

RTMC IS COMING! MAY 12-16TH



OCA Trustee Steve Short (left) is pictured with astronomy professor Nick Contopoulos of Orange Coast College, who was recently named OCC Faculty Member of the Year. A brief overview of Professor Contopoulos is on page 10.

OCA CLUB MEETING

The free and open club meeting will be held May 14th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month, Dr. Robert Quimby of Caltech will speak about the Palomar Transient Factory

NEXT MEETING: May 14th

STAR PARTIES

The Black Star Canyon site will be open on May 8th. The Anza site will be open on May 15th. 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, May 7th at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana.

GOTO SIG: TBA

Astro-Imagers SIG: May 18th, June 15th

Remote Telescopes: May 24th, June 28th

Astrophysics SIG: May 21st, June 18th

Dark Sky Group: TBA

May 2010 President's Message

By Craig M. Bobchin

By the time you read this Bill Patterson's memorial service will have taken place. It took place on Sat. April 17th 2010, in Santa Monica. Bill's sister gave a very touching eulogy that touched on his early days as an amateur astronomer. Like myself (and I'm sure many others reading this) he used to drag his sister out at all hours of the night to observe when they were youngsters. She related how she saw very little of what he was pointed to save for some of the brighter objects such as the Moon, Saturn, and other bright objects. There were two portfolios of Bill's astroimages, some of which I had never seen before. We also learned a bit more about Bill outside of his club interests. For one, I did not know that he was such an avid bike rider logging 8,000 miles in one year.

Those who have been to Anza recently may have noticed that the winter storms we've had are starting to have an effect on the land. In addition to the greenery and wild flowers on that are visible on the ride out to the site, the site itself is starting to show growth. The weeds and other plants that are growing now will die and create a fire hazard. So we must be vigilant and proactive in weed control this spring and summer. All Pad and observatory licensees should be aware that May 31st is the deadline for pad clean up and weed control. This means that you should cut back growth from your pads and observatories to make and maintain a defensible perimeter in the event of fire. You should also remove any trash (especially flammables) and bring them to the transfer station in Anza.

This does not mean that May is the only time for brush control and general clean up, just the beginning.

Speaking of clean up, one of our major assets that is shared by the entire club is the Anza site and Anza house in particular. If you do see an issue at Anza house and are willing to fix it please do so. Also please notify a board member and Steve Condrey our Anza house coordinator. We should also plan for a general Anza House clean up day in the near future, the May star party is probably not the best date due to reasons listed a bit further on in this column, but we do need to give Anza house a good cleaning as we have some broken furniture and various repairs that need to be made. I'm asking for volunteers (and I know we have a lot of talent out there) one thing we'll need is a trailer or large pickup truck to haul things to the transfer station. Contact myself, or Barbara Toy to volunteer.

Spring into summer also means we'll start seeing more critters around Anza. We have a wide variety of wildlife on the site most harmless, but there are a few that you should be aware of, these include Black Widow spiders, rattlesnakes, and mice. In general these animals are more afraid of us than we are of them, but they can cause injury if you are bit, so caution is called for.

Anza Internet

One of the other major and shared resources at Anza is the broadband Internet connection. This is a limited bandwidth satellite connection that has to be shared amongst all the users at Anza. So please refrain from abusing it especially during busy star party weekends. We ask that you not download or stream video and audio, which uses bandwidth that has to be shared. It can also open the club to legal liabilities for copyright infringement. As in everything that is shared, please be courteous to other users of the system.

May Astronomical happenings

The month of May is a very busy time here in Southern California for Astronomical events. In addition to our two star parties this month, Black Star Canyon on the 8th, and Anza on the 15th, there is also RTMC on May 12th - 16th. This represents a major change in dates from RTMC's normal Memorial weekend time frame. Just prior to RTMC is the Society for Astronomical Sciences (SAS) conference where amateur and professional astronomers get together to discuss the latest in Pro-Am collaborations. Bob Buchheim, our club secretary is an active member at SAS, and this year at RTMC will be receiving the G. Bruce Blair award. The G. Bruce Blair Medal is awarded annually by the Western Astronomical Association (WAA) to an individual who has made truly outstanding contributions to amateur astronomy. Congratulations on the honor, Bob!

The same weekend as RTMC and the Anza star party is also the annual JPL open house. For those that have never been to JPL's open house I can assure you it is a lot of fun. You get to see the inner workings of JPL and learn about the various space missions that JPL have been involved with, past present and future. It is a lot of walking and standing in line, so wear comfortable shoes and drink plenty of water.

Also in May is Explore the Stars which is our joint outreach with the San Diego club (SDAA) that happens at the Observatory campground below Palomar Observatory. If you have never been to this event which typically occurs once a month from April to Oct. you should join us. The next date for ETS is May 14 and 15. See <http://nanzscience.com/explore/index.html> for details on the program. As one who has been involved with this over the years it is a fun and rewarding experience.

