SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

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The Milky Way looms bright over the Owens Valley Radio Observatory in this picture taken by Pauline Acalin during a recent OCA field trip to the facility. Owens Valley is one of several field trips the club conducts on a regular basis. Be sure to check our website for details about upcoming trips!

OCA CLUB MEETING

The free and open club meeting will be held February 12 at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month's speaker is Jerome Orosz of San Diego State University with the topic "Planets With Two Suns"

NEXT MEETINGS: Mar. 11, Apr. 8

STAR PARTIES

The Black Star Canyon site will open on February 13 and March 5. The Anza site will be open on February 6 and March 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 February 5. The following class will be held March 4.

GOTO SIG: TBA
Astro-Imagers SIG: Feb. 9, Mar. 8
Remote Telescopes: TBA
Astrophysics SIG: Feb. 19, Mar. 18
Dark Sky Group: TBA

!

The Loneliest Galaxy In The Universe

By Ethan Siegel

Our greatest, largest-scale surveys of the universe have given us an unprecedented view of cosmic structure extending for tens of billions of light years. With the combined effects of normal matter, dark matter, dark energy, neutrinos and radiation all affecting how matter clumps, collapses and separates over time, the great cosmic web we see is in tremendous agreement with our best theories: the Big Bang and General Relativity. Yet this understanding was only possible because of the pioneering work of Edwin Hubble, who identified a large number of galaxies outside of our own, correctly measured their distance (following the work of Vesto Slipher's work measuring their redshifts), and discovered the expanding universe.

But what if the Milky Way weren't located in one of the "strands" of the great cosmic web, where galaxies are plentiful and ubiquitous in many different directions? What if, instead, we were located in one of the great "voids" separating the vast majority of galaxies? It would've taken telescopes and imaging technology far more advanced than Hubble had at his disposal to even detect a single galaxy beyond our own, much less dozens, hundreds or millions, like we have today. While the nearest galaxies to us are only a few million light years distant, there are voids so large that a galaxy located at the center of one might not see another for a hundred times that distance.

Image credit: ESA/Hubble & NASA and N. Gorin (STScI); Acknowledgement: Judy Schmidt, of the loneliest void galaxy in the known: MCG+01-02-015.

While we've readily learned about our place in the universe from observing what's around us, not everyone is as fortunate. In particular, the galaxy MCG+01-02-015 has not a single known galaxy around it for a hundred million light years in all directions. Were you to draw a sphere around the Milky Way with a radius of 100 million light years, we'd find hundreds of thousands of galaxies. But not MCG+01-02-015; it's the loneliest galaxy ever discovered. Our Milky Way, like most galaxies, has been built up by mergers and accretions of many other galaxies over billions of years, having acquired stars and gas from a slew of our former neighbors. But an isolated galaxy like this one has only the matter it was born with to call its own.

Edwin Hubble made his universe-changing discovery using telescope technology from 1917, yet he would have found absolutely zero other galaxies at all were we situated at MCG+01-02-015's location. The first visible galaxy wouldn't have shown up until we had 1960s-level technology, and who knows if we'd have continued looking? If we were such a lonely galaxy, would we have given up the search, and concluded that our galaxy encompassed all of existence? Or would we have continued peering deeper into the void, eventually discovering our unusual location in a vast, expanding universe? For the inhabitants of the loneliest galaxy, we can only hope that they didn't give up the search, and discovered the entire universe.

This article is provided by NASA Space Place.

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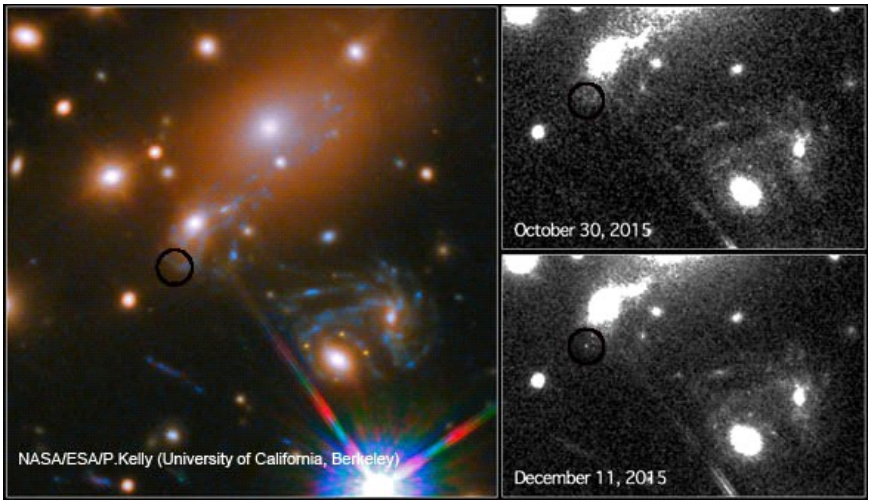
AstroSpace Update

