SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

December 2010 | Free to members, subscriptions $12 for 12 issues | Volume 37, Number 12

This H-alpha image of the Bubble Nebula (NGC 7635) was created by Bill Hall from Yorba Linda, CA on September 2, 2010 using a C8 at f/5.7 and 139 minutes total exposure.

OCA CLUB MEETING

The free and open club meeting will be held December 16th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month, Dr. Doug Millar will present 'A Practical Guide to H-alpha Solar Observing and Equipment.'

NEXT MEETING: January 14th

STAR PARTIES

The Black Star Canyon site will be open on December 4th. The Anza site will be open on December 11th. 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 on Friday, December 3rd at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana. Next month the class will be offered on January 7th.

GOTO SIG: TBA
Astro-Imagers SIG: Dec. 21st
Remote Telescopes: Dec. 27th
Astrophysics SIG: Dec. 17th
Dark Sky Group: TBA

NIGHT SKY PHOTOGRAPHY OUTING

by John L. Roberts

Twelve of the required pre-registered minimum of 15 participants showed up for the Night Sky Photography workshop held on Saturday, October 23, 2010, in the Meeting Room of the Palm Canyon Resort, located in Borrego Springs, California. After a few hours of instruction, we all signed a Release Form to participate in a photographic outing that was located in the hills off Highway S-22, the town's main thoroughfare.

Dennis Mammana, our instructor, has resided in Borrego Springs for about seven years and is a member of TWAN sky photographers, which is an acronym for **T**he **W**orld **a**t **N**ight, an organization which may be looked up on the Internet at www.twanight.org.

dennismammana.com
Dennis Mammana
P.O. Box 2071
Borrego Springs, CA 92004-2071
E-mail: mammana@skyscapes.com

Basically, Dennis says his Night Sky Photography course is all about trial and error; namely, shoot, review, and reshoot. The end photographic result is a matter of the photographer's personal interpretation.

Dennis suggests setting one's lens to Manual mode and obtain some "gaffer's tape," which leaves no sticky residue and is readily available from any art supply store, to tape the exact setting on your camera lens for the sharpest focus, which he stresses is not necessarily located at the infinity mark imprinted on the lens' barrel. He suggests also taping over the Automatic / Manual switch so that one does not accidently or intentionally switch back to Automatic and attempt in that mode to take normal photos while the lens is still taped, for doing so may result in damaging the camera lens' gears as it grinds away trying to focus automatically while still securely taped.

Dennis suggested placing red reflecting tape on one's tripod in strategic areas so that a person may find his or her tripod in the dark if they wander afar. Then, when a flashlight is shined, you can easily find it. He related a story of his meandering off and ending up hunting around in the dark one night for two hours trying to find his tripod. He also suggested placing knee pads on your equipment check-off list for crouching on the ground to look through a polar scope, finder scope, or to aim the camera at specific regions directly overhead. Ugh! It can be painful on the knees, especially the older you are and if there are little rocks underfoot (Ouch!).

If you bring a camera bag, Dennis suggests keeping it sealed at all times. Otherwise, a scorpion or other creepy crawler(s) may hitch a ride in it and bite you when you feel around in the bag for a much-needed camera accessory. Crawling creatures may also become stowaways and later invade your home.

Dennis suggests packing doubles of anything on your check-off list that can break (which is usually everything, anyway), including memory cards, flashlights, and an extra set of car keys in case you get locked out of your car in no man's land, since is no cell phone service is available out there in the sticks, so who ya gonna call for help? Having an observing buddy tag along, too, does have its advantages.

It is easy and not difficult to take night sky photos.

Dennis suggests weighting down your tripod unless it is a heavy one, as an unexpected gust of wind can easily blow the setup over. If you are in a sandy location, press down on the tripod head to sink the tripod legs in the sand. He also suggested bringing along a few plastic grocery bags and loading them with available sand or rocks and hanging them from the tripod to give it more weight and to make it more vibration resistant.

Dennis also suggests always shooting in raw mode in case you end up with a Pulitzer Prize photograph. By shooting in raw mode, you will always have the original information the camera captured rather than a second-generation images, as is the case with fine JPEG. In raw mode, you can process the sky foreground and background separately and blend them together with post-processing software on the computer.

If you are going to use JPEG, Dennis suggests setting the white balance to about 3400K, but cautioned that once you set the white balance in-camera in JPEG, you can't change it later at the computer, so it is better to change the white balance during

(continued on page 10)