Of course trying to get to all of these events may be tough with everything seemingly happening on the same weekend.

Till next month here's wishing you clear dark skies.

OCA meetings – you can now attend them while sitting in your armchair!

By Liam Kennedy

Back in 2003 we setup the OCA TV group of volunteers and together we taped and then produced a monthly (sometimes twice-monthly) TV show called "Look Up Tonight". This was aired on local public access TV channels. In total we produced about 24 episodes. Producing that show took quite an effort for everyone involved and for me personally was about a 30 hour (or more) effort each month. Although I enjoyed it immensely in the end I had to attend to other things in my life. You can still view many of those old shows on the web site here: <http://www.ocastronomers.org/e-zine/LookUpTonight/>

Of course the best way to experience the monthly OCA meetings is to actually be there in person. However, we know that is not always possible and some members live a long way away so attending would be a rare event for some.

Since 2004 quite a few OCA members have commented how great it was to be able to watch the shows and how much they miss being able to do that. I always wanted to re-establish this capability – however I really don't have the extra 30 hours per month to do it the way we did in the past.

For the past few months I have been experimenting with a new approach to capturing/broadcasting the monthly meetings which requires far less effort on my part (which is very helpful to my schedule and other commitments). With about 30 minutes of setup each month, I am now able to broadcast the meetings LIVE for anyone to view via the web. So instead of 30 plus hours of work it is now a 3-4 hour effort. Very doable! Last month we had about 16 people viewing the live video stream of the entire meeting.

You can watch next month too by going to <http://www.LiveStream.com/OCAstronomers> on the night of the OCA meeting at about 7:30pm. The meetings are also available for viewing at any time after the meeting finishes (it usually takes me a couple of days after the meeting to "clean up" the captured video and re-post the final versions).

Here are links to some of the prior meetings we have captured:

February 2010: "The Sun In Motion" by Gary Palmer - <http://bit.ly/TheSunInMotion>

January 2010: Members presentation night - <http://bit.ly/OCAJan2010>

December 2009: "George Ellery Hale: MIT and the Road to Palomar" by Mike Bertin <http://bit.ly/OCADec2009>

November 2009: "The evidence of things not seen" by Bob Buchheim - <http://bit.ly/OCANov09>

Special thanks: For the past couple of months Bob Buchheim and Sheila Cassidy are also part of the team helping make this happen (operating the video cameras and software to control the stream). Thank you Bob and Sheila!

I am using a piece of commercial software on my laptop (called Wirecast) that captures the video and slides and streams it out via the Livestream service. I must offer my thanks and appreciation to Janet Swift who is the Marketing Communications Manager for Telestream Inc (<http://www.Telestream.net>) for the use of their excellent software.



TOP TWENTY THINGS AN ASTRONOMER SHOULD SEE

17 The Green Flash

By Helen Mahoney

The green flash is next on my list because it doesn't take any special equipment, long-term planning, or distant travel. But, like seeing a rainbow, it takes being in the right place at the right time. And, like a rainbow, the phenomenon is due to the refraction—or bending—of different wavelengths of light.

The right place is anywhere you can see a fairly flat horizon without clouds. A view over the ocean is great, but distant mountains, like the western view from Anza, will also suffice. The right time is sunrise or sunset—but it is extremely hard to catch it at sunrise, so sunset is when most people see it.

While a rainbow's light is bent as it passes through rain droplets, at sunset it is the thickened layer of atmosphere that the sun's rays are passing through that causes the different wavelengths of light (i.e. colors) to separate. The shorter green and blue rays are bent more than the longer red rays. In those last few minutes before we see the sun set below the horizon, there actually is a green rim around the top limb of the sun, and a red rim around the bottom. The green flash is the last few rays, and actually is seen when the disk of the sun disappears. The blue light is mostly scattered by the atmosphere, so it is harder to see. I have actually seen a blue flash following the green flash on few occasions when the conditions were perfect.



The green flash as captured in a photograph taken in Finland in 1992 (Pekka Parviainen)

All wavelengths of light from the sun at sunset are bent by the atmosphere.

So much, in fact, that we actually see the sunlight for more than 2 minutes after it has set! Put that together with the fact that it took the sunlight 8 minutes to travel to the earth, and we are really seeing something that isn't there!

I had heard people talk about the green flash for years, but the first time I actually saw it was in the early 90's. It was St. Patrick's Day, so I thought that was appropriate! I had an office on the 5th floor of a building in Long Beach, with a west facing window. Being a few days before the equinox, the sun was almost due west, and I had a good horizon. Call it the luck of the Irish.

