SIRIUS ASTRONOMER

www.ocastronomers.org

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This panoramic view looking northwest towards tropical storm Gustav was acquired from by the crew of the International Space Station at about 1:24 p.m. (EDT) on Aug. 29 as the storm, located just west of Jamaica, was approaching hurricane strength with winds of 70 miles per hour and moving west-northwest at 11 miles per hour. Photo Credit: NASA

OCA CLUB MEETING

The free and open club meeting will be held Friday, October 10th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. The main speaker is Dr. Philip R. Goode of the New Jersey Institute of Technology, speaking about upgrades to the Big Bear Solar Observatory.

NEXT MEETING: November 14th

STAR PARTIES

The Black Star Canyon site will be open on October 4th. The Anza site will be open on October 25th. 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, November 7th at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana.
GOTO SIG: TBA (contact coordinator for details)
Astro-Imagers SIG: Oct. 21st, Nov. 18th
EOA SIG: Oct. 22nd, Nov. 26th
Astrophysics SIG:Oct. 17th, Nov. 21st
Dark Sky Group: TBA (contact coordinator for details)

President's Message
By Barbara Toy

Besides Octoberfest and Halloween, October used to be known as the month when Daylight Savings Time went off and we went back to standard time. The Powers That Be have decreed that Daylight Saving Time now ends in the early morning of November 2nd, too late to benefit the trick-or-treaters on Halloween. The main practical effect on those of us with computers or other devices that make the switch to standard time automatically is that they may stick to the old schedule and make the change the weekend before Halloween, which could cause some difficulties. So, if you notice equipment acting strangely near the end of October, you might want to check the time, and check again after November 2nd.

Considering that astronomy deals with vast reaches of time and space, it seems odd that local time can be so important, but, if your local time is off, it sure makes it hard to find things in all that vastness!

The First PATS Conference Was a Success!

The first annual Pacific Astronomy and Telescope Show was held on September 13 and 14 (close to the full moon, not a calendaring accident), and was preceded by a one-day astroimaging conference on September 12. I hope you made it at least to the main conference – it was a great event! And they are planning an even better one for next year, so make sure you calendar it when they announce the dates!

I spent most of my time on Saturday in the vendor area (though I did make it to the Story Musgrave talk on the Hubble repair, which turned out to be different than I expected – more philosophical and artistic than technical, but interesting and enjoyable, and it featured a lot of excellent photographs he's taken over the years). There were a lot of raffles by different vendors over the course of the day, and I'm happy to report that we had several club members who won some very nice items, but, of course, there were even more of us who didn't, though we always have hopes for next time….

The OCA booth was a genuine joint effort, and was one of the most elaborate booths we've had. We taped one of the banners that Matt Ota made for us around the front of the table, where it made an eye-catching identifier for the club. Bob Buchheim put together a slideshow from parts of shows he's done for the general meetings. Instead of showing this on a computer screen as originally planned, we ran it through a projector that Dave Radosevich donated to the club several years ago and projected it onto a "screen" that was part of a poster that Alan Smallbone put together, featuring pictures of different club activities around the area where the slides were shown. This sat on a table behind the main table, and the projected slide show was much more visible than if we had just played it on a computer screen.

Several imagers (Don Lynn, Ray Stann, Dave Kodama and Craig Bobchin) loaned us prints of some of their images, which we put in portfolio book to protect them, and we also had the portfolio of some of Alan's prints that we used at the OPT event. Wally Pacholka generously loaned us several of his mounted prints, most notably his spectacular shots of the Milky Way from Maui and over the Grand Tetons. We used one to shield the computer and projector from general view and make our main table more interesting, and others we displayed on an easel or mounted against the back wall – and they did attract a lot of attention! Fortunately, Wally was at the Hutech booth with even more of his pictures, so we could send folks over there for answers to questions about his images and possibly to buy some. Besides the pictures, we had club brochures and cards, and many people picked them up after being drawn to the booth by the display. Alan, Craig, Sheryl Benedict and I handled the booth on Saturday, with help from Bob Buchheim while he was there, and Craig, Sheryl and Shelia Cassidy handled it on Sunday.

Overall, the conference was a great success for OCA as well as in general – and hopefully we'll be able to get even more prints together for the next time we have this kind of booth, to show off the skills of even more of our imagers. It would be nice to show some interesting prints of different club activities, as well, so if you have any good pictures of outreach events, star parties, meetings, or other club events that you would be willing to let us use, please send me a copy.

Many thanks to everyone who helped make the OCA presence at PATS such a success!

OCA Elections

Although whenever someone says "election" right now, the assumption is that the reference is to that bit of national business set in November, we have our own election season coming up. As you might note, our season is only about three months long, and is free of career politicians – two refreshing differences from some of the other contests going on as I write this. We often have to invite or encourage people to run for club positions, though, as our members seem to be a bit diffident about taking on a leadership role. Please consider this my encouragement to you to run for club office, which I am sure you would handle very capably. One of our greatest strengths as a club is that we have such a wide range of talents among our members, and this has given us a lot of diversity on our Boards over the years and made them more effective as different members have served as trustees and officers of the club.

To run for a trustee position, you need to be a member in good standing and to have been a member for at least a year. With those credentials, you could technically run for secretary or treasurer as well. If you want to run for president or vice president, you also need to have served at least one year on the board at some point (but not necessarily this year).