TOP TWENTY THINGS AN ASTRONOMER SHOULD SEE

#10 The Milky Way From a Really Dark Sky

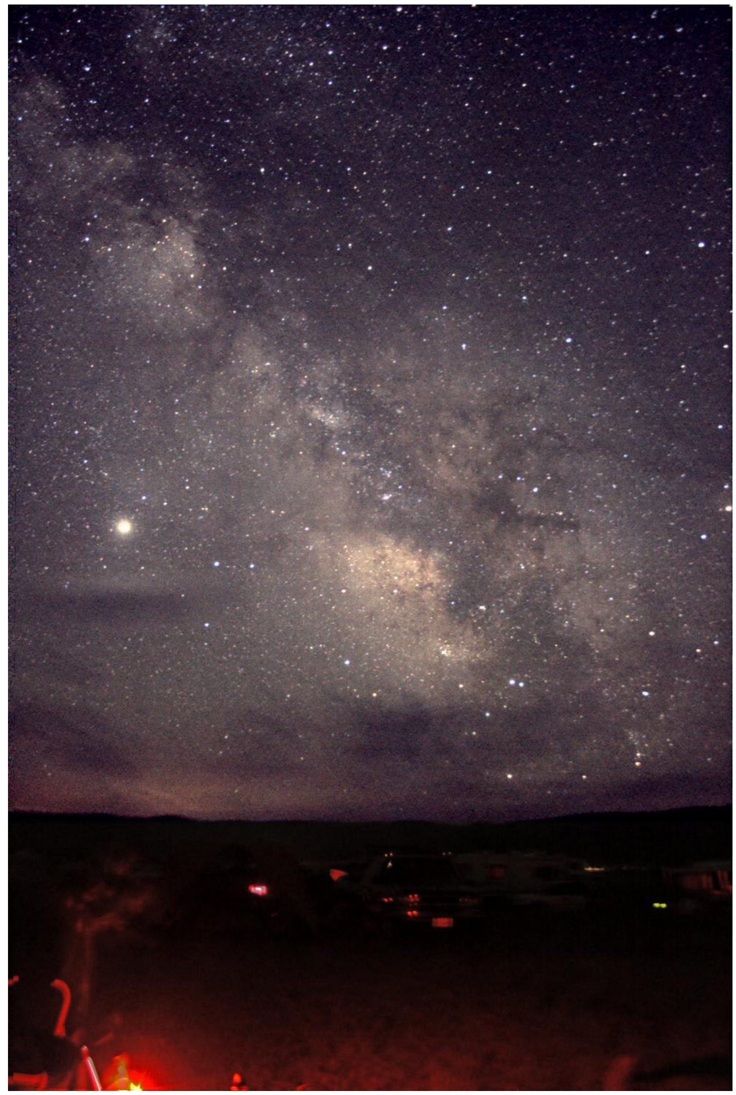
By Helen Mahoney

We are now into the "Top Ten", and most of the rest of my choices will require planning, or travel, or both to see. But as they are more difficult to see, they are also more spectacular.

For #10, if you already are lucky enough to live in a place with a really dark sky, this one won't be much of a problem. Those of us who live in Orange or Los Angeles counties have to go pretty far for dark skies. I mentioned in my article #16 that I grew up in Long Beach, California, where we are lucky to see third magnitude stars, and that I had never seen the Milky Way until I went away to camp in the mountains. I have only seen the Milky Way from Long Beach once. I was at the beach at night, several years ago, looking south over the ocean. It was dark enough to barely visualize the steam cloud coming out of the Sagittarius tea pot.

The Milky Way is beautiful to see it at all, but the darker the sky, the more of it you see, and detail emerges. You begin to appreciate the structure in it. I remember a particularly dark night many years ago in Big Bear (at RTMC), when the lights of Los Angeles were blocked out by a marine layer. I was staring at the Milky Way when suddenly something snapped, and I could see the three dimensional structure of the whole sky. I was staring at the center of my own galaxy. The Milky Way wasn't just up in the sky—I was imbedded in it! The sky has never been the same to me since.

I've heard my friends and acquaintances talk about the darkest skies they have observed in. For me, the darkest have been the Australia outback (more on that in a future article), and the Grand View campsite in the White Mountains near Bishop, California.



OCA President Craig Bobchin captured the Milky Way over the Golden State Star Party in Aiden, CA on July 5, 2008. This image is a stack of 6 30-second exposures at ISO 1600 taken through a Canon 20d.

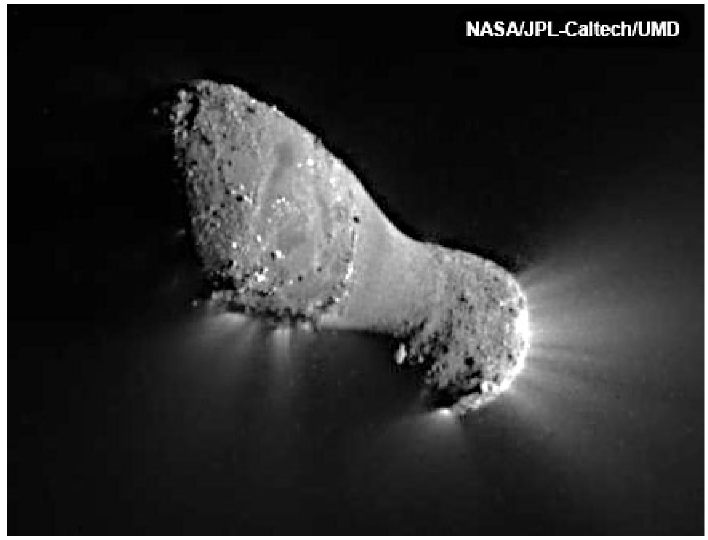
The White Mountains campsites are "primitive", and that includes no lights for a very long distance. When the sun set (spectacularly over the Sierras), so many stars were out that it was actually hard to pick out familiar constellations. I was looking at some deep space objects with my telescope. When I looked up from the eyepiece, there was the Milky Way, and it startled me. It was about twice the width that I was used to seeing it. My instinct told me that because it was bigger, it must be closer, and that is why I jumped—it must be falling! It was actually so bright that it cast shadows of our hands against our friend's white telescope.

Even though I can't see the Milky Way from home, I know where it is supposed to be, and I often stare up at Cygnus, and imagine it stretching over to Cassiopeia. When I forget where the outline is, it's time to find a dark sky and re-calibrate.