February 2016

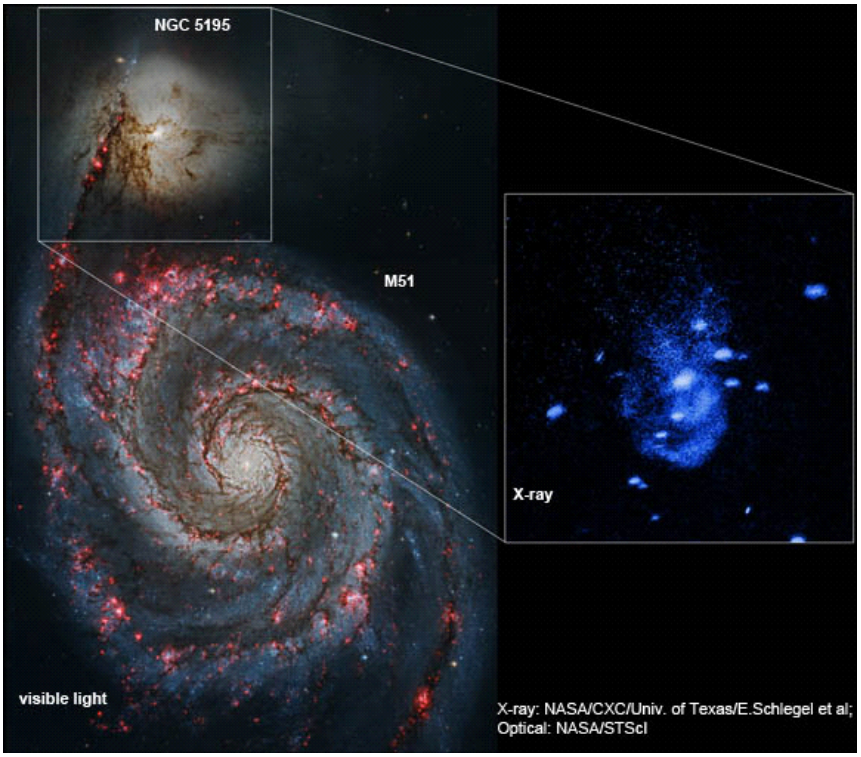
Gathered by Don Lynn from NASA and other sources



Hubble (space telescope) – In November 2014 a supernova was seen in multiple places because its light was bent by the gravitational lensing of a massive galaxy in front of it. The light from the galaxy took 5 billion years to get here, and that of the supernova 10 billion years, due to their great distances. Analysis of the concentrations of mass in the cluster of galaxies indicated that light from the supernova should appear in 2 other places, one several years ago (1998), and one in the future. Different paths through the galaxy cluster take different amounts of time. Hubble kept watching the area, and on December 11 the supernova was seen in the predicted position. 1st time that has ever happened.

Blazar – The galaxy known as PKS 1441+25 is a rare type of galaxy called a blazar, which has an active black hole with a jet that happens to be aimed at us. Blazars are inherently unsteady light sources and can sometimes emit flares 10-100 times brighter than normal. A flare from this blazar was detected last April and observed by a range of telescopes sensitive to different wavelengths, including VERITAS, a gamma-ray telescope array in Arizona. The blazar is so distant that it takes light 7.6 billion years to reach us. It was unexpected to see very-high energy gamma rays from this far away because theoretically high-energy gamma rays should collide with light photons and be destroyed in such a long trip. The Universe is full of faint light known as the extragalactic background light (EBL), which is the light from all stars that have ever existed. The new VERITAS observations, combined with other telescope observations of this blazar, put a new upper limit on how bright the EBL can be in order for the blazar gamma rays to have survived. Galaxy counts have previously put a lower limit on how bright the EBL can be. So astronomers are closing in on a value for the EBL brightness. A surprise in the new observations was that the source of the gamma rays was found to be roughly 5 light-years away from the blazar, much farther than expected. Physicists are debating the exact mechanism behind jet gamma-ray emission, and these observations are giving clues to that.