There are a lot of good reasons for serving on the board, such as "giving back" to the club and wanting to help the club move forward and develop in the best way possible. Some slightly less noble reasons are that it really is a lot of fun to develop and work on projects you believe in at the board level, and there's a lot of enjoyment in getting to know and work with the other board members. Also, as a board member, you would be closer to information sources in the club, and could enjoy knowing more of what's going on than most members as well as being an information source (where appropriate) to other club members.

The Board meets every other month starting in January, and our practice is to set Board meetings for the convenience of as many board members as possible, though always on a Sunday evening. We start with a potluck around 5:00 p.m. on the meeting dates, then the actual meetings start at 5:30. We try to end by around 8:30, as almost everyone on the board has to be at work Monday morning. The Board actively administers the club, and is far from a rubberstamp entity, which also makes being a Board member more interesting and meaningful.

We start taking nominations in October, and take the final nominations at the November general meeting. The final ballot goes out with the December Sirius Astronomer and will also be available on the website and at the January general meeting. You can vote by mail (instructions are on the ballots), or at the January general meeting. The election ends at the end of the January general meeting, which will be on January 9, 2009.

So, get ready to throw your hat in the ring and join in the governance of the club! If you want to run, getting nominated is as simple as giving your name to Bob Buchheim or me between now and the November meeting date (November 14), volunteering to run at the October or November general meetings, or having someone else do a formal nomination at either of these meetings.

Looking forward to seeing your name on the ballot….

A sad farewell to OPTAS

Those of you who have done business with Oceanside Photo and Telescope are most likely aware of OPT's astronomy club, OPTAS (the OPT Astronomical Society), and some of you may be past or present members. The club has provided a lot of people with their first star party experiences, and given a lot of people the opportunity to use their equipment under dark skies and with a congenial group of folks who could help them get the best use out of it. It's also encouraged people to get involved with astronomy or stay involved when their initial enthusiasm waned, and it has been a significant factor in the local astronomy scene for many years.

Unfortunately, when you see a paragraph framed in those terms, it generally means bad news about the subject of the paragraph. This is no exception – due to a number of factors outside their control, OPTAS has made the reluctant decision to disband, and it will be very much missed. They have a number of members who still have some time left on their OPTAS membership, and other local clubs, including OCA, have agreed to allow them to transfer the remaining portions of their memberships to those clubs if they choose to do so. So, you may meet some new members who have come to us through the transfer of their OPTAS membership to our club.

If so, please make them welcome and help show them the ropes. If you are one of these new members, welcome to OCA! And please feel free to call me or other people on our Contacts list (see the back of the Sirius Astronomer or the OCA website, www.ocastronomers.org) if you have questions or would like more information about any of the club's different activities. In fact, that goes for any new members, and for any existing members who may have questions that they've never had answered about the club.

Outreach

Now that school is back in session, our regular outreach program for the winter months is gearing up. Jim Benet, our Outreach Coordinator, has been sending out e-mails about upcoming outreaches – if you are not on his mailing list, please contact him at jimbenet@pacbell.net to be put on the list so you get the most current information about upcoming events.

If you ever find yourself trying to excite friends or family members about what you can see in the eyepiece, or try to explain the planets, the moon, or any other astronomical subject to non-astronomers, or answer questions in those areas, you're a natural for the outreach program. The objective of the program is to make the night sky more accessible to people who otherwise might never look to see what's up there through a telescope or binoculars. Amazingly, even though many people will tell you that they have a long-standing interest in astronomy, very few of them have actually looked through a telescope. At an outreach event, you can demonstrate that they can see many wonderful objects in the eyepiece without exorbitantly expensive equipment or extremely dark skies, which can be a real revelation. Along the way, you can show them why they should care about the negative effects of unnecessary lighting on the night sky, and that there are fun things to do in the evenings that don't involve watching the television.

So what happens at a typical outreach event? The winter events are generally set up with classes at different schools, and volunteers take telescopes or other observing equipment, such as astronomical binoculars, and let the students and their families and friends take a look at whatever is visible for themselves. As you may recall from when you first looked through the eyepiece, seeing an object alone is not generally as satisfying as seeing an object while learning something about it. Outreach volunteers regularly give their viewers information about the objects in view, and answer questions, though seldom at a very advanced level,

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AstroSpace Update

October 2008
Gathered by Don Lynn from NASA and other sources

Phoenix (Mars lander) touched down in May in an area covered with polygon patterns, similar to those seen in arctic lands on Earth, which are caused by expansion and contraction with temperature changes. The first samples analyzed in Phoenix's analyzer oven and wet chemistry analyzer have come from the interior of the polygon that the lander sits on. Some trenching has now been dug along the line of different material between polygons. Digging within a polygon has hit a very hard icy (water ice) soil layer about 2 inches below the surface. Between the polygons has gone as deep as 7-inches without hitting a hard layer. A sample from between has been placed in the wet chemistry analyzer, and plans are to place one in the oven analyzer. Preliminary results from the wet chemistry analysis are that it is alkaline, composed of salts and other chemicals such as perchlorate, sodium, magnesium, chloride and potassium. So far this is similar to the previous soil samples. Scientists are anxious to try to explain why deep soil is cloddier than shallow soil. They are also trying to shed light on this by piling up material dug from a deep trench and shooting pictures of it.