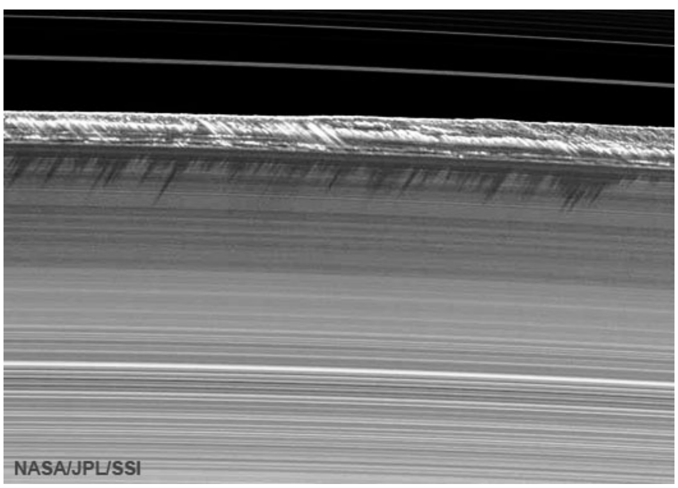
■

AstroSpace Update

December 2010
Gathered by Don Lynn from NASA and other sources



Deep Impact spacecraft flew by comet Hartley 2 on November 4, almost exactly through the aim point 435 mile from the comet. The first pictures showed a shape like a bowling pin, with multiple jets of material spewing out from both ends. One surprise is that the jets were not located at the warm point (directly under the sun), but were spread about both the day and night sides. The "neck" of the bowling pin shape is much smoother than the rest, probably coated in thick dust. No jets appear in that area. There are no apparent craters anywhere. The life of a comet has to result in multitudes of collisions, so the resulting craters must have been obliterated or covered up. Only 4 other comets have been seen close-up by spacecraft, and this flyby produced more observations than any previous one. Of the others, one (Borrelley) is similarly shaped, and Halley is roughly similar, usually being called peanut-shaped. The Deep Impact spacecraft was reused for this mission, after completing its flyby and impact (of a separate projectile) at comet Tempel 1. The reuse of the spacecraft cost NASA about 1/10 of what a new mission to a comet would cost. Hartley 2 is a tiny comet, only about 1.2 miles long. This is ¼ the length of Tempel 1, resulting in 1/100 the volume. Just before the flyby, the comet was observed to expel a surge of cyanogen radical, commonly called cyanide. This has been observed before with other comets, but Hartley 2 is the only one to discharge this without also blowing out large quantities of dust with it. Theory says that dust is well distributed within the frozen ices of the comet. So whenever a pocket of any kind of ice (including cyanide) evaporates, it should release dust too. This behavior will keep the theorists busy revising. Malcolm Hartley, who discovered the comet in 1986, was invited to JPL to give a lecture and to watch the first close-up pictures as they arrived. He was not the first discoverer to see his comet up close; Paul Wild lived long enough to see the images sent by the Stardust spacecraft as it flew by comet Wild 2 in 2004.



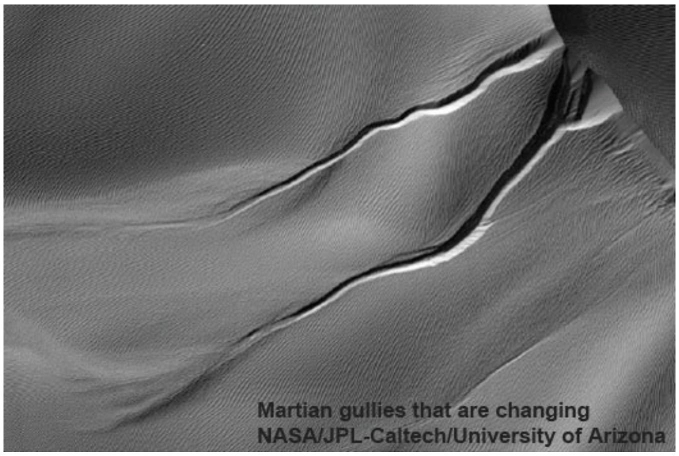
Cassini (Saturn orbiter) – Scientists have analyzed years of Cassini images of Saturn's rings and have found that 2 areas on the outer edge of the B ring are disturbed, sort of rumpled. Vertical disturbances there rise as high as 2 miles above the plane of the rings. Likely there are moons embedded in the areas, smaller than can be resolved in the images. It has been calculated that gravitational disturbances from the moon Mimas would push nearby moons to this distance from Saturn, and then trap the tiny moons there. Mimas revolves once about the planet every time this part of the ring revolves twice, setting up a resonance that promotes such disturbances. 3 rotating wave patterns were found in the ring. That is, parts pulse slightly inwardly and outwardly over time. The periods of these pulses match what is calculated for the natural frequency of the B ring. That is, the pulses are the result of the ring ringing, like a bell. The same math found to apply to the B-ring should work on other disk systems, such as spiral galaxies and protoplanetary dust disks about stars.

Cassini data show that Saturn's southern hemisphere is emitting about 1/6 more heat energy than the northern hemisphere. Old data from the Voyager flybys in the early 1980s shows that the heat from the 2 hemispheres was nearly equal. It was thought that this might be a seasonal effect, but the Saturn season was nearly the same at the Voyager flybys as now. The best guess is that cloud patterns vary enough over the years to affect the hemispheres' heat emissions. In addition, the Cassini data show that the total **heat emitted by Saturn** has been gradually dropping over the years of the mission. Scientists have been watching the heat emitted by Saturn, trying to understand why it gives off so much heat, more than twice the heat it absorbs from sunlight.

Cassini entered **safe mode** early in November due to a computer glitch. Restoration of operation by commands from the ground is proceeding as I write this, and is expected to complete by November 24. Due to safe mode, no data will be taken during the November flyby of Titan. But this can probably be made up during the 53 flybys of that moon planned during the rest of the mission, currently scheduled to run until 2017. This is the 2nd safe mode since it began orbiting Saturn in 2004, and the 6th since launch in 1997.

Martian water – Data returned by the Spirit Mars rover before it went into hibernation due to the lack of power during Martian winter has been analyzed to show that the soil under the rover shows evidence of water sinking into the ground. There is a lot of dispute over what happened to the water that apparently was plentiful on Mars billions of years ago. Sinking into the ground may be one answer. Minerals least likely to dissolve in water, such as silica, hematite and gypsum, were found nearer the surface, while minerals of increasing solubility, such as ferric sulfates, were found deeper and deeper. Analysis of different layers of soil was enabled by the rover wheels digging deep into the soil during efforts to free the rover from the powdery soil that it was stuck in. The dissolving of the sulfates appears to be geologically recent, that is within the last few hundred thousand years. The source of the water sinking into the soil could have been melting frost or snow.

More Martian water – There is considerable evidence that lakes or seas existed on Mars, probably billions of years ago. One leading theory of how they formed is that water underground was released by large areas of crust collapsing in a catastrophic flood. A new study says that the observations support slow and continued frequent releases of ground water through fractures in the crust to form the lakes and seas. Such fractures are still seen in basins on Mars. If this theory is right, lakes and seas could have formed, disappeared and reformed many times.


Martian gullies that are changing
NASA/JPL-Caltech/University of Arizona

Mars Reconnaissance Orbiter (MRO) – Scientists have been studying gullies on Mars that show up with changes between images taken by MRO. Most gullies on Mars appear similar to ones on Earth that were created by running water. But the fact that gullies on Mars continue to deepen, and running water is very unlikely under current Martian conditions, has discouraged the view that water is the cause of Martian gullies. A new study of 18 gullies that changed, with lengths ranging from 50 yards to 2 miles, showed that all the changes occurred during Martian winter. That implies the most likely cause of the growth of the gullies is avalanches. The temperatures at the time indicate that the ice involved in the avalanches would have to be dry ice (frozen carbon dioxide) not water ice. Though flowing water is eliminated by these observations, there remain a few other possibly gully causes, such as trapped evaporating (subliming) dry ice blowing material in the gullies downhill. So observations of Martian gullies will continue.