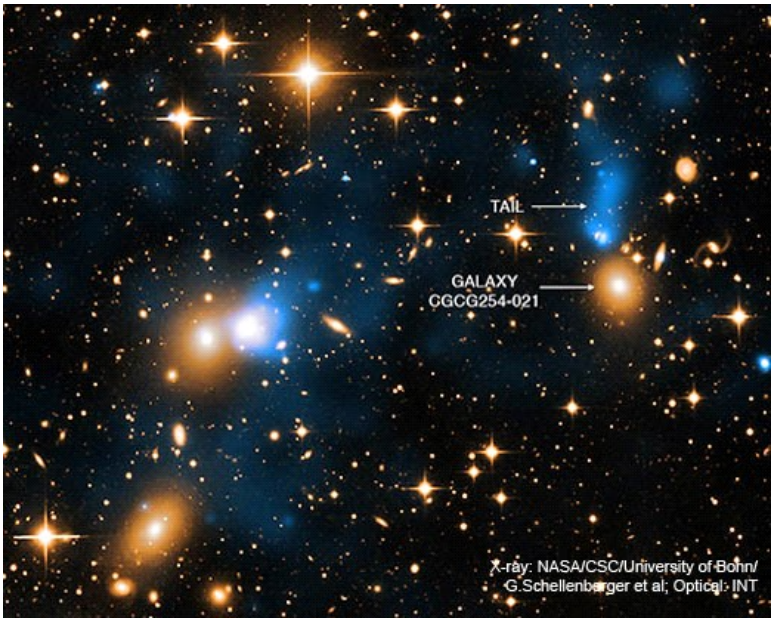
Black hole blasts – Evidence for powerful blasts produced by a giant black hole has been discovered using the Chandra X-ray space telescope. This is one of the nearest supermassive black holes to us that is currently undergoing such violent outbursts. Astronomers found this outburst in the black hole centered in the small galaxy NGC 5195, which is the small companion in Messier 51. The astronomers detected 2 arc of X-ray emission close to the center of NGC 5195. They think these arcs are fossils from 2 enormous blasts when the black hole expelled material outward. Just outside the outer arc, the researchers detected a slender region of emission of relatively cool hydrogen gas in a visible-light image. This suggests that the hotter X-ray emitting gas has plowed the hydrogen gas from the center of the galaxy. Astronomers believe it is important to study black hole outbursts because it appears that they regulate galaxy growth.



NuSTAR (X-ray space telescope) – The most massive black holes in the Universe are often encircled by thick, doughnut-shaped disks of gas and dust. Material in the doughnut feeds the growing

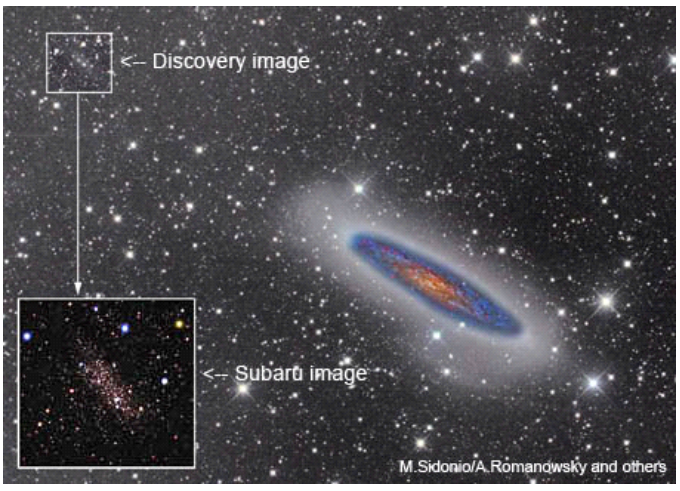
black hole inside. Until recently, telescopes were not able to penetrate some of these doughnuts. NuSTAR, working with higher energy X-rays than other telescopes, was able recently to peer inside one of the densest of these doughnuts surrounding a supermassive black hole in the spiral galaxy NGC 1068, located 47 million light-years away in Cetus. The observations revealed a clumpy doughnut, not a simple round doughnut as originally thought. This is the 1st time clumpiness has been observed in an ultra-thick black hole doughnut, and supports that this may be common. Future research will address the question of what causes the unevenness in the doughnuts.

Deprived black hole – Supermassive black holes at the centers of galaxies typically are embedded in large spheres of stars. New research has found one unusually star-deprived black hole at the site of 2 merged galaxies. The galaxy SDSS J1126+2944 is the result of a merger between 2 smaller galaxies, which brought a pair of supermassive galaxies into the galaxy. One of the black holes is surrounded by a typical amount of stars, but the other black hole has 500 times fewer stars. One possibility is that extreme gravitational forces stripped away most of the stars from on black hole during the merger. The other possibility is that the star-deprived black hole is far smaller than thought, and so would have a much smaller star entourage.