Clumps of material have been found adhered to Phoenix's lander legs and the clumps are changing and growing. Possible explanations are that splashed mud during landing started the clumps or that salty material landed on the legs. The growth is caused by moisture condensing from the atmosphere and freezing or combining with the salt. The clumps are concentrated on the north side and are usually in the shade.

A fork-like conductivity probe has sensed humidity rising and falling beside **Phoenix**, but when stuck into the ground it showed the soil is thoroughly and unexpectedly dry. When humidity is high, surfaces exposed to the air, such as the soil, should have water molecules adhere to them, even at the low temperatures and pressures found on Mars. Measurements will be made deeper in the soil by scooping away some of the soil before inserting the probe.

Phoenix cameras took images that were assembled into 2 interesting movies: one shows water ice clouds drifting over, and the other shows a **dust devil** sweeping by. Until recently, Phoenix had not seen any dust devils, though the rovers near the equator have seen many. While the dust devils pass, the weather instruments show a drop in air pressure. As of this writing Phoenix has now seen 6 of them, ranging from 2 to 5 yards across, smaller than the ones seen by the rovers. It may be that in the high latitudes dust devils don't occur frequently in mid summer, and are now beginning with the change in season.

Phoenix completed its scheduled mission Aug 26, but will continue to observe and analyze its northern landing site until solar power is unable to keep its storage batteries and instruments from freezing. Because it is above the Martian arctic circle and summertime, the Sun never set for Phoenix until August 21, receiving 24.6 hours (the length of a Martian day) of sunlight on the solar panels every day. Phoenix has already returned more than 20,000 pictures and used over half of its wet chemistry and oven soil analyzers (it had 4 and 8 of these respectively). All instruments are working, though recently gas flow from the ovens to the mass spectrometer has been erratic, but the spectrometer results are believed correct.

Mars Express (European orbiter) has a camera on board, called the VMC, whose only purpose was to monitor the separation of the main spacecraft from the lander Beagle. The camera did its job back in 2003, though the Beagle disappeared later, presumably crashed on the surface. Last year, scientists asked if the VMC could be turned back on. After tests were made, it was found to be working properly, and it was turned on to stare at Mars 24.6/7 as Express passed over it. This has resulted in some extraordinary pictures of objects, both geological and meteorological, larger than Express's main cameras can take.

Mars rover Opportunity drove back out of Victoria Crater along the same route it had entered nearly a year before. Images taken just afterward show its exit tracks right on top of its entering tracks. It had finished observing and analyzing all the scientifically interesting features in the crater that were safe to drive to. It found continued evidence of water standing for long periods (in the distant geological past) even in the deeper sediments that the crater penetrated and exposed. The sediments were probably originally deposited by wind, but analysis showed they were modified by standing water. The rover is now inspecting loose cobbles, fist-size and larger, lying on the plains surrounding the crater. Many of these cobbles are thought to have been thrown long distances when other impact craters formed in the plain. So observing these rocks allows analysis of places that are too far to drive to. Rover operators were worried about spending much more time inside the crater, since a voltage spike on a wheel motor recently occurred, which resembled ones the other rover experienced before one of its wheels failed. It would be difficult or impossible to drive up out of a crater if a wheel failed, though the other rover proved it can maneuver while dragging one wheel on flat or mildly sloped terrain.

The other rover, **Spirit**, has resumed observation now that the southern winter is ending. It spent the winter parked on a north-facing slope, with instruments turned off in order to survive the low power production of its solar panels while the Sun is lowest during winter. Solar energy has risen from 235 to 245 watt hours per day. It must rise more before it can resume driving. At that time, Spirit will explore some unusual silica-rich soil that it spotted last year. Silica deposits on Earth are often the result of hot water. The rovers have each completed over 1600 (Martian) days of their 90-day missions.

Martian water – A new study suggests that the ancient valley networks on Mars were carved by recurrent floods during a geologically long period of time, not by single flood episodes, as held by some theories. Sophisticated computer models of flooding, using the latest elevation data from Mars showed that the valleys would have formed differently if the time period involved were short, that is, only a few thousand years or less. In particular, single episode conditions would have filled, breached and cut through

many craters, and this is not observed. This means that in the distant past, liquid water was stable in Mars then-existing climate for at least tens of thousands, probably hundreds of thousands of years. It was likely a generally arid climate, so that lakes would recede or dry up periodically.

Cassini (Saturn mission) has detected 2 faint partial rings, called ring arcs, orbiting with the small moons Anthe and Methone. It appears that most of Saturn's small inner moons orbit within partial or complete rings. Both Anthe and Methone orbit in locations where they resonate gravitationally with the larger moon Mimas. The resonance not only explains why the ring arc particles are trapped from filling the whole orbit, but also why Anthe and Methone rock forward and back within the arcs. The resonance mechanism containing the arc material appears to be the same as that which contains an arc within the G-ring. The material forming the newly found arcs likely is knocked off the small moons by micrometeoroid impacts. The images of the ring arcs represent the discovery of the arc for Anthe, and confirmation of arc detection magnetically of the other.