Eris (dwarf planet) – I reported here last month that the material on the surface of Eris was found to be almost identical to that on Pluto. It was assumed by planetary astronomers that the interior of Eris should be almost identical to Pluto, since they should have formed in the same way in the same general area of the solar system. But on November 6, Eris passed in front of (occulted) a star and this was observed by 3 observers. Now for the 1st time the size of Eris is precisely known, calculated from the 3 timings of the occultation. The masses of both Pluto and Eris were already known, from timing their moons' orbits. From the new diameter measurement, Eris is found to be a lot denser than Pluto, so the former is mostly rock inside and the latter is mostly ice inside. So they could not have formed similarly in similar places. What's more, the occultation calculations just dropped Eris from the largest dwarf planet to 2nd place, probably. The uncertainty in the measurements of Pluto's and Eris's diameters leaves a small chance that Eris is just barely larger, but unlikely. But Eris is still the most massive dwarf planet. It was the most distant solar system object ever observed to occult a star.

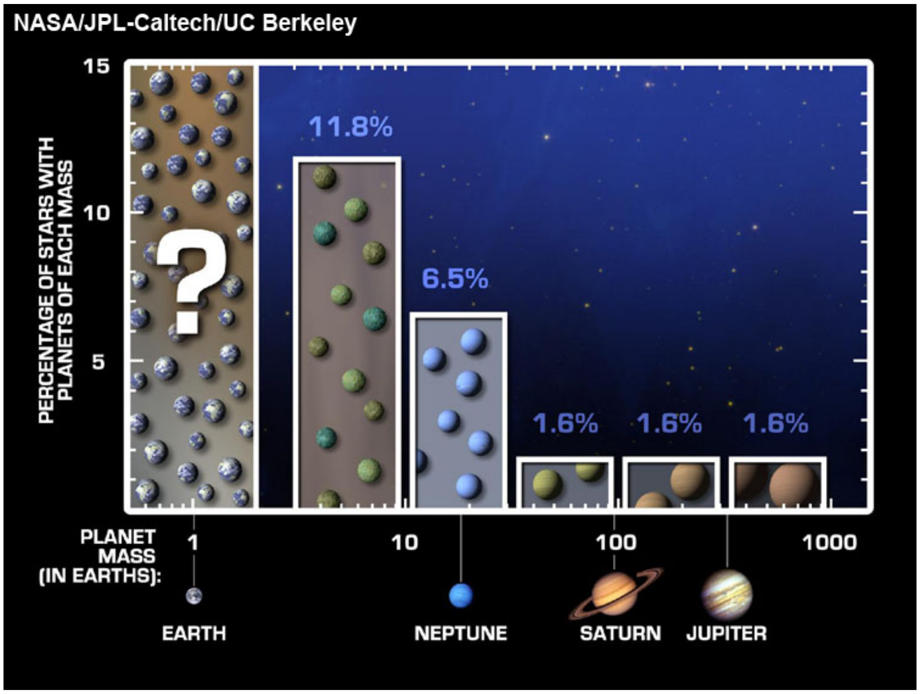
LCROSS (lunar impact mission) has announced more results of analyzing the data taken on the plume of material splashed up from the impact in a crater near the south pole of the Moon. Somewhere between 9 and 13 thousand pounds of material was thrown into the field of view of the LCROSS instruments. The impact created both a low-angle and a high-angle cloud. A substantial amount of water was detected, in various forms: vapor, ice, breakdown products, such as 2 forms of hydroxyl. Roughly 6% of the mass of material within the crater is estimated to be water ice. In addition these were seen, roughly in decreasing order of abundance: carbon monoxide, hydrogen sulfide, carbon dioxide, sulfur dioxide, hydrogen gas, methane, formaldehyde, ethylene, ammonia, sodium, mercury and silver. The abundances of these changed over the time that they were observed. The spacecraft crashed into the Moon, as planned, 4 minutes after the rocket body impacted, so all the data was observed and relayed to Earth during that time. The changes in abundance are being related to what was released at the impact, what was evaporated by sunlight, and what was sweated out by the heat of impact. The concentrations of ammonia and methane relative to water were similar to what is seen in a comet, supporting the theory that the material in the polar lunar craters was put there by comet impacts. However there is some evidence for outgassing from the Moon, solar wind and other sources for the material. Water (mostly as ice) is not uniformly distributed within the shadowed cold traps, but is in pockets, some of which lie outside the shadowed regions. The high concentrations of carbon monoxide and hydrogen sulfide suggest that considerable chemical reactions have occurred in the material lying in the crater. How this could occur at only 70-90° F. above absolute zero, without sunlight, is baffling scientists.

Chandrayaan 1 (lunar orbiter from India) – Continued study of the data from this now-completed mission has uncovered 2 new types of moonrock: magnesium spinel and chromite spinel. The first was found in small spots inside a crater on the far side of the Moon, in areas unusually devoid of pyroxene and olivine, normally quite widely distributed on the Moon. No other clues were found as to why magnesium spinel formed in this particular area. The other new type of moonrock was found in plain sight on the front side, in a large area known to have formed long ago from explosive volcanic activity. The new rock types showed up in the infrared mineral-identification survey made by Chandrayaan 1.

(continued next page)

THEMIS (fleet of magnetosphere spacecraft) – Since launch in 2007 of the 5 THEMIS spacecraft, the 2 outermost have drifted into orbits that cause them to spend too much time in the Earth's shadow. They were designed to tolerate only 3 hours without sun on their solar panels. Something had to be done to save the spacecraft. The decision was made to send the 2 to the Moon. Little is known about the fields and particles in the Moon's vicinity, the 2 had completed science goals near the Earth, and there remained plenty of fuel on board to move to the Moon. They have been stationed in the L1 and L2 Earth-Moon Lagrange points, located above the near and far side of the Moon respectively. Their new mission has been named ARTEMIS. They will explore the Moon's plasma wake, the solar wind, and the Earth's magnetotail (which they and the Moon pass through once a month). After 6 months at the Lagrange points, the spacecraft will be moved closer to the Moon to explore that region and observe the solar wind's effects on the Moon. They will use highly elliptical orbits, spending only a little time near the Moon, in order to reduce the orbit-disturbing effects of the mass concentrations in the surface of the Moon.