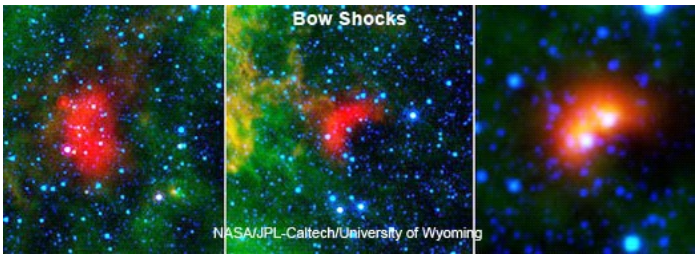
Galaxy tail – An extraordinary ribbon of hot gas trailing behind a galaxy like a tail has been discovered using data from the Chandra X-ray space telescope. With a length of at least 250,000 light-years, it is likely the largest such tail ever detected. The tail is in the galaxy cluster Zwicky 8338, which is almost 700 million light-years away. The length of the tail is more than twice the diameter of the Milky Way galaxy. The tail contains gas at temperatures of about 10 million degrees, about 20 million degrees cooler than the intergalactic gas, but still not enough to glow brightly in X-rays. The researchers think the tail was created as a galaxy known as CGCG254-021, or perhaps a group of galaxies dominated by this large galaxy, plowed through the hot gas in Zwicky 8338. The pressure exerted by this rapid motion caused gas to be stripped away from the galaxy. There is a significant gap between the tail and the galaxy. The tail has a brighter spot referred to as its head. The gas in the head may be cooler and richer in heavier elements than the rest of the tail. In front of the head, there are hints of a bow shock, similar to a shock wave formed by a supersonic plane. Other research has determined that CGCG254-021 has the highest mass of all galaxies in the cluster. Infrared observations imply that, among the galaxies in the cluster, CGCG254-021 had by far the highest rate of stars forming in the recent past. However, there is no evidence for new star formation now, possibly because gas has been depleted in forming the tail. The material in the tail includes not only hydrogen but heavier elements and could spawn a new generation of stars in the tail.

Amateur discovery – An amateur astronomer in Australia named Michael Sidonio in 2012 was just trying to get a good image of the Sculptor Galaxy NGC 253. He found a nearby smudge that he couldn't find in any galaxy catalog. Professional astronomers followed up with further observations, including some with the Subaru Telescope in Hawaii. The result is a paper announcing the discovery of a dwarf galaxy that the much bigger NGC 253 is in the process of gobbling up via tidal disruption. The paper has 10 authors, including amateur Sidonio. Another group of astronomers independently discovered the dwarf galaxy, but they used the 6.5-meter Clay Telescope in Chile rather than an amateur telescope. Sidonio calls himself the World's Strongest Astronomer, since he used to compete in strongman contests.



Runaway stars – When some speedy, massive stars plow through space, they can cause material to stack up in front of them in a feature called a bow shock. These arc-shaped features are being used by researchers to find massive runaway stars. The bow shock heats up and glows in infrared light. A team of astronomers turned to archival infrared data from the Spitzer and WISE space tele-

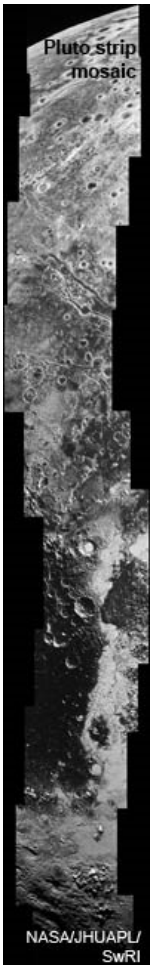
scopes to identify new bow shocks, including some more distant ones that are harder to find. Their initial search turned up more than 200 fuzzy red arcs. Then they used the Wyoming Infrared Observatory to follow up on 80 of these candidates and identify the sources behind the suspected bow shocks. Most turned out to be massive stars. The finding suggests that many of the bow shocks are the result of speedy runaway stars that were given a gravitational kick by other stars. However in a few cases, the features could turn out to be something else, such as dust from stars and birth clouds of newborn stars.



Star formation – A new radiotelescope survey is giving astronomers new information on how nature makes stars and planets. The Jansky Very Large Array radiotelescope observed 100 newborn stars in Perseus for 264 hours. The way in which stars form from a cloud of gas and dust is generally known, but details remain hazy, particularly for multiple stars. The new observation showed that most binary star systems fall into 2 categories: closer than 300 AU (where an AU is the Sun's distance from us), and those over 1000 AU. Apparently 2 different star formation mechanisms occur for these 2 cases. Likely the 2nd star forms in the 1st star's disk in the close case, but stars form in separate fragments of the cloud in the far case. Few older binaries were found in the far case, so likely such binaries drift apart over time. Only 3 early-stage star-forming disks were known in this region before the survey, and 18 more were found. Another discovery in this survey was that the particles in the disks were not the very fine dust expected at this early stage of star/planet formation, but were sand or gravel sizes.

Curiosity (Mars rover) has found much higher concentrations of silica at some sites it has investigated in the past 7 months than anywhere else it has visited. Silica makes up 9/10 of the composition of some of the rocks. Silica can be concentrated by evaporating water solutions or by leaching away other minerals. Both processes involve water. Further study is needed to determine which process occurred at these places. Adding to the puzzle, some silica at one rock studied is in a mineral named tridymite, rare on Earth and never before seen on Mars. The usual origin of tridymite on Earth involves high temperatures in igneous or metamorphic rocks, but the rocks in this vicinity are generally sedimentary rocks, not igneous or metamorphic. A lot of lab work is going on now to see if tridymite can be made without high temperatures. The other areas of high silica content found by Curiosity are not tridymite, much of it being noncrystalline opal.

