

# Southwest Florida Astronomical Society

## SWFAS



## The Eyepiece

### April 2013

#### **A MESSAGE FROM THE PRESIDENT**

Spring has sprung! We are unfortunately having to say goodbye to some of our part time residents.

Kelly Flaherty had a nice group for the *Astronomy for Amateurs* on March 8th and we had a number of members out there for it. Kelly and I thank all who came out.

On March 9th, we had good skies early on for the STEMtastic event at the Lee County School Board complex. Unfortunately, the clouds came in after noon and put a damper on observing. We had a very good turnout of members: Alice Mack and Isaac Osin did great with the large crowd inside. Outside we had quite a number of people outside with the telescopes: Richard Sozio, Dick Gala, Tony Heiner, Carol Stewart, Carole Holmberg and Gary McFall. (If I missed anyone, I am sorry.) (And yes, we had to dodge the bottle rockets again!)

Unfortunately, clouds came in pretty bad so we had to cancel the CRP star party for March 9th. Carol Stewart had her Springtime Astronomy event at the CNCP and was able to get a few objects in for the 41 that came out.

This month's meeting program is *Astro-Geology* by Jack Berninger.

We will be holding a club Bar-B-Que at CRP on the afternoon of April 13th prior to the Star Party that night. This way we can all get together in the daytime! If you can bring something, please let me know ([swfasbrisley@embarqmail.com](mailto:swfasbrisley@embarqmail.com)) so we can plan accordingly. I do need a total count of people coming so we can plan the food. If you did not get the information I emailed, please let me know and I can get it to you.

We had a donation of a Celestron Celestar 8 from Mr. and Mrs. John Merrell of Sanibel/Noblesville, IN. It is a nice fairly portable scope that will be available to educators/youth leaders. It is not a goto scope, but is powered by a simple 9V battery, so there are no power cords to deal with. I picked up a very nice case to transport/store the scope and accessories.

Moon: Last Quarter 3rd, New 10th, 1st Quarter 18th, Full 25th.

Planets: Mars is very low in the west at sunset. Jupiter is high in Taurus near the Hyades at sunset. Venus is creeping into the evening sky and Mercury is in the morning sky. Saturn is rising just an hour or so after sunset and is well placed in the sky most of the night. We have the Lyrid meteor shower around the 21st, but the waxing moon will be up for most of the night.

Dues for 2013 are now due. I sent out email notifications to all members who have not already paid. Please pay at the meetings or events we are holding or send your payment in to SWFAS P.O. Box 100127, Cape Coral, Florida 33910. If you have any questions about your dues, contact me.

## Club Positions

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## Upcoming Events

- \* Thurs Apr 4th Sanibel School STEM Night (Annie Franke: AnnMF@LeeSchools.Net)
- \* Thurs Apr 4th Monthly meeting at the Calusa Nature Center Planetarium, 7:30pm (Jack Berninger: Astro-geology)
- \* Sat Apr 6th Star Party at Shell Point Village (Dusk)
- \* Sat Apr 13th Club Bar-B-Que at Caloosahatchee Regional Park, afternoon
- \* Sat Apr 13th Club Star Party at Caloosahatchee Regional Park (Lakeland Christian School will be there) (Dusk -?)
- \* Sat Apr 27th Skyline Elementary 25th Anniversary (Carol Stewart: cjstewart@mindspring.com) Solar Observing
- \* Thurs May 2nd Monthly meeting at the Calusa Nature Center Planetarium, 7:30pm
- \* Sat May 11th Club Star Party at Caloosahatchee Regional Park (Dusk -?)

## April Meeting

Our April monthly meeting will be held on April 4th at 7:30 pm at the Calusa Nature Center Planetarium. Jack Berninger will give a talk entitled *Astro-geology*.

## CRP Star Party Schedule

The remaining Star Parties for 2013 will be April 13, May 11, June 8, July 6, August 3, September 14, October 5, November 2, November 30, and December 28.

## Club Bar-b-Que Saturday April 13th

Ok, as mentioned at the last meeting, we are going to have a club Bar-b-Que out at the Caloosahatchee Regional Park before the Star Party the night of the 13th. This is open for all family members!

This is a chance for us to see each other in the daylight! :-)

(You will need to pay for parking. Please note: pets, alcohol and fireworks are not permitted. )

Kelly Flaherty has arranged for us to have the pavilion reserved at the Star Party site the entire day! (Thanks Kelly!)

The plan is to meet for the Bar-B-Que around 4pm at the North Side pavilion.

You are free to come to the park earlier for any activities that you may be interested in.

Remember, the North side has the off road bike trails!

For those interested, there are kayak rentals available too. If you want to camp out, see the camping information below.

The plan is to be setup for solar observing during the day with the CPC and PST at a minimum. If you are interested in helping supply items or food, please get in touch with me so we can coordinate it. We are planning to have grills available for cooking. I would like to have an idea of the people coming so we can plan accordingly. If you have a large cooler, that would be helpful. There is power available at the pavilion if you need to plug in something like a crock pot. If you are interested in doing a walk with Kelly, please indicate so that we can plan to do it. Here's hoping for nice weather!

(We are expecting a school group from Lakeland at the star party. If you have friends interested in coming, this would be a good time to invite them out. We have Jupiter at sunset, and Saturn is up by midnight!)

We are making arrangements to be able to setup in the field to the east of the parking lot. This will remove us from the parking lot car lights and provides better horizons. We'll see how it goes, as it may be a better spot than the parking lot, but we don't have AC there. I will see about a generator for power in the field.