Small exoplanets – A new study of exoplanets, those outside our solar system, has found that smaller planets are much more common than larger ones. The study considered only those orbiting close to their stars and which were found with the radial velocity search technique, since this class has been more completely examined than other classes. This result agrees strongly with another recent study that selected planets by a different method. More large planets have actually been found, but these 2 studies imply that is only because our planet detection methods find large planets more easily. Data on Earth-sized planets is incomplete, but extrapolating the curve established by larger planets showed that about ¼ of Sun-like stars should have Earth-sized planets. The study estimated that there are over 46 billion Earth-sized planets in our Milky Way. Some planet-formation theories have predicted that certain ranges of sizes of planets would rarely form. The new study found no such ranges, contradicting those theories.



Gliese 581d (exoplanet) – Last month here it was announced that the first exoplanet (Gliese 581g) had been found that is firmly within the zone where planet surface temperatures allow liquid water. Now studies of the conditions at that planetary system indicate that the next planet outward, Gliese 581d (it got the earlier letter "d" because of earlier discovery), is also likely to allow liquid water. It can probably hold an atmosphere, and the likely constituents of that atmosphere should warm the planet, even at its farther distance, enough for liquid water to exist.

Spitzer (infrared space telescope) has mapped the temperature around the surface of an exoplanet by measuring the changes in light as the planet orbits its star upsilon Andromedae. The planet cannot be resolved separately from the star, so only their combined light is seen. The planet orbits its star closely, taking only 4.6 Earth days to complete its year. It keeps one side of the planet always facing its star, due to tidal effects. The planet had a hot spot, as expected, but it was not at the sub-star point, but nearly at the sunset point, at an 80° angle away. Some wild theories for this are being proposed, such as supersonic winds, shock waves heating the atmosphere, and magnetic interactions, but these all lie at the speculation level so far. More observations of exoplanets' temperature distributions will be required to sort this one out.

WISE (infrared space telescope) has discovered its 1st cool brown dwarf star. It turns out to be easy to find such in the false-color infrared images, because cool brown dwarfs appear green – they don't give off the infrared colors coded as red and blue. Continuing examination of WISE images has turned up many more brown dwarf candidates, which are being confirmed by other observations. Hundreds are expected to be found eventually in the WISE data. Brown dwarfs are stars that lack sufficient mass to cause continued fusion of hydrogen, which is what powers ordinary stars. Thus the brown dwarfs just slowly cool off after their formation. The newly discovered one is about 620° F., and is estimated to be 18-30 light-years away.

Gravitational lenses are quite useful to astronomers: they magnify and brighten the objects behind, they can be used to calculate the distribution of mass (including dark matter) about the lensing object, and can be used to calculate distances. But they are notoriously hard to discover. Strong gravity bends light to form these lenses, as predicted by General Relativity. But gravitational lenses have been found to show up quite brightly in images from the Herschel Space Observatory, due to the wavelengths that Herschel observes. In a quick search of 2% of the planned Herschel survey of the sky, 5 suspected gravitational lenses were found, all of which were confirmed by follow-up observations with other telescopes. The search will continue.

Most massive neutron star – Astronomers using the Green Bank radiotelescope have discovered the most massive neutron star yet found, having about twice the mass of our Sun. Several of the theoretical models for the interior structure of a neutron star will not support a star that massive, so those can now be ruled out. The existence of hyperons or kaons within the star are 2 ideas that are ruled out. Free quarks within the star, but not interacting quarks, are also ruled out. On the other hand, more massive neutrons stars support the theory that short-duration gamma ray bursts are caused by colliding neutron stars. The newly discovered neutron star spins 317 times per second, sending radio pulses toward Earth each time around. A companion star, a white dwarf, orbits it every 9 days. The orientation of the orbit is such that the radio pulses pass next to the white dwarf once every orbit. The distortion of space (due to General Relativity) caused by the white dwarf's gravity was measured by its effect on the radio pulses. This, along with the orbital information, allowed calculating the masses of both stars.

Strange pulsar – Magnetars are a type of neutron star with incredible magnetic fields, billions of times stronger than our Sun's. It was thought that dramatic flares and bursts of energy came from only magnetars, but now such bursts have been observed emanating from a weakly magnetized, slowly rotating pulsar (neutron star that produces pulses each time it rotates). In fact this star was discovered last year when it gave off bursts of gamma-rays that were seen by the Fermi space telescope. The star is rotating every 9.1 seconds, which is relatively slow for a pulsar. Another characteristic of this star that is unexplained is that the rotation rate is not slowing down, where other pulsars are gradually slowing.

Youngest black hole – Astronomers using the Chandra X-ray space observatory have found evidence of the youngest black hole (only 30 years old) known to exist in our cosmic neighborhood. It is the remnant of supernova 1979C, which exploded in the galaxy M100 about 50 million light-years from Earth. Data from Chandra, Swift, XMM-Newton and the ROSAT X-ray space observatories revealed a bright source of X-rays that has remained steady during observation from 1995 to 2007. This suggests the object is a black hole being fed either by material falling into it from the supernova or from a binary star companion. In 2005, a theory was presented that the bright optical light of this supernova was powered by a jet from a black hole that was unable to penetrate the hydrogen envelope of the star to form a gamma-ray burst, so was observed simply as a supernova. X-ray data fits this theory very well. One other possibility exists: the supernova could have produced a neutron star instead of a black hole, which could possibly produce the X-rays if it had a high stellar wind. That would make it the youngest known neutron star and the brightest example of a high-wind pulsar. More observations will either confirm or rule out this alternate explanation.

Magellanic Clouds, small nearby galaxies, possess speeds relative to the Milky Way that are suspiciously close to escape velocity that it is not certain that they are permanently captured in orbits about our Milky Way. Their motion is not in the right direction for them to have formed as part of the Milky Way formation process. Their gas content differs considerably from the other nearby galaxies that probably did form with the Milky Way. All this suggests that they came from elsewhere and were captured by the Milky Way, perhaps only temporarily. A new series of computer simulations of their motions back in time suggests that they may have formed with the Andromeda Galaxy and later ventured into the vicinity of our Milky Way. This is one of the theories that already existed to explain their origin. The new simulations are probably more accurate than past efforts, since they take into account the attractions of other galaxy clusters and the best estimates of the distribution of dark matter.