New Horizons (Pluto mission) continues to return data taken during the Pluto flyby last July, and new discoveries are being made. Geological evidence has been found for widespread past and present glacial activity, including the formation of networks of eroded valleys, including hanging valleys (ones that end far up the side of an intersecting valley). New computer simulations of heat convection within the layer of nitrogen and other ices on Pluto explain the numerous polygonal ice features seen there, and also indicated this layer may be up to a few miles thick. Evaporation of these ices and condensation on higher surrounding terrain leads to glacial flow-back toward the basin. The haze in Pluto's atmosphere was found to be much more complicated than thought. Further study of the New Horizons data is expected to allow astronomers to understand this haze. New upper limits have been obtained for the density of the extremely tenuous atmosphere of the moon Charon. New data shows that ammonia is absorbed in low levels in many areas of Charon, not just the few high-concentration areas that were immediately found. It is not known what controls the distribution of Charon's ammonia, or if it comes from the interior or an external source. Atoms in Pluto's escaping atmosphere have been observed to be interacting with charged particles in the solar wind.



Pluto stamps – In 1991 the US Postal Service issued a series of stamps illustrating the planets. One pictured an artist's concept of Pluto with the words "Pluto: Not Yet Explored". One of those stamps was placed aboard the New Horizons spacecraft, so it witnessed the exploration of Pluto. The Postal Service released the designs for stamps for 2016, and a pair of them shows the New Horizons spacecraft and an image of Pluto taken by that spacecraft. Also in the stamp release are images of (now 8) Solar System planets, Earth's Moon, and a tribute to Star Trek.

Centaur threat – A team of astronomers studied the hundreds of Centaurs (asteroids orbiting among the 4 outer planets) discovered in recent years, and found they pose more of a threat of Earth collision than the currently known Near Earth Objects. The Centaurs are icy asteroids, and so are sometimes considered giant comets. Their typical size is 30-60 miles (50-100 km). Centaur orbits are unstable over long terms because of the disturbances by the gravity of the large planets. There is some evidence that a Centaur was deflected to the Earth's vicinity about 30,000 years ago. Closer to the Sun, a Centaur should disintegrate into dust and large fragments, flooding the inner Solar System with debris, some of which will by probability collide with Earth. The ages of submillimeter craters in lunar rocks returned

by the Apollo program are almost all younger than 30,000 years, indicating vast amounts of tiny debris hit the Moon during this period.

Solar eruptions – Researchers have identified a mechanism that may halt eruptions before they leave the Sun. It may provide a way to distinguish which solar activity will explode, possibly disrupting satellites and communications on Earth, and which will fall back into the Sun. The violent eruptions called coronal mass ejections stem from a sudden release of magnetic energy that is stored in the Sun's corona, the outermost layer. This energy is often found in what are called magnetic flux ropes, massive arched structures that can twist and turn. When these long-lived structures twist and destabilize, they can either erupt out into the Solar System or collapse back into the Sun. The researchers found in laboratory experiments that such failures occur when the guide magnetic field, a force that runs along the flux rope, is strong enough to keep the rope from twisting. Under these conditions, the guide field interacts with electric currents in the flux rope to produce a dynamic force that halts the eruptions. The researchers discovered this using the Magnetic Reconnection Experiment, the world's leading device for studying how magnetic fields in plasma converge and violently snap apart.

Exoplanets named – The IAU has announced official names for several exoplanets, and while they were busy naming, they added common names for some of the stars orbited by those exoplanets (some of those stars already had common names, shown in brackets below). The names were selected from those suggested by amateur astronomers in a naming contest and voted upon by the public.

New star name	**Previous star name**	**New planet name**	**New star name**	**Previous star name**	**New planet name**
Veritate	14 Andromedae	Spe	Ogma	HD 149026	Smertrios
Musica	18 Delphini	Arion	Intercrus	HD 81688	Arkas
Fafnir	42 Draconis	Orbitar	Cervantes	Mu Arae	Quixote (b)
Chalawan	47 Ursae Majoris	Taphao Thong (was planet 47 Ursae			Dulcinea (c)
		Taphao Kaew (c)			Rocinante (d)
Helvetios	51 Pegasi	Dimidium			Sancho (e)
Copernicus	55 Cancri	Galileo (b)	[Pollux]	Beta Geminorum	Thestias
		Brahe (c)	Lich	PSR 1257+12	Draugr (b)
		Lippershey (d)			Poltergeist (c)
		Janssen (e)			Phobetor (d)
		Harriot (f)	Titawin	Upsilon Andromedae	Saffar (b)
[Ain]	Epsilon Tauri	Amateru			Samh (c)
Ran	Epsilon Eridani	AEgir			Majriti (d)
[Errai]	Gamma Cephei	Tadmor	Libertas	Xi Aquilae	Fortitudo
[Fomalhaut]	Alpha Piscis Austrinus	Dagon	[Edasich]	Iota Draconis	Hypatia
Tonatiuh	HD 104985	Meztli			

DAMPE (cosmic-ray and gamma-ray space telescope) was launched by China on a Long March 2 rocket in December. It was China's 1st astrophysics payload sent to orbit. The spacecraft is nicknamed Wukong after the Monkey King in a 16th century novel. Because some theories of what dark matter is predict that it will occasionally annihilate into gamma rays, DAMPE may learn something about dark matter, too. It is sensitive to higher energy rays than current spacecraft searching for effects of dark matter.