When out on a star party at Anza, many people gather on the west side of the observatory at sunset to look for the green flash over the distant Santa Ana Mountains. I have seen it many times from there. Probably the best time was when I watched the sunset from the lower pads at the foot of the observatory stairs. I saw the green flash, then ran up to the top of the stairs where the sun had not yet set—and saw it again!

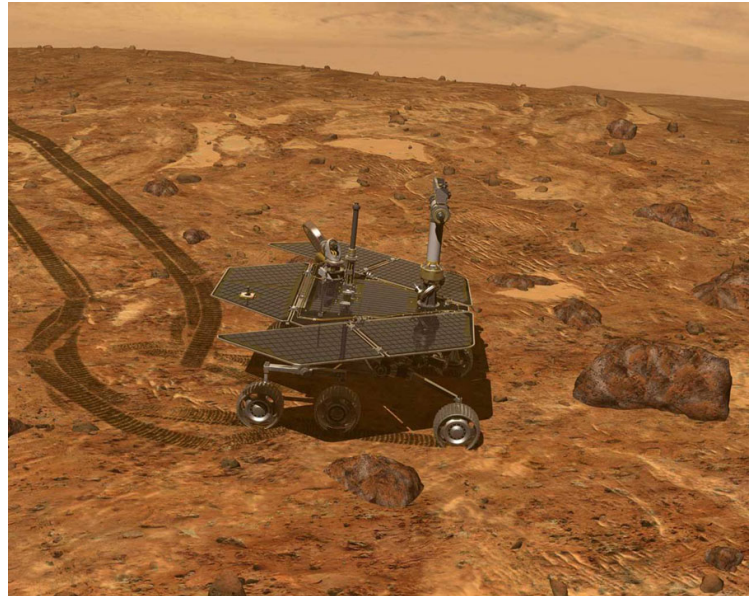


A Rock Hound is Born

It's tough to be a geologist when you can't tell one rock from another. Is that a meteorite or a chunk of lava? A river rock or an impact fragment? Houston, we have a problem!

It's a problem Spirit and Opportunity have been dealing with for the past six years. The two rovers are on a mission to explore the geology of the Red Planet, yet for the longest time they couldn't recognize interesting rocks without help from humans back on Earth. Fortunately, it is possible to teach old rovers new tricks. All you have to do is change their programming—and that's just what NASA has done.

"During the winter, we uploaded new software to Opportunity," says Tara Estlin, a rover driver, senior member of JPL's Artificial Intelligence Group, and the lead developer of AEGIS, short for Autonomous Exploration for Gathering Increased Science. "AEGIS allows the rover to make some decisions on its own." Estlin and her team have been working for several years to develop and upload increasingly sophisticated software to the rovers. As a result, the twins have learned to avoid obstacles, identify dust devils, and calculate the distance to reach their arms to a rock.



Opportunity spots a rock with its NavCam that its AEGIS software says meets all the criteria for further investigation.

With the latest upgrade, a rock hound is born. Now, Opportunity's computer can examine images that the rover takes using its wide-angle navigation camera (NavCam) and pick out rocks with interesting colors or shapes. It can then center its narrower-angle panoramic camera (PanCam) on targets of interest for close-up shots through various color filters. All this happens without human intervention. The system was recently put to the test; Opportunity performed splendidly.

At the end of a drive on March 4th, the rover settled in for a bit of rock hunting. Opportunity surveyed the landscape and decided that one particular rock, out of more than 50 in the NavCam photo, best met criteria that researchers had set for a target of interest: large and dark. "It found exactly the target we would want it to find," Estlin says. "It appears to be one of the rocks tossed outward onto the surface when an impact dug a nearby crater."

The new software doesn't make humans obsolete. On the contrary, humans are very much "in the loop," setting criteria for what's interesting and evaluating Opportunity's discoveries. The main effect of the new software is to strengthen the rover-human partnership and boost their combined exploring prowess. Mindful that Opportunity was only supposed to last about six months after it landed in 2004, Estlin says "it is amazing to see Opportunity performing a brand new autonomous activity six years later."

What will the rock hounds of Mars be up to six years from now? Stay tuned for future uploads!

Learn more about how the AEGIS software works at <http://scienceandtechnology.jpl.nasa.gov/newsandevents/newsdetails/?NewsID=677>. If you work with middle- or high-school kids, you'll find a fun way to explore another kind of robot software—the kind that enables "fuzzy thinking"—at http://spaceplace.nasa.gov/en/educators/teachers_page2.shtml#fuzzy.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

