




A dark polar **collar** on Saturn's moon **Titan** has been observed by Cassini in ultraviolet light. The collar was previously seen by Voyager 2 and the Hubble Space Telescope, but was not seen until now by Cassini, implying it is probably seasonal.

Data from the Mineralogy Mapper instrument on the Indian Shandrayaan-1 spacecraft has detected water in a feature known to have been dredged up from deep within the Moon's interior by an impact. Previous detections of **lunar water** are believed to be from sources other than deep rock.

Data from a NASA airborne radar mission has found a previously unknown **canyon in Greenland**, longer than the Grand Canyon but only about half as deep, hidden under a mile thick of ice. The feature is thought to predate the covering ice sheet, which has covered Greenland for the last few million years.

## Nominations for OCA Leadership

The Orange County Astronomers is managed by Officers and Trustees that are elected each year by the membership. Please consider whether you would like to play a role in the leadership of the club during 2014. Nominations are now open for Officer and Trustee positions (self-nominations are encouraged). Trustees must be 18 years or older and members of OCA for at least one year. Officers (President, Vice President, Treasurer, and Secretary) must meet the same eligibility requirements as Trustees, and in addition candidates for President and Vice President must have served as an OCA Trustee for one year, at some point during their lives.

If you would like to add your name to the ballot, please contact Bob Buchheim (OCA Secretary) at Bob@RKBuchheim.org or in person at the monthly meeting.

Nominations will close at the end of the November meeting. The ballot will be included in the December Sirius Astronomer, and completed ballots must be received by the club's Election Coordinator by the close of the January, 2014 General meeting. The new Board and Officers will take office at the January Board meeting.

This image of the North American Nebula (NGC 7000) showcases the area that would be analogous to the Gulf of Mexico on the map. Bill Hall obtained this image on 8/25/13 from Yorba Linda, CA using an 8-inch f/4 Newtonian with an MPCC coma corrector, ST-8300 imager, and an H-alpha filter. The total exposure time for all frames used to compose the image was 2 hours, 10 minutes.

# 2013 G. Bruce Blair Award


Albert J. Highe

Albert Highe is an inventor driven by the desire to learn how things work. Formally, he is trained in Physical Chemistry, earning his

PhD from CalTech in 1981. As a scientist and inventor, he acquired knowledge of materials science, electrochemistry, and electrical and mechanical engineering. Albert applied his talents to the development of new materials, and products.

Eventually Albert's interest in science and technology drew him to the hobby of amateur astronomy. Since observing his first Messier objects in 1990 with a borrowed 4-inch reflector, he has logged observations of thousands of objects using 6- to 20-inch Newtonian reflectors while discovering that no commercial telescope met all of his needs. Creating his own was a perfect opportunity to integrate his interests, technical training, and product development experience. He is best known for his unique three parallel strut reflector designs that have appeared in *Amateur Telescope Making Journal* and *Sky and Telescope*, and on the websites of manufacturers who adopted them for sale. Albert has been active with TAC (The Astronomy Connection), participating in outreach, a regular attendee at Calstar and other Northern California star parties, and has been an enthusiastic mentor to anyone who wishes to pursue his designs for either personal or commercial ventures.

Albert is also an astrophotographer and known for his detailed observing notes on the Abell clusters and other challenging objects. Most recently, Albert has written, and Willmann-Bell published, "Engineering, Design and Construction of Portable Newtonian Telescopes," arguably one of the best books on amateur telescope making to date. His research and writing have brought, for the first time, an engineer's viewpoint and materials science approach to the art of amateur telescope making.

For all his many accomplishments and contributions to amateur astronomy, the Western Amateur Astronomers Board of Directors is proud to present this year's G. Bruce Blair Award to Albert J. Highe.

*EDITOR'S NOTE: This article originally appeared in the April 2013 issue of* The New Pacific Stargazer*, the newsletter of the Western Amateur Astronomers, and was used with permission.*

# *Magazine Subscriptions*

Subscriptions to the Astronomy magazines are now due for renewal, if you subscribed for one year or would like to subscribe at the club rate. You may also extend an existing subscription that does not end in December for one year at the club rate. Bring your check made out to the OCA to the meeting or mail it to:
**Charlie Oostdyk, Orange County Astronomers, PO Box 1762, Costa Mesa, CA 92628.** ***Checks made out to the magazine publishers cannot be processed and will be returned to you***. If you already subscribe, please provide the mailing label or the billing invoice with your check. One -year rates are as follows:

| | **Club Rate** | Regular Rate |
|---|---|---|
| Sky & Telescope* ..... | **$33.00** | $37.95 |
| ASTRONOMY..... | **$34.00** | $42.95 |

***Sky & Telescope subscribers please note: Due to a change by the publisher, renewals of current subscriptions should now be made directly through Sky and Telescope! New subscriptions at the club rate must still be made through Orange County Astronomers and then renewed through the publisher.**

**FOR SALE**

Celestron NexStar 5, barely used. $1400 o/b/o. Contact Carol at ccbopper@hotmail.com

Non-computerized C6 SGT including tube, mount (never used), Telrad finder, 25 mm eyepiece, focal reducer and case for the tube. Contact Michael Mirjahangir at 714-319-3103

Meade ETX-125C with accessories (tripod, carrying case, Autostar system, heat/dew cover, etc.) $500 o/b/o. Email SRFROGN@aol.com with copy to startraveler68@yahoo.com for details.

Skywatcher 100ED f/9 refractor with Celestron CG-4 mount. Scope comes with a hard case, 8X50mm finder, 2-inch dielectric diagonal, 2 LET eyepieces, and 4-inch Baader solar filter. CG-4 mount has motors for both RA and DEC. Optical tube can be sold separate. $600 o/b/o. Contact Val at 949-382-1869.

Celestron 90mm Maksutov Sky Prodigy with all attachments. $300. Contact Val at 949-382-1869.

Meade LX90 10" ACF, f/10, with Autostar; GPS; Smartfinder; Telrad finder; 6.7 and 40 mm eyepieces and 8X50 ViewFinder. $1700. Contact Don Rader at dgrconsult@roadrunner.com or 714-996-5138.

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