NASA awarded contracts to Orbital ATK, Sierra Nevada Corporation, and SpaceX to deliver cargo to and from the International Space Station (ISS) between 2019 and 2024. 2 of these (not Sierra Nevada) have had the contracts for ISS cargo until 2019, since the retirement of the Space Shuttle in 2010. Sierra Nevada's cargo craft is the Dream Chaser, a spaceplane, while the other 2 companies are going with the traditional capsule atop a rocket. Each company is guaranteed at least 6 flights. SpaceX's cargo

craft has the ability to re-enter the atmosphere and soft land (as does the Dream Chaser), but Orbital's craft burns up on re-entry (which will be used to dispose of ISS trash). The choice of 3 companies was made on the basis of different capabilities of the space-craft and redundancy of supplier in case of unavailability. Both Orbital and SpaceX shut down their launches temporarily last year due to launch failures. Of course price and projected reliability were considered in the contract decision.

NASA budget – Congress passed a national budget late in 2015 that included about $19.3 billion for NASA, an increase of $1.2 billion from the previous year. Some earlier proposals had cut NASA's budget. Nearly all NASA programs will benefit. SLS (the monster rocket under development) is one of the biggest winners. The Commercial Crew Program to develop 2 systems to transport astronauts to the International Space Station also benefits, and can now maintain its scheduled 2017 launch and abandonment of US use of the Russian Soyuz spacecraft. The orbiter and lander to Jupiter's moon Europa planned for the early 2020s got support. There is money for continued operation of Opportunity Mars rover and the Lunar Reconnaissance Orbiter, which had been threatened with abandonment in an earlier budget proposal.

Instant AstroSpace Updates

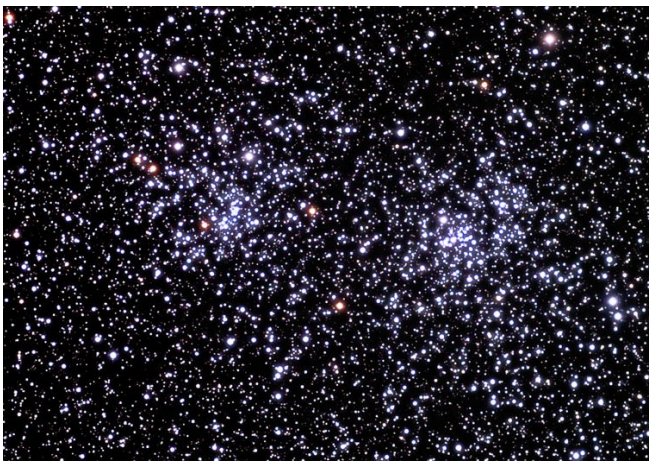
New calculations show that a supermassive **black hole** should destroy its surrounding disk and prevent further material from falling in when the mass reaches 50 billion solar masses, which roughly coincides with the largest black holes yet discovered. However, a black hole might grow even larger by colliding with another black hole, but the lack of a disk could prevent us from observing it.

SpaceX has successfully soft **landed**, tail first, a **Falcon** 9 booster rocket after separating from the upper stage and payload, opening the possibility of reusing such, and lowering the cost to get to space. The flight launched 11 communications satellites.

NASA has suspended the planned March launch of Mars mission **InSight** because the principal instrument, a seismometer that must operate in a vacuum, has sprung another leak in its vacuum chamber during extreme cold tests (previous leak was fixed), and there is not enough time to fix and test it. Next alignment of Earth and Mars for a launch opportunity is 26 months later.

The Oak Ridge Lab has begun making **plutonium-238** for use in powering spacecraft (there have been 27 US plutonium-powered ones) that go too far from the Sun for solar power, or operate at night, like rover Opportunity; none of this fuel has been made since the late 1980s.

Juno (Jupiter mission) has broken the record (was 492 million miles = 792 million km, held by Rosetta) for the farthest distance from the Sun while under solar power; it has 3 of the largest and most efficient solar panels ever on a spacecraft. Arrives at Jupiter July 4.