AstroSpace Update

May 2010

Gathered by Don Lynn from NASA and other sources

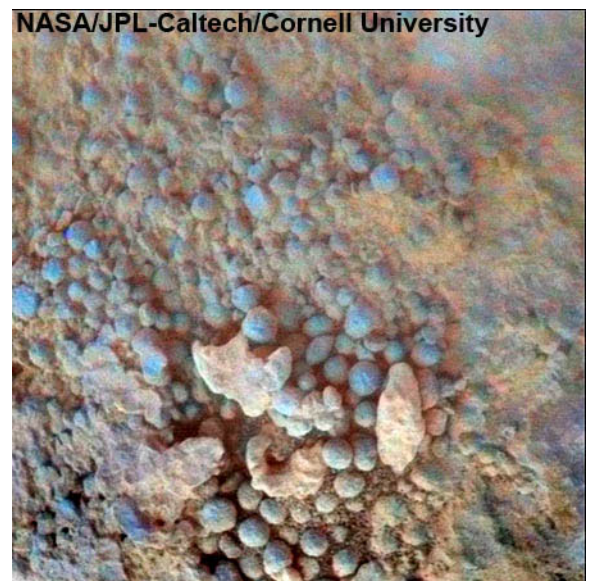
Retrograde exoplanet – It was reported here in January that the 2nd known retrograde exoplanet (planet outside our solar system that orbits in the opposite direction to its star's rotation) had been discovered, and the comment was made that this should be unusual. Planet formation theory says the planets form from the cloud of material orbiting the star, and the cloud would have to rotate the same way the star does, and in the same plane as the star's equator. A new study found that 6 of the 27 exoplanets studied orbit retrograde. Further, over half of the hot Jupiters (exoplanets at least as large as Jupiter which orbit so close to their star that they are quite hot) studied were found to have orbits steeply inclined to the star's equator. We are no longer looking at a rare occurrence, and theorists need to explain how these (retrograde and inclined) can be common. One possibility is that we completely misunderstand how planets can migrate close to their star. Migration is required, since Jupiter-sized planets can form only at great distances, where the composition and temperature of the formation cloud are conducive. The current theory is that drag from the formation cloud causes the migration, but that retains the direction and inclination of the planet's orbit. Gravitational encounters with other planets (or companion stars) combined with tidal friction could possibly cause inward migration accompanied by changes in direction and inclination of orbiting. Many theorists are jumping on this bandwagon in light of the latest observations. Gravitational encounter migration, however, has the side effect of eliminating small Earth-like planets from the system. So it seems unlikely that we will find Earth-like planets (when the technology improves to allow finding such) in the same system as a hot Jupiter.

CoRoT (planet search space telescope) has found an exoplanet, deemed Corot-9b, that is in the zone where liquid water can exist. It is a gas giant, so is not Earth-like. The 2 most productive methods of finding exoplanets are most sensitive to planets close to their stars, so most exoplanets known are hot Jupiters. The new planet is fairly close to its star (roughly Mercury's distance from our Sun), but that star is cool enough that the planet's temperature is somewhere in the range of liquid water. Compared to the few other exoplanets known in the water zone, this new one should produce a lot more information because it has easily studied transits in front of its star. The transits occur every 95 days and last for 8 hours. 9b is 1500 light-years away in Serpens. Its size is 5% larger than Jupiter, its mass 84% as large, resulting in a density of only 0.9 (where water is 1.0). It is made of mostly hydrogen and helium. The planet's distance from its star is far larger than that of any other exoplanet discovered by the transit method.

Maybe not an exoplanet – Astronomers have discovered an object the size of a planet (about 5-10 times Jupiter's mass), but which probably did not form like a planet. The object orbits a brown dwarf – a star so small that it cannot sustain nuclear fusion, which powers ordinary stars. But the brown dwarf, and therefore the planet-like object, is too young to have allowed a cloud of material to condense into planets. So the object probably formed as a companion star to the brown dwarf, that is, by collapsing from the same pre-star cloud of gas. So the best description is probably "planet-sized star".

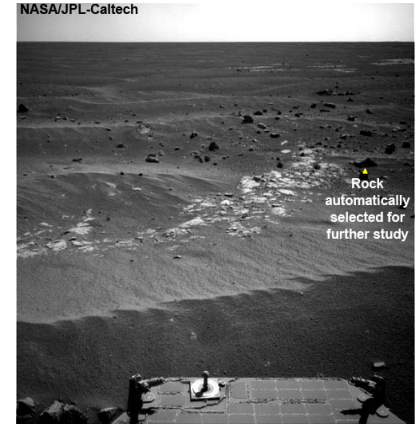
Venus Express has found evidence that volcanic activity occurred at most about 2.5 million years ago on Venus, and therefore probably continues today. The evidence is the detection of 9 spots of lava rock that are slightly warmer (a few degrees) than surrounding rock. The heat is not a remnant of the volcanic activity, but is an indication that the rock there has not deteriorated yet under the harsh conditions on Venus. Mineral measurements of the areas also showed this lack of weathering. These areas were found to have gravity anomalies, that is, concentrations of mass, of the sort that indicate hot plumes of lava below the surface. Previous observations of the planet's surface by radar have shown land forms that are definitely volcanic, but these new observations provide the best evidence of the age of such features. There was suspicion before this work that the volcanic activity was geologically recent, since few impact craters are found on the planet, indicating that more recent volcanic activity covered most impacts.