Second Sedna – Astronomers have found the second (after Sedna) icy asteroid with a very eccentric orbit that brings it close to Neptune's orbit and then far beyond the Kuiper Belt. Yet neither orbit reaches as far as the Oort Cloud is calculated to be. These orbits indicate that these 2 objects were not formed in Neptune's vicinity (would be more circular orbit), nor in the Kuiper Belt or Oort Cloud (one end of the orbit would be in the origination area). Some astronomers believe that these objects (and some comets) prove that there must be an inner Oort Cloud, considerably closer than the main cloud. The newly discovered object is designated 2006 SQ372. Its orbit takes it about 50% farther from the Sun than Sedna, a total of about 50 times Neptune's distance, and so takes about twice as long for each orbit (22,500 years). From the brightness, SQ372 must be 30 to 60 miles across.

Retrograde orbit – An object designated 2008 KV42 has been found in the Kuiper belt, a ring of icy bodies beyond Neptune, and it is orbiting in the retrograde direction. Its orbit is tilted just 13 degrees past vertical to the plane of the planets, but anything past vertical means it is orbiting in the direction opposite nearly everything else in the Solar System. The team that found it also found 20 steeply inclined objects in the Kuiper Belt, but this is the only one of them orbiting retrograde. It has been nicknamed Drac (as in Dracula). Its orbit appears to have been stable for millions of years. It is hard to figure how the object ended up in this orbit. The discoverers believe that it was deflected from a point inside the Oort Cloud, but beyond the Kuiper Belt, that is, the proposed inner Oort Cloud. A future encounter with a planet (though none are predicted for a long time) could modify its orbit into that of a Halley-type comet. Halley-type comets and captured moons are the only objects in the Solar System among which retrograde orbits are common.

Meteorites vs. asteroids – About 2/3 of the Near Earth Asteroids (NEAs) have been found to match the spectrum of a specific type of meteorite, known as LL chondrites (the LL stands for Low iron, Low metal content). Yet only 1/12 of the meteorites found on Earth are of type LL chondrite. Since chips of the NEAs were thought to be the source of most meteorites, this difference in frequency was puzzling. A new study of the Yarkovsky effect on asteroids has found the explanation. Chips off asteroids in the main belt (between Mars and Jupiter) are the source of most meteorites, not the NEAs. The main belt contains a fraction of asteroids with LL chondrite-like spectra more closely matching the fraction found for meteorites on Earth. Yarkovsky said more than a century ago that heat radiated by a rotating asteroid would slowly push it to a different orbit. The new study found that this effect, while quite slow to change orbits of larger bodies, is quite efficient in pushing small debris, say under a yard across, from the asteroid belt inward toward the Earth's orbit. This is how we on Earth run into more debris from the main belt than from NEAs.

Rosetta (European comet mission) in early September flew only 500 miles from a small (3 mile) irregularly shaped asteroid named Steins in the main belt, collecting a wealth of data. It is an E-type asteroid, which are composed mainly of silicate minerals with little or no iron, generally small, and relatively rare. This is the first of its type seen close-up. The type is thought to consist of fragments of mantle from the breakup of a larger asteroid during the early history of the Solar System. Rosetta will encounter a larger asteroid (Lutetia) in July 2010 and arrive at Comet Churyumov-Gerasimenko in 2014.

Planet picture – Attempts over the past many years to take a picture of a planet orbiting a star other than our Sun have been unsuccessful, until possibly now. The Gemini North telescope in Hawaii has taken an infrared image with its adaptive optics, which counteract the Earth's atmosphere's blurring effects, of a planet near a young star known as 1RXSJ160929.1-210524. Since previous claims to have done this have all proved false, more work is needed to verify this image. The evidence for the claim that this is a planet orbiting another star: The spectrum of the planet was taken, confirming that it is a hot (about 2800° F.) young planet (hasn't had time too cool off much since forming) with a mass of about 8 times Jupiter's, and it is about the same distance from us as the star. The case against the claim: the planet appears to be about 330 Astronomical Units (1 AU is the Earth's distance from the Sun) from the star, 11 times that of Neptune from the Sun, farther than planets are believed to orbit their stars. It has not yet been established that the star and planet are moving across the sky together, which would imply the planet is orbiting the star. This will be done, but it will take about 2 years. The star is similar to the Sun, but somewhat less massive (85%), and much younger. Young stars were targeted for this study, since they would have young planets, which are hotter, and show up more easily in infrared. The only previous successful images of planets outside our Solar System were of free-floating planets (not orbiting a star, and therefore not lost in the glare of a star), or ones orbiting brown dwarfs (which weren't quite massive enough to make star status, and are so dim that their planets are not lost in their glare).

Planet formation – Astronomers have studied 3 planet-forming discs around young Sun-like stars in unsurpassed detail using a new technique known as spectro-astrometric imaging. The result revealed the motion and distribution of gas in the inner parts of the discs, including implications of giant planets. Observations were made on the Very Large Telescope in Chile. The new observations confirm that gas is present in the gaps in the dust in the discs. This means that either the dust clumped together to form planetary

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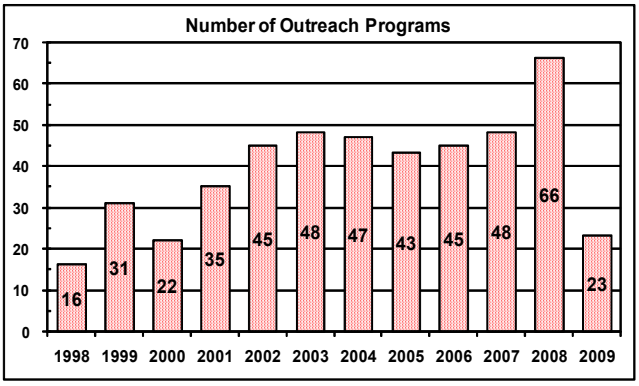
Outreach Programs Increased in 2008

Jim Benet

The number of Outreach programs has increased significantly over the previous years. By the end of 2008, the OCA will have conducted 66 Outreach events, sixteen more than the previous year representing a 37% growth. They include 2 organizations, 7 clubs, 2 libraries, 15 parks and 40 schools.