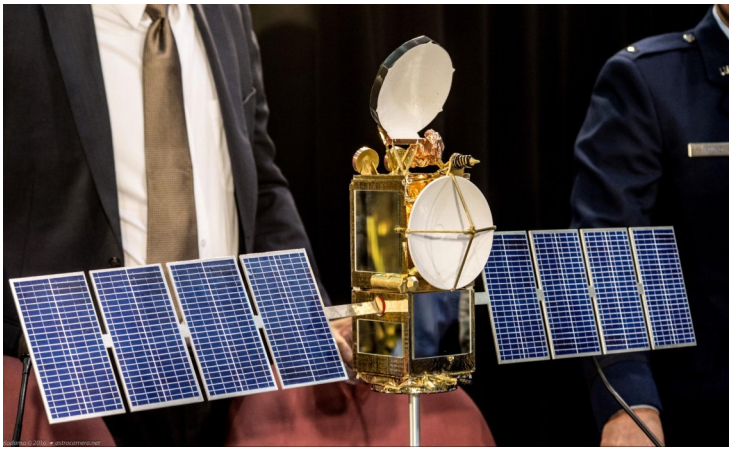
The famous Double Cluster (NGC 884, 869) in Perseus is a very easy target for beginners using instruments of any size. A circumpolar object, the Double Cluster is visible throughout the year. (credit: Don Lynn)

A Rocket Launch "Expedition" (#2)

By Dave Kodama

The January launch of the Jason 3 ocean monitoring satellite from Vandenberg Air Force Base in California brought a second chance for me to attempt another photo road-trip to a rocket launch.

Background



Jason 3 is the third in a series of satellites designed to monitor the height of the oceans using radar altimetry. This is a multi-agency effort including NASA, NOAA, JPL, EUMETSAT (European Meteorological Satellite Organization), and CNES (French National Space Agency). The Jason series of satellites itself follows the road pioneered by TOPEX/Poseidon (1992-2006). As you may expect, the mission includes many on-going projects, but the highest profile one is to monitor the changes in ocean level to add hard numbers to the question of climate change effects.

Jason 1 and Jason 2 were also launched from Vandenberg AFB (2001 and 2008, respectively) via Delta II boosters. Jason 3 was launched using a SpaceX Falcon 9 vehicle. It's interesting to note that when Jason 1 was launched, SpaceX was not even in existence!

One of the interesting products coming from Jason observations is the ability to track the El Niño via the bulging of the warm water surface, so it's also a bit ironic that the launch of the satellite happened to be scheduled between waves of El Niño winter storms hitting the California coast. Fortunately, it all worked out and the launch went off right on time on Sunday, January 17th.

The Photo Expedition

Back in September 2013, my wife, Jean, and I made our first attempt to photograph a Vandenberg rocket launch. This was also a SpaceX launch, which we viewed from outside the base. Seeing a launch in person was impressive, so I was determined to make more attempts. The weather was (as it turns out) exceptionally clear for that launch (left), but there were hills which blocked our view of the launch pad and so we were not able to see the first few seconds of the launch.

For this launch (the second for SpaceX from Vandenberg AFB). we were able to obtain permission to get onto the base, for what we hoped to be a better viewing spot. As a bonus, the day before the launch we were able to photograph the launch pad from the remote camera viewpoint where automated camera setups are permitted, but no one is allowed to be present during the launch. Our launch viewing position

was to be 3-4 miles away to the north of the launch pad, to the far right of the panoramic view shown below. The shot shows the SpaceX launch vehicle on its pad. To the left, under construction is the landing pad to be used by returning boosters. When launch constraints do not allow for a booster's return to the landing pad, the SpaceX barge will serve as the landing pad.

Despite the dicey weather prospects due to winter weather, the day

of the launch was expected to be perfect (0% predicted chance of a weather cancellation), and the day before was nice, with only high clouds. So it was with a great deal of optimism that our crew (Jim Windlinger, Jean, and myself) brought 8 cameras with us on Sunday morning.