Spirit (Mars rover) was put into a low power mode, where it turned off almost all instruments and communicated with Earth only once each direction per week, in preparation for the loss of power from its solar panels as winter approached. It was programmed so that when power dropped to a certain level, it would go into hibernation, using no power at all, except for its clock and a heater for its electronic components. Apparently hibernation began the last week of March, since the rover did not make its planned radio contact then. Temperatures in the electronic components are predicted to reach minus 67° F at the worst point of the winter, which is the lowest temperature at which the system was tested before launch. If the resistance to cold has not deteriorated since then, the rover should survive the hibernation. If so, higher levels of power in spring will wake up the rover. This could happen as late as October. Controllers hope then to try again to move the rover from the soft sand in which it has been stuck for a year (Earth year). At the end of April, Spirit becomes the longest operating lander on Mars, surpassing Viking 1's record of 6 years, 116 days. But we won't know if Spirit was operating at the end of April until (if) it awakens from hibernation months later.

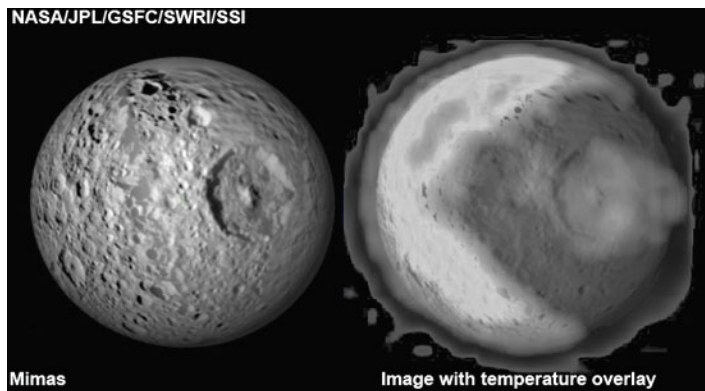


Opportunity (the other Mars rover) spent 6 weeks investigating a crater like no other it has seen, having dark rays extending from it. The rays may mean the crater is relatively young, since rays are expected to eventually weather away. Investigation shows a strange dark grayish coating on faces of and in cracks within many of the rocks that were thrown out when the crater formed. The rocks (other than the coating) are chunks of the same type of bedrock previously seen at hundreds of locations that Opportunity has visited. The dark coating seems to be a concentration of the small spherical pieces that Mars geologists have been calling blueberries. They are trying to determine how the coating was created, and there are 2 theories so far: 1) partial melting during the impact that formed the crater concentrated the blueberries (meaning they would be more resistant to melting), or 2) the material formed in fractures in the rock by some process before the impact. The rays about the crater look particularly dark in images taken from orbit, and this has now been explained by the rover's observations: the blocks thrown out of the crater when it formed cast substantial shadows in the mid-afternoon, when the pictures from orbit were taken.

Opportunity just got smarter. New software, called AEGIS, was transmitted to the rover, which allows it to identify interesting objects and investigate those objects further before even sending the first images to Earth. Spacecraft controllers make a list of properties that are considered interesting (such as size, color, or shape), and the new software grades everything seen in wide angle images by these criteria. The best objects are investigated further automatically. This will speed up the science being done, and in cases where the rover moves on before images are analyzed on Earth, it results in science that would have simply been skipped. The rover has been turned back under such circumstances very few times, for only the most compelling findings (such as a meteorite). Previous additions to the rover software have included: choosing its own route around obstacles, calculating how far to reach out the rover arm to touch a rock, and sorting through many images to find dust devils or clouds so that only the interesting images use up the limited communications to Earth.



Cassini (Saturn mission) has for the first time imaged lightning flashes on Saturn. Cassini, and before it Voyager, had previously detected lightning by its radio signal. Saturn has been too bright to see lightning up until recently because the reflected light from the rings makes the night side of the planet fairly bright. But the night side got considerably darker during the recent equinox, when the rings are edge-on to the Sun, and so reflect almost no light. The lightning images showed that the flashes are about as large and powerful as the largest lightning strikes on Earth. However, lightning storms on Saturn are much less common, typically only one at a time on the whole planet. But Saturnian lightning storms often last for months.



Cassini made a close pass by **Mimas** and made the highest-resolution temperature map of the moon. It was expected to find smoothly varying temperatures that peaked in the early afternoon near the equator. Instead they found a warm spot (27° F warmer) shaped like Pac-Man located in the early morning area, and a round spot by the enormous crater Herschel. The topography of the crater can explain the 2nd spot, but no one has an explanation for the other. The suggestion was made that the texture is different at the 1st warm spot, but no cause for a different texture has been even theorized, particularly with such sharply defined edges. Images taken showed dark streaks trailing down bright crater walls and a continuous, narrow pile of dark debris tracing the foot of each wall. Similar dark features have been seen on other Saturnian moons, and it is believed that warming of darker material by sunlight causes the features.