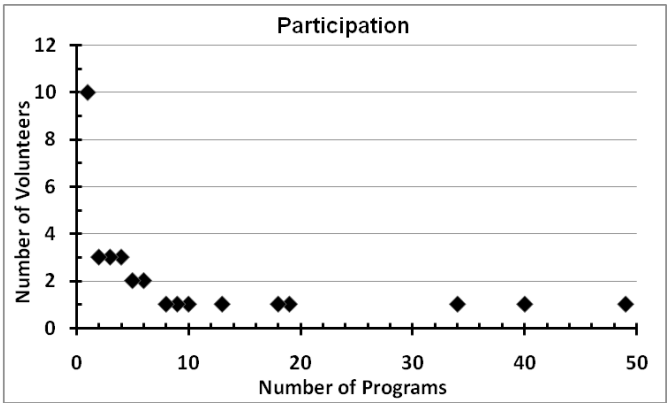


The success of the Outreach Program would not have been possible without the dedication of some outstanding OCA members helping me. They are **Tom Drouet, Vittal Badithe, Craig Bobchin, Steve Short**, **Paul Krietz**, Maury Bennett, Sheryl Benedict, Ippei Tanaka, Doug Acrea, Diane Mason and Jan, Keith Hoffman, Richard Stember, Reza Amirarjomand, Roy Weinberger, John Wohlfeil, Joe Ewach, Jamie Flores, Donald McClelland, Jim Fitz, Bill Gabris, Bob Shanta, Dave Baker, Chris Brown, Chris Buchen, Sam Fahmie, Walt Glowski, Dick Greenwald, Dennis Moonitz, Matt Ota, Lorna Pecoraro, Ray Stann, and Val Akins. Volunteers whose names are shown in **bold** have done 20 or more events this year. I extend my heartfelt thanks to each of these wonderful volunteers.

We know that this program is very much appreciated by members in the community. We get many comments of thanks from families, students, teachers, principals, park rangers, Scout leaders, and especially viewers. We also receive monetary donations for the club.

This expansion is a mixed blessing. Whereas we love to do these programs, we don't always have enough people to accommodate these events. We typically have around 150 viewers at the Outreach programs. To adequately service that many viewers requires a minimum of five telescopes per event. Ten telescopes would be even better. That amounts to approximately 660 telescopes for this year.

So far this year, we have had 260 telescopes covering the first 54 Outreach programs. We actually had 32 volunteers doing those programs. However, the volunteers were not spread out evenly across all the programs. The chart below depicts the participation of the volunteers. The dots show number of volunteers (vertical axis) participating in the number of Outreach programs (horizontal axis). For example, 10 volunteers participated in only 1 program and 1 volunteer participated in 49 programs. (You might be able to guess who that last example was.)



We expect to be doing even more Outreach programs in 2008. We have already 23 reservations scheduled for 2009. To be able to properly handle that level of Outreach activity, we need additional volunteers. We also need some of our one-timers to do a few more events. Please contact me if you would like to help. Thanks.

NASA's Space Place

Extreme Starburst

by Dr. Tony Phillips

A star is born. A star is born. A star is born.

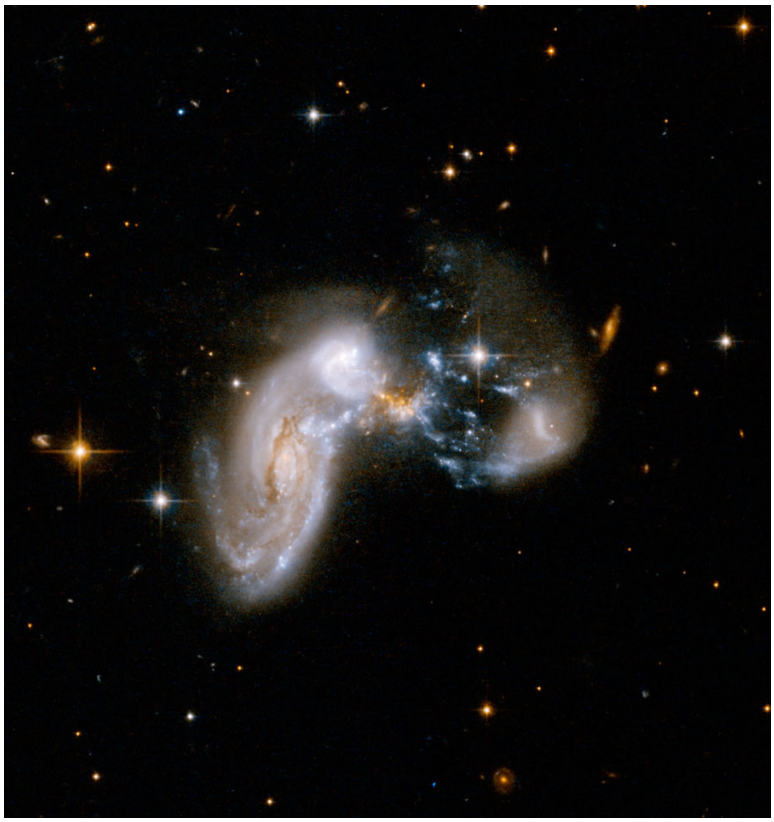
Repeat that phrase 4000 times and you start to get an idea what life is like in distant galaxy J100054+023436.