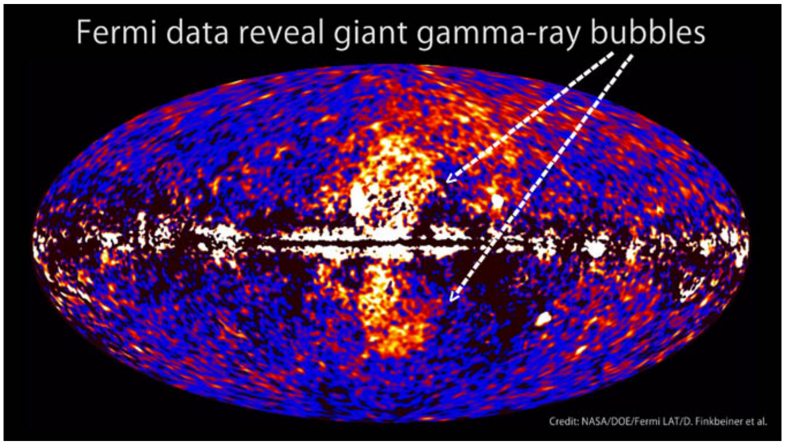
Farthest galaxy – A team of astronomers using the Very Large Telescopes in Chile has measured the redshift, and therefore the distance, to a faint galaxy found in the Hubble Ultra Deep Field image, and found it to the be farthest galaxy reliably measured. Its redshift is 8.6, which corresponds to being so distant that its light left there only 600 million years after the Big Bang. The light has been traveling toward us for about 96% of the history of the Universe. The light is so redshifted that visible and ultraviolet light that left there has been stretched into infrared light. At the time we are seeing the galaxy, some hydrogen in the space between galaxies had not been ionized (most is ionized today, and has been for billions of years). Unionized hydrogen absorbs much ultraviolet light, which makes galaxies in this era dimmer and more difficult to see. Such galaxies as this are thought to have supplied the light that ionized the intergalactic hydrogen. However, calculations made on this observation show that it is not bright enough to ionize its area of the Universe, implying that there are more galaxies in its vicinity, too dim for us to see with current technology, that add enough more light to ionize the region.

Andromeda thick disk – The Milky Way is known to have a thin disk and a thick disk. The thick disk is more thinly populated, but with stars generally older and more lacking in heavy elements, and with a larger range of velocities. Searches for the thick disk of the Andromeda galaxy have been unsuccessful until now. The difficulty in finding the thick disk is probably because we see the thin disk through the thick disk because of the angle of the galaxy to our line of sight. The successful technique was to observe the spectra of red giant stars using the Keck II 10-meter telescope in Hawaii. Andromeda's thick disk is 3 times thicker than the Milky Way's. The average velocity of the thick disk is indeed higher than the thin, but both averages are higher than the Milky Way's respective velocities. The origin of thick disks is not known. One theory is that galaxy mergers create the thick disk. If this turns out to be the correct theory, then the characteristics of the Andromeda thick disk would point to more merger activity there than at the Milky Way.

Fermi (gamma-ray space telescope) has discovered 2 huge bubbles emitting gamma rays, one on each face of our Milky Way galaxy, each extending 25,000 light years. They may be remnants of some past eruption from the center of the galaxy, but the exact origin is unknown. The bubbles became apparent when better methods were developed of computer processing Fermi data to eliminate the general fog of gamma rays coming from all directions in space. Hints of the bubbles have appeared in past X-ray and radio data, but they were not as distinct as the new gamma-ray data.

(continued next page)

(continued from page 7)



Milky Way shape has been determined by observations made at wavelengths of light that penetrate dust, such as radio or infrared. Being on the inside of a galaxy with much obscuring material has made this difficult. The radio measurements have generally looked for a spectral line given off by hydrogen. A new study was made of the shape of our galaxy using a spectral line of carbon monosulfide, a reasonably common gas in the Milky Way. The results roughly agree with previous methods. However the new study found several straight sections of galaxy spiral arms among the curves. Some spiral galaxies, such as M101, are known to have such straight sections, which give them a rather boxy look. So our galaxy, if seen from outside, may well have this boxy look. Also the new study detected a 3rd spiral arm. Some studies in infrared have found only 2 arms.

Starquakes – A team of scientists that used data regarding thousands of stars observed by the Kepler spacecraft announced that they have detected stellar oscillations, or starquakes. Kepler was designed to monitor 160,000 stars looking for exoplanets to pass in front of them. Data relevant to starquakes is a free byproduct of the observations. The team reported on watching a star grow into a red giant, and watching the star RR Lyrae, the first-found of a class of variable stars. 2 periods of oscillation were known for RR Lyrae, but the Kepler data showed a 3rd period, twice and long as the primary oscillation period.

Space carbon – After the Spitzer space telescope found buckyballs from their spectrum in a planetary nebula (announced here in the September issue), more such nebulas, as well as areas of interstellar space, have been examined and more buckyballs have been found. Buckyballs are molecules composed of 60 carbon atoms in a spherical shape. 3 nebulas in the Milky Way and one in the Small Magellanic Cloud (SMC, a nearby small galaxy) have been found to contain buckyballs. All the nebulas were found to be rich in hydrogen, an unexpected result. Buckyballs don't form in the lab in the presence of hydrogen. The nebula in the SMC was the only one for which a reliable distance is known. Calculating the mass of the cloud of buckyballs requires knowing their distance. The one known-distance cloud totaled 15 times the mass of our Moon. The buckyballs in interstellar space were found not far away from young solar systems, so that was likely the source. Buckyballs can act like cages for other molecules and atoms. Some have been found in meteorites carrying extraterrestrial gases.