Summer on Triton (Neptune's moon) – Astronomers using the Very Large Telescope in Chile detected seasonal changes on Triton for the first time. About 4 times the atmosphere now exists as did during the Voyager 2 flyby in 1989, apparently due to summer evaporating (subliming) of surface ices. The balmy summer weather that caused this is about minus 390° F. The ices involved include nitrogen and methane. The observations found carbon monoxide in the atmosphere for the first time. Each Triton season lasts 41 Earth years. The atmosphere is still not much after its summer growth, being 20,000 times less than Earth's atmospheric pressure.

WISE (orbiting infrared telescope) is discovering dozens of new asteroids every day, many of them being ones that are too dark to be seen with visible light technology, but which glow more brightly in infrared. Most of the asteroids being found are in the main asteroid belt between Mars and Jupiter, but a fraction of them are Earth-approaching ones. A handful of those are classified as "potentially hazardous", meaning that their orbits can result in passes within 5 million miles of Earth. Statistically, WISE should, before it runs out of gas (actually coolant) late this year, find 100,000 new asteroids, with hundreds of those near-Earth.

Epsilon Aurigae (eclipsing star) has been imaged using a new infrared beam combiner on the Chara array interferometer. The star dims every 27 years for about 2 years, with characteristics unlike any other star known. The latest eclipse began last August. The star has been studied for 175 years, without a definitive explanation. One theory that explained observations well is considered quite unlikely – that is that the star has an extremely dim companion that is surrounded by a fairly dense dust disk with a central hole

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(and here is the most unlikely part) that is in the same plane as the companion star's orbit, and coincidentally aimed at Earth. The new images support this theory. They show a thin dark disk moving progressively across the star. Stay tuned to see if observations of the rest of the eclipse continue to support the theory.

Binary variable star – Japanese amateur astronomers discovered what appeared to be a nova (sudden brightening of a star) in March in Cygnus. It was soon realized that it was at the location of a known variable star, V407, which is a Mira-type variable. That type smoothly varies in brightness over months, due to the star periodically swelling. It appears that this Mira-type star can dump matter, by means of its stellar wind, onto its companion white dwarf star, causing occasional flare ups that we classify as a recurring nova. Later the Fermi orbiting observatory detected gamma rays from the object, something not seen before in this type of binary variable. Astronomers will continue to monitor the object, since a variety of behavior is possible with interacting binary variables (often called symbiotic binaries).

Very Large Telescopes – Astronomers often use the Lyman-alpha spectral line (a particular color given off by hydrogen) to search for very distant galaxies. Different distances produce different redshifts in this line (and all lines), so one can filter for a particular color and pick up only the galaxies at the particular distance desired. It has long been thought that many galaxies might be missed by this technique if they did not generate much Lyman-alpha light or if what was generated got absorbed. So astronomers using 2 of the Very Large Telescopes (of the 4) in Chile took very long exposures in both the wavelength from redshifted Lyman-alpha and the wavelength from another hydrogen spectral line (hydrogen alpha). The Lyman-alpha image showed only about 10% of the galaxies that showed up in the other wavelength. Now they know how much the Lyman-alpha technique is missing. The technique will probably continue to be used, though not thorough, because it quickly finds (some of the) galaxies at a particular distance.



X-37B (spaceplane) is scheduled to be launched into orbit on an Atlas 5 rocket on April 19. The unmanned reusable craft looks like a small Space Shuttle, being about ¼ the Shuttle's dimensions, and being covered with heat-protective ceramic tiles to allow re-entry into the Earth's atmosphere. It is planned to land automatically at the Vandenberg (California) Shuttle runway, which was never actually used by the Shuttle. The Air Force is not disclosing its payload or landing schedule. Like the Shuttle, X-37B has a payload bay that can hold space experiments or launch satellites, but the bay is only about the size of a pickup truck bed. Unlike the Shuttle, its power is from solar panels (rather than fuel cells), and so can stay in space for much longer, about 9 months. The X-37B has a rocket capable of substantial orbital changes, in addition to decelerating for return to Earth. This is the 1st of at least 2 planned test flights.

Large Hadron Collider in Switzerland at the end of March broke its own record for the most powerful particle collisions, by a factor of 3.5. It is not expected to reach full power (double this new record, that is, 14 trillion electron volts) for another year or 2. Hopes are that it will produce the Higgs boson, the theoretical particle that causes mass in other particles, dark matter particles, and supersymmetric particles, which are predicted by string theory.