Astronomers using NASA's Spitzer Space Telescope and ground-based observatories have found that the galaxy gives birth to as many as 4000 stars a year. For comparison, in the same period of time the Milky Way produces only about 10. This makes J100054+023436 an extreme starburst galaxy.

"We call it the 'Baby Boom galaxy," says Peter Capak of NASA's Spitzer Science Center at the California Institute of Technology in Pasadena, CA. "It is undergoing a major baby boom, producing most of its stars all at once. If our human population was produced in a similar boom, then almost all people alive today would be the same age."

Capak is lead author of a paper entitled "Spectroscopic Confirmation of an Extreme Starburst at Redshift 4.547" detailing the discovery in the July 10th issue of *Astrophysical Journal Letters*.

The galaxy appears to be a merger, a "train wreck" of two or more galaxies crashing together. The crash is what produces the baby boom. Clouds of interstellar gas within the two galaxies press against one another and collapse to form stars, dozens to hundreds at a time.



The "Baby Boom" galaxy loosely resembles the galaxy shown here, called Zw II 96, in this Hubble Space Telescope image. This galaxy is only 500 million light-years away, while the Baby Boom galaxy is 12.3 billion light-years away.

This isn't the first time astronomers have witnessed a galaxy producing so many stars. "There are some other extreme starburst galaxies in the local universe," says Capek. But the Baby Boom galaxy is special because it is not local. It lies about 12.3 billion light years from Earth, which means we are seeing it as it was 12.3 billion years ago. The universe itself is no older than 14 billion years, so this galaxy is just a youngster (Capak likens it to a 6-year-old human) previously thought to be incapable of such rapid-fire star production.

The Baby Boom galaxy poses a challenge to the Hierarchical Model of galaxy evolution favored by many astronomers. According to the Hierarchical Model, galaxies grow by merging; Add two small galaxies together, and you get a bigger galaxy. In the early years of the universe, all galaxies were small, and they produced correspondingly small bursts of star formation when they merged. "Yet in J100054+023436, we see an extreme starburst. The merging galaxies must be pretty large."

Capak and colleagues are busy looking for more Baby Boomers "to see if this is a one-off case or a common occurrence." The theory of evolution of galaxies hangs in the balance.

Meanwhile… A star is born. A star is born. A star is born.

See more breathtaking Spitzer images at www.spitzer.caltech.edu/Media/mediaimages. Kids can play the new Spitzer "Sign Here!" game at spaceplace.nasa.gov/en/kids/spitzer/signs.

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

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embryos or that a planet has already formed but has not yet cleared the gas. The 3 discs studied were found to be very different and will likely result in very different planetary systems. Traditional imaging can't resolve details on the scale of planetary distances because they are so far away. The new technique combines adaptive optics to cancel the distortion of our atmosphere with near-infrared spectrography using a very narrow slit. The result is resolution of better than 1 milli-arcsecond.

Star formation – Theory says that when a new cluster of stars forms, the most massive and therefore brightest stars in the cluster push surrounding material outward with their light and stellar winds. This creates a cavity surrounded by bunched-up material, and a new generation of stars is thought to form in the bunch-up. Evidence that this "triggered star formation" actually occurs has been hard to observe. A new image from the Spitzer Space Telescope appears to show generations of stars formed this way in a cosmic cloud called W5, located about 6500 light-years away in Cassiopeia. Infrared is needed to see what is happening within such clouds, since infrared penetrates such better than visible light. Stars within the cavities were shown to be older than the stars at the cavity rims, proving there are at least 2 generations. Further work will be done to try to distinguish more generations.

Dark matter voids – All the 3-dimensional surveys of galaxies out to at least a few 100 million light-years have shown that galaxies are grouped along filaments of superclusters, with voids in between the filaments. But astronomers were not sure if the areas devoid of galaxies were also devoid of dark matter. A new analysis of the Sloan Digital Sky Survey II (SDSS II) showed that indeed dark matter is missing from the voids, just like ordinary matter. The analysis also showed that the sizes of voids exactly matched theory. The results were found to apply both to red (old) and blue (new) galaxies.

Dark matter – A second (after the Bullet Cluster) collision of galaxy clusters has been found in which the dark matter of each cluster is no longer centered on its cluster. This proves that dark matter exists (if the gravitational effect measured were caused by something other than dark matter, then it would be centered on the cluster). And it proves that dark matter doesn't interact (other than gravitationally) with itself or ordinary matter, since it passed right through the collision, while the galaxy clusters themselves were slowed by encountering the gas of the other cluster. The newly discovered collision was found by the Hubble and Chandra (X-ray) space telescopes, and is designated MACSJ0025. The dark matter was mapped indirectly through gravitational lensing, using the distortion that large mass causes as light passes by.