Launch Day

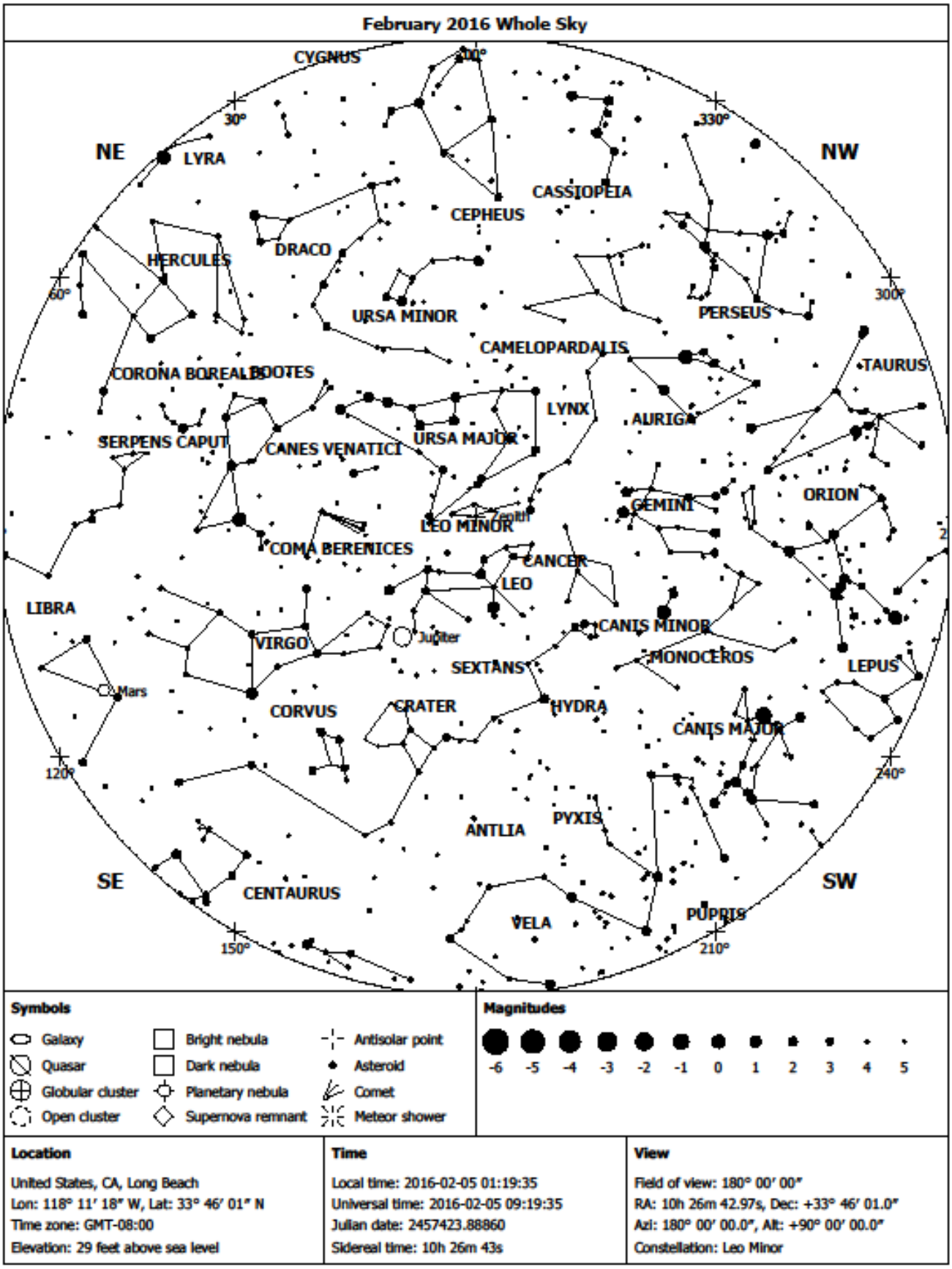
The day of the launch was indeed just fine… for launching a rocket, but not for seeing the launch! Unfortunately fog and clouds blanketed the southern California coast, so we saw only about a 5-second glimpse (composite at left) of the rocket flames far down-range, though we did hear and feel the launch more strongly than at the first launch. We even had a brief whiff of kerosene, pre-sumably from the launch.

The launch itself and deployment of the satellite went as planned. For several months the Jason 3 satellite will be in the same orbit, about a minute behind Jason 2. Later the separation will be ad-justed so Jason 3 trails Jason 2 by 5-10 minutes. This orbit (inclined 66 degrees) covers the entire earth in 10 days.

Unfortunately, a secondary SpaceX goal of landing the 1st stage on a barge located along the flight track failed after the rocket fell over when a landing leg did not lock into place, possibly due to icing up of condensation from the damp weather at launch. So-o-o close to success! Clearly SpaceX has at least gotten the barge targeting and soft touchdown worked out as the booster appears to have gently settled right on the landing target.

The good news is that as SpaceX gets into high gear, there will be more frequent photo opportunities from the Vandenberg site. We could clearly see the landing area under construction near the launch pad, so perhaps we'll also get to see a landing in the future, Vandenberg fog permitting!

For more photos, see http://astrocamera.net



Location	Time	View
United States, CA, Long Beach Lon: 118° 11′ 18″ W, Lat: 33° 46′ 01″ N Time zone: GMT-08:00 Elevation: 29 feet above sea level	Local time: 2016-02-05 01:19:35 Universal time: 2016-02-05 09:19:35 Julian date: 2457423.88860 Sidereal time: 10h 26m 43s	Field of view: 180° 00′ 00″ RA: 10h 26m 42.97s, Dec: +33° 46′ 01.0″ Azi: 180° 00′ 00.0″, Alt: +90° 00′ 00.0″ Constellation: Leo Minor

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