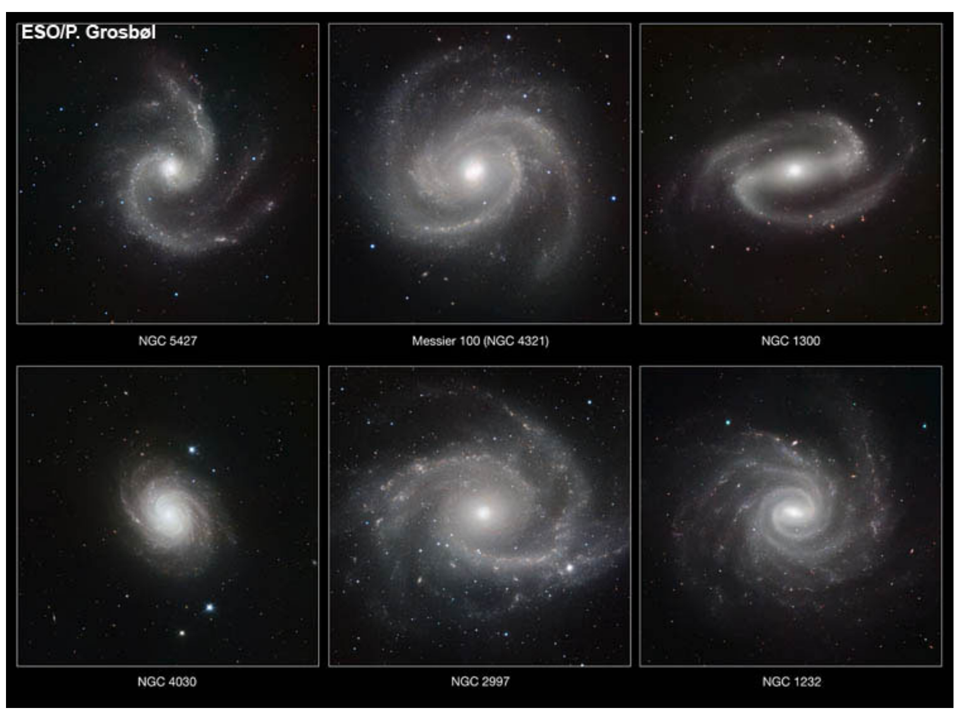
Alpha Magnetic Spectrometer-2, scheduled to be flown to the International Space Station in February, is already collecting data on cosmic rays as it sits in a work stand in Florida, awaiting launch. The Earth's atmosphere stops much of the cosmic rays, so it is rather incomplete data being collected, but it is good to know that the device works. Cosmic rays are very energetic atomic particles, some of them millions of times more powerful than those produced by the largest particle accelerators on Earth.

Instant AstroSpace Updates

The Very Large Telescopes have been imaging nearby spiral galaxies in infrared to show where **star formation** is taking place, since infrared penetrates the dust of such galaxies, showing all star forming areas.

Mars Reconnaissance Orbiter – Light-colored mounds of the mineral hydrated silica deposited on a volcanic cone on Mars more than 3 billion years ago represents the best evidence yet for hydrothermal activity, either hot springs or steam fumaroles, on that planet.

A new study of the spectra of many red giants in the huge globular cluster Omega Centauri showed that they are throwing off mass at the rate of 1 solar mass per billion to 10 billion years, in general agreement with **mass loss** predictions made by stellar evolution theories.



■

The Season for Giving

Giving Back to Your Astronomy Club

By Tom Koonce

December, 2010
Lancaster, California

The holiday season is here once again. It's a time to recognize those in need and for giving to others. With the fun that I've had through the years with my astronomy club and fellow amateur astronomers across the country, I started thinking about ways that I might give something back to amateur astronomy. You know that running any organization is a lot of time and work, so you can imagine that our club leaders would be appreciative of any help that is offered. I realized that the best gift I could give to the club would be to step up and help out with an aspect of the club that fits into my schedule. If this sounds like something you're interested in doing too, I have a few ideas for you to consider.

It's surprising how many astronomy-related bits and pieces that we accumulate that we haven't used in a long time such as basic amateur astronomy books, old binoculars, our first eyepieces, and perhaps an old telescope. Consider donating items like these to the club to be gathered up into a potential Spring garage sale for the benefit of the club's treasury. Maybe this could jumpstart the club savings for the summer picnic or piece of equipment that all members could share.

Even if you don't have items to donate, consider donating the benefit of your amateur astronomy knowledge by volunteering to teach a 30 minute to 1 hour class on the area of astronomy that interests you. If enough people wanted to teach small classes, perhaps a Saturday event could be put together that would really interest and excite members!

Even with no preparation, acting as a "Star Guide" mentor for a new member is a way of giving that means a lot. We all remember the first experienced club member who showed us the ropes when we were beginning in astronomy. Why not be that memorable mentor for another person?

I always find it interesting to read the newsletter when someone has written up their observing session. It doesn't have to entail the discovery of a new comet or anything, just the simple observations. (Of course a discovering a new comet would be a pretty nice write-up!) A photo, sketch or even a star map of the area that is being discussed is a plus, but not required. Give back to the organization by summarizing your next observing session and share the evening with your fellow members.

If schedule is tight, giving even a bit of your time is appreciated. For instance, a nice gesture is to assist with greeting people at the monthly meetings. Many clubs do this as a way of welcoming new and long-time members at the door. If you would like to help increase club membership, making others feel welcome each month and taking a personal interest in them is one of the best ways.

If you have a bit more time, you can help the club out by volunteering to help on a committee or (longer term) running for an officer position to give back to the club in tangible ways that are also rewarding for the volunteers. Frankly, sometimes these are positions that can get a bit stale if the same people are in them again and again. If you are one of the people who have been in a particular job in the organization for a while, thank you for all that you do! Consider mentoring another person to take on this position while you try out something different. The club needs you! But changes can keep the organization fresh and vibrant and it will keep you excited about why we're involved in the first place… because it's fun. It might be a gift that both you and the mentee could give for the long term vitality of the club. Happy Holidays to you and your families. Clear Skies! - Tom

■

(continued from page 2)

post processing in the computer at home and always take your photos in raw mode, where you decide what appeals to you, in the final analysis, as you create your photograph on your computer monitor.

As far as nighttime focusing difficulties, focus on the moon and possibly autofocus on it. Tape it at that focus position and immediately switch the button from Autofocus to Manual mode. Tape over the switch for the reason previously stated.

Shoot early in the evening near dusk or early twilight in the morning. To shoot the moon and ground together (for even illumination), it has to be done at twilight or dusk. Dennis believes that middle tones make the photograph and always shoots with moonlight because it always lightens the middle tones and illuminates everything equally: the sky, foreground, and middle tones so that they all require approximately the same exposure.

Priority or Manual mode allows additional controls that Automatic mode lacks. Dennis suggests shooting with an ISO of 100 in daytime because it creates a cleaner digital noise level and turns out more colorful. Bracket your exposures by shooting an f-stop over and an f-stop under so that later you have the option of blending portions of the three photos in raw format at the computer.

Do not delete pictures until you get home. Some pictures that were slated for deletion because they look like crap may actually look good on the monitor at home, and post-processing may even make them look great!

As a starting point for taking skyscape pictures, Dennis personally uses an ISO of 200 at around f2.8 for about 20 seconds for his 14mm Canon lens, which he seems to prefer for skyscapes.