Medium black holes – Most black holes have either the mass of a heavy star, perhaps 10 times the Sun's mass, or else are supermassive (millions or billions of times the Sun's mass) and located at the centers of massive galaxies. Astronomers have been searching diligently for black holes with medium mass. Theorists have proposed that they would form at the centers of globular star clusters. X-ray and visible light observations of a globular cluster called RZ2109 in a galaxy about 50 million light-years away has found no medium-mass black hole. In fact a small black hole was found. Theoretically a small black hole is unstable near a medium black hole; the small one will be either dragged in or thrown out of the cluster. This means RZ2109 has no medium black hole, not even a hidden one. This looks bad for the black hole/globular theory, though observation of other globulars is planned. The next best theory for medium black holes is that they should exist in dwarf galaxies, but they should be even more difficult to find there than in globulars.

XMM-Newton (European orbiting X-ray telescope) has found a cluster of galaxies so big that astronomers believe only a few of them could exist. It is so distant that its light took 7.7 billion years to reach us. Estimates of its mass are about 100 times that of our Milky Way galaxy. Much of the mass is in the form hot gas between galaxies that has been heated to 100 million degrees. The cluster was found during a deep survey of about 1% of the entire sky. A question raised by the discovery is whether the survey was lucky to hit this huge cluster, or whether the estimates are wrong of how common such clusters are. The discoverers believe that a galaxy cluster could not have evolved as far by that early time in the Universe's history if it were not for the effects of dark energy.

Minimum galaxies – Measuring star orbital speeds within 18 of the dwarf galaxies orbiting our Milky Way has allowed calculating the mass of each. Astronomers expected the masses to vary, with the brightest "weighing" the most and the faintest the least, but surprisingly all had the same mass, about 10 million times that of the Sun. The conclusion is that galaxies can't form with less than this mass. The discoverers said that this is teaching us something about how galaxies form.

Maximum black holes – An astronomer studying black holes says there is an upper limit to how big a black hole can get, and he believes it is about 10 billion times the Sun's mass. Visible light and X-ray data of supermassive black holes at the centers of galaxies were studied, and the observations can only be explained if there is a limit to the size. One possible explanation for the limit is that black holes eventually reach the point when they radiate so much energy as they consume their surroundings that they interfere with the gas supply that feeds them. Since black hole size and galaxy size appear correlated, this may limit the size of galaxies also.

Pulsar radiation – It has long been known that pulsars (spinning neutron stars) give off high-energy gamma rays that are the result of electrons being accelerated to immense speeds. But the exact location and means of accelerating electrons has not been pinned down. INTEGRAL (European gamma-ray telescope) has observed that the gamma radiation of the pulsar in the Crab Nebula is polarized in alignment with the rotation axis of the pulsar. This shows that the acceleration occurs quite close to the pulsar to have been influenced by its spin, disproving some theories that had the acceleration occurring far from the pulsar.

Gamma-ray burst that was accompanied by an afterglow that became so bright it could briefly be seen naked-eye was reported here in the May issue. Further analysis has explained why it was the intrinsically brightest such burst ever observed. It had a very narrow and very bright jet, apparently centered within the normal wider jet, and that bright center happened to be aimed almost

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so there's no need to feel intimidated about that aspect of these events. Questions are often about equipment as much as about the objects being viewed.

A typical event starts with the volunteers arriving and setting up their equipment, ideally well before the viewing is scheduled. Since most of these events are scheduled during the week, and most volunteers have day jobs, many can't make it before the viewing starts, but come anyway and set up without undue problems even though there may be a lot of people milling around expectantly, waiting to look through what they've brought.

Depending on the school or other location, sometimes the event starts with some type of presentation, which may be provided by one of volunteers, by Jim, or by the school itself. The major event for most of the volunteers and the people attending, however, is the viewing session that follows any presentation. Generally, viewers will look through as many different scopes as they can, and the size of the scope is not necessarily the most attractive feature. A lot of kids, in particular, seem to relate better to the smaller scopes, so don't feel that you need to bring big equipment to have a success in an outreach event. New viewers are also amazingly impressed by bright objects, so the moon and bright planets are always favorites – fortunate, because they are usually pretty easy to find and often can be seen even when there are thin clouds or haze. Bright clusters such as the Pleiades and the Hyades are also popular in binoculars. And, since winter is coming on, Orion is often available – a showstopper even when there's light pollution!

If you haven't yet tried volunteering for an outreach event, please do – you'll most likely find that it's a lot more fun than you ever imagined!

Outreach Partners at Bommer Canyon Park in Irvine

THE JOURNEY TO PALOMAR

review by Tom Kucharski

THE JOURNEY TO PALOMAR is the story of American astronomer George Ellery Hale's dramatic public and private struggles to build the world's four largest telescopes, which set the stage for astronomy and space exploration throughout the 20th century, revealing the greatest discoveries since Galileo and Copernicus. The documentary, airing Monday, November 10, 2008, 10:00-11:30 p.m. ET (check local listings) on PBS, traces Hale's lifelong efforts to build these great instruments, culminating with "the most famous telescope in the world" — the million-pound telescope on Palomar Mountain.

However, not all PBS stations in the Orange Coutny area have it on their schedule. Please call your local PBS station and ask that it be aired.