Hubble Space Telescope (HST) has measured the distortion caused by gravitational lensing (the bending of light by massive objects, as explained by General Relativity) on 446,000 galaxies located in a small area of the sky. Distances

for 194,000 of those galaxies were obtained from ground-based redshift measurements. The galaxies were seen as they appeared when light left them, so that the history of galaxy clustering was established over much of the age of the Universe from these observations. Analysis of this history showed that the expansion of the Universe is accelerating. This substantiates the other methods that have shown this acceleration, which has been attributed to dark energy, a mysterious force that tends to expand space.

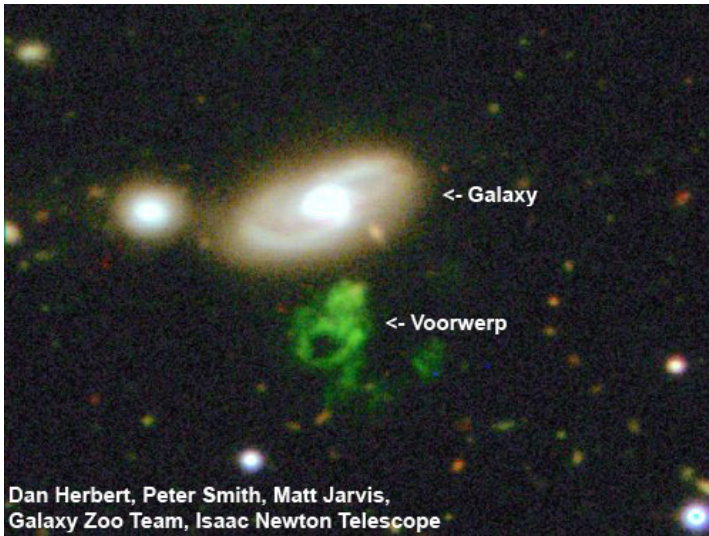
General Relativity has been put to the test many ways, but a new test is the first to confirm it out to cosmic distances. Data from the Sloan Digital Sky Survey that included several hundred million galaxies and quasars was used to measure how galaxies cluster, what their velocities are, and how they are distorted by gravitational lensing. The sample included substantial numbers of galaxies out to 3.5 billion light-years away. The result of the analysis is that no other theories fit the data as well as General Relativity. In particular, theories that exclude dark matter, but instead require gravity to differ (from General Relativity's equations) at farther distances, fail to match the data.

Instant AstroSpace Updates

NASA in September will send the first human-like (one head, two hands, but alas, no feet) **robot**, named Robonaut 2, to the International Space Station (ISS) to assist astronauts. It is not designed to withstand the extreme temperatures outside, so will be confined inside.

The SpaceX Company announced that astronauts have installed and activated a communications system that will allow its **Dragon** cargo vehicles to dock with ISS, starting with a test flight in May. SpaceX has a contract with NASA to provide cargo transfer to ISS, starting in 2011, after the Shuttles are retired.

Astronomers have **imaged an exoplanet** (actually 3 of them) for the first time using a relatively small (59" aperture) Earth-based telescope, using adaptive optics, infrared, and a coronagraph (blocks out the nearby bright object). All previous exoplanet images (10 or so of them) have been with space-based or the largest Earth-based telescopes.



A team of astronomers has obtained observing time on the Hubble Space Telescope to observe **Hanny's Voorwerp** (means "object" in Dutch), a starless glowing smudge like no other, near the galaxy IC 2497. The object was discovered by Hanny van Arkel, a Dutch school teacher who volunteered (along with thousands of others) to classify galaxies for the Galaxy Zoo Project.

A new computer simulation of a black hole at the center of a galaxy shows that **dark matter** does not get pulled into the black hole in substantial amounts, as does ordinary matter near the black hole; otherwise, galaxy populations would be different than what are observed.

The strength of the **magnetic field** in space between galaxies was measured for the first time, using a novel technique of looking for the influence of magnetic fields on electron-positron pairs that were produced when gamma rays from blazars collide with photons from the Cosmic Microwave Background. The measurements were a few femtoGauss (look it up, or take my word that a femtoGauss is REALLY small). ■



Jeff Malmrose obtained this image of M51 on April 20th of this year, using a Takahashi FS-102 with a modified Canon XT imager.

NICHOLAS CONTOPOULOS



OCC Astronomy professor, Nick Contopoulos, known to close associates as “Nick Astro”, began his teaching career at Orange Coast College in 1991 after having earned his graduate degree from San Diego State University. Nick grew up in Berkeley and lived in Greece for a time. He is also a product of the community college system, having obtained his AS degree from Merritt College. He later taught there, as well as at a number of other community colleges, and California State University, East Bay.