May I interject that from my own experience the limits for shooting stars *BEFORE* star trailing begins to appear in the photograph. If you are using a camera with an APS-size sensor, remember to multiply the focal length of your taking lens by 1.5 for comparable cropping factors. I personally was using a 35mm and 50mm lens at 6, 8, 10, 12, and 14 seconds duration and chose those pictures with the least or an acceptable amount of star trailing.

On Friday, October 29, 2010, at around 7:00-7:30 p.m., Dennis related that there was a scheduled Vandenberg Air Force Base launch that would be nice to photograph. He suggested experimenting five minutes before launch time to aim the camera in the proper direction and take a picture and adjust the settings until you get it exactly the way you want, and that is the setting you would use for photographing the rocket.

Dennis likes shooting with a crescent or quarter moon present in the sky. To him all Andromeda or Orion nebula pictures, for example, look nearly the same. Sky photos, on the other hand, are all unique, with no two looking the same.

Star trails (with no moon): Try f8 with an ISO of 200-400 for 10, 15, and 20 minutes. If you shoot on a cool night, the camera generates less heat and, therefore, reduces the camera's noise level. It all depends on your camera's technology. Some people suggest turning off Live View mode to decrease excessive heat buildup in the camera. Also, turn off the automatic Playback display function.

As for processing, a negative is to a music score as a finished print is to a performance; it is all a matter of interpretation. In raw mode, you can change various layers but not the original raw information. Dennis suggests making color temperature changes in raw mode after the fact. Then change the brightness and contrast to suit your individual taste and, finally, sharpen. Following these three steps can turn a crappy-looking picture into a "Wow!" picture. He prefers the post-processing to bring his pictures to life better than shooting them in the first place and is thrilled with the personal satisfaction gained by being able to bring his pictures to life at the computer.

For multiple exposures, try an intervalometer. Also, see www.startrails.de

C:\Users\John Roberts\Documents\Astronomy\Borrego Springs and NightFall\Night Sky Photography notes.doc

■

FOR SALE:

5.5" f3.64 Celestron Comet Catcher. includes eyepiece and photo tripod+original case and mounting rings. $275

Celestron 15x70mm 'Skywatcher binoculars' with case. $65

Super Abbe orthoscopic eyepieces (1 1/4" dia.) 4.8;7.7;10.5 and 16.8mm $25 each or $90 for whole set.

2" Celestron OIII filter $50

Lumicon 1/ 1/4" slide filter selector (4 filters) $65

Thousands Oaks 8" SCT full aperture Solar filter $65

Skywatcher 80mm F11 refractor tube assembly with rings

25mm and 12mm plossl eyepieces; erect image diagonal; Barlow lens and red dot finder (all like new)

Baader 'semi-apo' 1/1/4 inch refractor filter $50

Celestron 1 1/4" Contrast minus violet filter $30

7lb. counterweight for Celestron CG-5 mounts $25

Meade 3X shorty barlow (1 1/4") $20

Orion EQ-1 mini mount with RA drive and connections for small scopes $75

All items in excellent conditions. I can meet with interested parties in local OC area.
Contact: Val Akins, 949-382-1869 or akins28@comline.com

SIRIUS ASTRONOMER
www.ocastronomers.org
The Newsletter of the Orange County Astronomers

NEWSLETTER OF THE
ORANGE COUNTY ASTRONOMERS
P.O. BOX 1762
COSTA MESA, CA 92628

Nonprofit Organization
U.S. Postage
PAID
Santa Ana, CA
Permit No. 1468

**DATED MATERIAL
DELIVER PROMPTLY**

RETURN SERVICE REQUESTED

HANDY CONTACT LIST

CLUB OFFICERS			
President	Craig Bobchin	ETX_Astro_Boy@sbcglobal.net	714-721-3273
Vice-President	Reza AmirArjomand	ocavp@me.com	949-212-3862
Treasurer	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Secretary	Bob Buchheim	rbuchheim@earthlink.net	949-459-7622
Trustee	Kyle Coker	kcoker@cox.net	949-643-9116
Trustee	Sheila Cassidy	rivme@pacbell.net	951-360-1199
Trustee	Greg Schedcik	gregsched@verizon.net	714-322-5202
Trustee	Gary Schones	gary378@pacbell.net	951-687-7905
Trustee	Steve Short	nightskytours@hotmail.com	714-771-2624
Trustee	Alan Smallbone	asmallbone@earthlink.net	818-237-6293
Trustee	Barbara Toy	btoy@cox.net	714-606-1825
COMMITTEES, SUBGROUPS, AND OTHER CLUB VOLUNTEERS			
Anza House Coordinator	Steve/Sandy Condrey	stevecondrey@ieee.org	951-678-0189
Anza Site Maintenance	Don Lynn	donald.lynn@alumni.usc.edu	714-775-7238
Beginner's Astronomy Class	David Pearson	astrodwp@dslextreme.com	949-492-5342
Black Star Canyon Star Parties	Steve Short	nightskytours@hotmail.com	714-771-2624
Explore the Stars - OCA Contact	Bob Nanz	bob@nanzscience.com	760-751-3992
Librarian	Karen Schnabel	karen@schnabel.net	949-887-9517
Membership, Pad Coordinator	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Observatory Custodian/Trainer/ Member Liaison	Barbara Toy	btoy@cox.net	714-606-1825
OCA Outreach Coordinator	Jim Benet	jimbenet@pacbell.net	714-693-1639
Sirius Astronomer Editor	Steve Condrey	stevecondrey@ieee.org	951-678-0189
Telescope Loaner Program	Mike Myers	loanerscopes@twow.com	714-240-8458
WAA Representative	Tim Hogle	TimHogle@aol.com	626-357-7770
Webmaster	Reza AmirArjomand	ocavp@me.com	949-212-3862
SPECIAL INTEREST GROUPS (SIG's)			
AstroImagers SIG	Alan Smallbone	asmallbone@earthlink.net	818-237-6293
Astrophysics SIG	Bob Sharshan	RSharshan@aol.com	714-845-6573
Dark Sky SIG	Barbara Toy	btoy@cox.net	714-606-1825
Remote Telescopes	Del Christiansen	DelmarChris@earthlink.net	714-895-2215
GoTo SIG	Mike Bertin	MCB1@aol.com	949-786-9450

OCA WEBSITE: http://www.ocastronomers.org STARLINE 24-HR. Recording: 714-751-6867 ANZA OBSERVATORY: 951-763-5152