FOR SALE: brand-new items - 8'F/6 Discovery Optics 1.5" Pyrex Mirror cell; 8"University Optics Alum Mirror Cell; Vega-HP1-1.25"Focuser (Japan Made); Vega-3 Low Profile Helical 2" Focuser; 48 Rini2 Eyepiece in Bolt Case (this item not new but seems to be in good condition. Will sell these items seperately or as a package for $300.00. Contact Doug 562-598-6103

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directly at Earth. The central core was about 0.4 degrees across, while the wider jet was about 20 times wider. The question now arises whether all gamma-ray bursts have this brighter central core. If so, this is just the first time we have observed one so well aligned toward Earth. From the size of the core it was calculated that this fine an alignment may occur only once per decade.

Fermi – The recently launched gamma-ray telescope GLAST has completed calibration and was renamed Fermi, honoring the pioneer in high-energy physics. It has already produced an all-sky image that combines 95 hours of observation. A similar image that was produced by the previous NASA orbiting gamma-ray observatory, Compton, took years to produce. Fermi has 2 telescopes: the LAT, which scans the entire sky every 3 hours when operating in survey mode, which will occupy most of its next year, and the GBM, which looks for gamma-ray bursts, and found 31 of them in its first month.

Instant AstroSpace Updates

Not a planet – It has been found that star spots can disturb the spectrum of a star in a way that resembles the shifts caused by an orbiting planet; in particular this occurred in the observations leading to the "discovery" of the planet at star TW Hydrae, so there is one less "known" planet now. The spot on TW Hydrae was huge, covering 7% of the surface.

The formation-flying quartet of satellites called Cluster has observed the exact means by which the Earth's **atmosphere** is slowly **leaking** off into space (the leakage itself has long been known). Oxygen ions were observed accelerating at places and times that the Earth's magnetic field shifted, attaining speeds that allowed escape of Earth's gravity.

Frequent clouds in the same position on Titan appear to be **"lake effect" clouds**, those that form when wind blows across warm liquid (water on Earth, but liquid methane and ethane on Titan). Those clouds began forming as the season began changing from winter to spring on Titan.

New Horizons (Pluto mission) was given its 2nd annual wakeup and checkout, which included a brain transplant (revised software for its computers). It is more than 2 AUs past Saturn's orbit, and is covering more than 1 million miles per day toward Pluto, which it will fly by in 2015.

Venus Express (European orbiter) has in its 2 years of orbiting made observations that revealed the global structure of winds on Venus, and measured changes in the winds.

NASA has selected another Mars mission: **MAVEN**, which will orbit the red planet beginning in 2014 and study the atmosphere, climate history and potential habitability. It will study how much of Mars's atmosphere was lost in the distant past and sample the upper atmosphere.

A team of astronomers has obtained the most detailed view ever (more than 1000 time better than the Hubble Space Telescope) of the supermassive black hole at the center of the Milky Way, using interferometry to **link radio telescopes** located from Hawaii to Arizona.

A competition was held by an international organization to suggest the best way to **deflect an asteroid** if one is found on collision course with us, and the prize winning entry by an Australian PhD student was to send a spacecraft to orbit the asteroid, draping it in reflective plastic wrap. Sunlight reflecting of that would slowly push it into a different orbit.

A worm (**computer virus**) that steals private information while you play internet games has been found (and removed with Norton) on a computer aboard the International Space Station. An investigation is underway to determine how it got there, since those computers are never connected to the Internet.

Astronomers believe that using a new technique of calibrating a spectrograph with a frequency comb should allow measuring the expansion speeds of distant galaxies so precisely that **dark energy** effects on that speed should show up within 20 years of observation. A frequency comb is light at many frequencies separated by precise intervals, and is generated with extremely short pulses of a laser.

Magazine Subscriptions

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

	Club Rate	Regular Rate
Sky & Telescope*	**$33.00**	$42.95
ASTRONOMY	**$34.00**	$42.95

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

The **DEADLINE** for subscribing at the club rates will be the **October monthly meeting, October 10th.** The publishers will send expiration notices to all current club subscribers about November 1st even if you renew through the club. It takes the publishers a few weeks to process renewals.

EINSTEIN: THE MAN AND HIS LEGACY

Come celebrate the life and work of the great scientist who turned our notions of the universe upside down!

Saturday & Sunday, November 1 & 2, 2008

in 147 Dodd Hall at UCLA

Sponsored by UCLA Extension

Astronomer Andrew Fraknoi and physicist Alan Friedman will present an illustrated non-technical exploration of Einstein's astonishing concepts of space, time, and the atom. The emphasis is on ideas, not equations. Beautiful images from telescopes on earth and in space, science demonstrations, and many opportunities to ask questions will complement the lectures.

Key topics to be covered include:

- The theories of relativity — what do they really say?
- Black holes — bizarre warps in space and time
- E = mc squared — the real meaning of the famous formula
- Einstein and the Bomb — myth or reality?
- Quantum theory - why did Einstein dislike a theory he helped create?
- Einstein and popular culture — Einstein as a symbol

No prior knowledge about science is required. The presenters specialize in explaining abstract concepts in everyday language.

The program may be taken for credit or just for fun. Full-time students are eligible for discount registration. Participants will receive an annotated guide to the best science and fiction resources about Einstein's work.

For more information, a program schedule, and to register, go to the course web site: www.uclaextension.edu/Einstein08

or call 310-825-7093.

(Cosponsored by the Astronomical Society of the Pacific, Griffith Observatory, and Friends of the Observatory)

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