After arriving as an instructor at Orange Coast College, Nick soon acquired a reputation for being a person students could approach easily. All hours of each teaching day are Nick’s office hours. According to Dr. Arnold Guerra III, Nick possesses an innate desire to help students excel by motivating them to understand the fundamental concepts of Astronomy prior to sitting down to solve their homework problems. Nick’s philosophy of education: “As a community college instructor of astronomy at Orange Coast College my goal has been to inspire students by fostering a positive thirst for learning as they grasp the

vastness of the universe. To motivate one student is often considered a great accomplishment; my philosophy is to motivate all my students through the study of astronomy, a branch of learning fundamentally rooted in all cultures of the world. I am immensely gratified when students in my classes have attained a degree of personal growth that prepares them to benefit the community and to participate in our rapidly changing technological society.”

When he is not teaching, you will find Nick riding his bike in the Newport Beach Back Bay. He bicycles religiously and vows next year to be a regular bicycle commuter to Orange Coast College.

As Full-Time Faculty Member of the Year, Nick will be the faculty commencement speaker at OCC’s 62nd Commencement.

ABOUT OUR SPEAKER



Dr. Robert Quimby

Postdoctoral Scholar in Astronomy, California Institute of Technology

2006 PhD, Astronomy, University of Texas, Austin

2004 BA, Astronomy, University of California, Berkeley

2010 Robert J. Trumpler Award, Astronomical Society of the Pacific

2008 Robert S. Hyer Award, Texas Section of the American Physical Society

2007 Gruber Prize in Cosmology (Supernova Cosmology Project Team Share)

The Palomar Transient Factory

We are conducting a new census of the time variable sky. The Palomar Transient Factory (PTF) employs the venerable 48" Oschin Telescope outfit with a 100 megapixel digital camera to monitor about 1/10 of the sky above San Diego County. With repeat visits spaced minutes to days, we can identify and catalog time variable objects. We conduct follow-up imaging of all transient sources (objects that were not previously detected) and often obtain spectroscopic data as well. PTF began science operations in the spring of 2009, and since then we have found and spectroscopically classified over 350 supernovae. For this talk, I will discuss the design of PTF and highlight some of the main discoveries we have made in our first year of operation.

Wanted: Old style 84-key AT keyboard for DOS/Windows PC (the kind with the function keys on the left instead of above the other keys). Tim Hogle timhogle@aol.com, (626) 357-7770.

For Sale: Celestron C8-SGT 8" Advanced Series Telescope (the C8 has XLT optics) with the latest version of hand control computer and includes a Telrad and the Celestron Auxiliary Port Accessory for firmware upgrades. \$975. Contact: Vance Tyree at 626-355-7210 or tyree@isi.edu

Observing Pad Lease for Sale! Location: Easternmost pad on top tier of Mars Hill. Largest Observing Pad at Anza, electricity, polar aligned pier, 2 work tables, adjacent parking, good neighbors. Contact: Tom Kucharski Cell: 949-683-8356

This is for the serious astronomers for May

The weather is warming up and observing — when we can see the sky — is becoming much more pleasant as we head toward the summer season. Spring is a time of renewal, and the time for cleaning things up and taking stock of new opportunities for many of us. It's also a great time to make the club facility safer and more usable for all of us. In that vein, I have the following suggestions for volunteer activities around the club that would help us out a lot:

1. **Weed cleanup at Anza.** You will most likely be hearing about this from Greg Bobchin and others, as well. Weed cleanup is extremely important for the safety of our Anza site, and can't be repeated in too many places. Besides the annual cleanup around the various pads and observatories that is one of the pad and observatory holders' license responsibility, we need cleanup around the common areas. These include the football field, Anza house, the club Observatory, and the various walks and roads around the site. In addition to the clearance, you may notice animal holes that pose tripping hazards; these need to be filled in, as well.

2. **Repairing and painting of the wooden banister at the entrance to Anza House:** the banister at Anza house has not done well in the harsh weather at Anza, and besides losing its paint has become splintery. At this point, it needs to sanded down, properly primed and repainted.

3. **Removal of the nonfunctioning refrigerator and nonfunctioning microwave at Anza House:** for quite some time, the proper disposal can be an issue. If you could help out with this, it would be a real help and significantly improve the facilities at Anza house.

There are a number of other projects that would significantly improve the facilities. Around the Observatory, we need to:

1. **Recarpet the observing area and stairs to the observing area.** Donations for this purpose would be very much appreciated.

2. **Install a new metal shield on the south and west sides of the Observatory.** Dave Radosevich has suggested that we first paint the Observatory with a highly reflective paint, to reduce the heat absorption that causes distortions in the seeing as it is released at night. To get the appropriate paint with the most effective additive would be quite expensive, and donations for the paint as well assistance applying it would be appreciated.

**NEWSLETTER OF THE
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HANDY CONTACT LIST

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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
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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)

Astrolmagers SIG	Alan Smallbone	asmallbone@earthlink.net	818-237-6293
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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