- Brian Risley

### **Additional Park Information from Kelly Flaherty**

There is already a guided walk scheduled for the morning of Saturday, April 13th. It's led by a volunteer docent Marti Daltry who is Florida Master Naturalist and an excellent interpreter. Here is the information about that walk:

#### **Guided Walk at Caloosahatchee Regional Park**

**Date:** 4/13/2013, **Start Time:** 9:00 AM, **End Time:** 11:00 AM

**Description:** Join park staff on a stroll through natural plant communities. See firsthand the plants and animals that make southwest Florida so unique. Participants should be able to walk one and a half miles. Please dress appropriately and bring a water bottle. We will meet at the main entrance of the park at 18500 North River Road. This program is free with paid parking. Limit 25 participants. Children must be accompanied by an adult.

**Location:** main entrance large shelter, **Contact Number:** 239-694-0398

I'm not sure if your group is planning to be at the park that early so if I'm available, I will try to stop over to the north side and see if anyone would like to do a guided walk in the afternoon starting from the north side. If there is a good time for that let me know and I'll try to make myself available. Maybe 2 or 3 p.m.? Let me know.

Thank you for your interest in Caloosahatchee Regional Park. You can view our park information, program information, event calendar, directions and see pictures of our campsites or pavilions at [http://leeparks.org/facility-info/facility-details.cfm?Project\\_Num=0253](http://leeparks.org/facility-info/facility-details.cfm?Project_Num=0253)

**Kayak Reservations:** Please call the campground office at least 24 hours in advance at (239)694-0398 to make an appointment to reserve a kayak. Single person or two person kayaks are available for rent. Kayak rental fees are \$15 per hour or \$40 for the day and include the kayak, paddle and life vest. More information will be provided when you call.

**Camping Reservations:** Family sites are \$15 per night and hold 2 tents. Group sites hold 6 tents. Group sites are \$30 per night. Check out is noon, check in is any time after noon. You will receive 2 parking passes per family site or 4 parking passes per group site upon check in. All additional vehicles in your party must pay the daily parking rate of \$1 per hour \$5 maximum for the day. Please bring exact change. You can only pay **cash or check** for the parking fee. We need a copy of your driver's license when you check in and you will sign a copy of our rules. Pets, alcohol and fireworks are not permitted. Firewood is currently available for sale for a donation (\$4 for 8-10 pieces of firewood). Check our web site or call to make sure we still have firewood. Otherwise, you may bring your own. The

Florida Department of Forestry may ask us to ban campfires due to dry conditions. If this happens, you may still use charcoal in the grill for cooking. Please check our website for updates on campfire bans at [http://leeparks.org/facility-info/facility-details.cfm?Project\\_Num=0253](http://leeparks.org/facility-info/facility-details.cfm?Project_Num=0253).

- Kelly E. Flaherty, Senior Program Specialist, Caloosahatchee Regional Park, Manatee Park and Hickey's Creek Mitigation Park, 239-694 -0398 (campground), [kflaherty@leegov.com](mailto:kflaherty@leegov.com)

## Request from the Sanibel School

*(If anyone can help Annie, please get in touch with her and let me know. - Brian)*

My name is Annie Franke. I am a 3rd grade teacher at The Sanibel School, and I am a dues paying member of SWFAS. I enjoy getting the updates from the club, but am not able to make the time to attend meetings.

Our school is having a STEM night for students and parents on Thursday, April 4th. We were hoping someone (or more than one person) from the club might be able to attend and conduct any type of activity related to Astronomy. Unfortunately, the event is from 5:30-7:30 pm, so night sky viewing will not be an option.

Are there any club members that might be available to attend? Are there any simple activities you could conduct with us? I'd appreciate any help you could give us.

- Annie Franke, 3rd Grade Teacher, The Sanibel School, 3840 Sanibel-Captiva Road, Sanibel, FL 33957, 239-472-1617, [AnnMF@LeeSchools.Net](mailto:AnnMF@LeeSchools.Net)

## Student Filmmakers Request Help

My name is Lindsey and I am a graduate film student at USC. We are currently producing a thesis film that celebrates deep space travel, and we want to spread the word about the project within the astronomy community.

"VIMANA" is the story of three astronauts on their way to the exoplanet, Gliese 581 g to begin a new settlement for mankind. Things go awry when their captain falls ill and passes away--at which point it becomes up to the two remaining astronauts to land the ship and complete the mission in his memory.

We are now working hard to do the research and raise the funds necessary to get this project made. We have a fundraising campaign if you have a moment to check out our pitch video: <http://kck.st/13RSOJJ>

Your help would be so appreciated to help us get this film completed:

- a financial contribution of any amount would go a long, long way
- sharing our project within your circles of colleagues and other space enthusiasts
- OR story consulting on our script

We thank you for your time and hope you will be part of the VIMANA journey!

- Faroukh, Lindsey and Natalie, [visitgliese@gmail.com](mailto:visitgliese@gmail.com), <http://www.vimanafilm.com/>



## Green Meteorite May Be from Mercury

*Left: This green meteorite that landed in Morocco in 2012 could be from Mercury.*

Scientists may have discovered the first meteorite from Mercury.

The green rock found in Morocco last year may be the first known visitor from the solar system's innermost planet, according to meteorite scientist Anthony Irving. His study

suggests that a space rock called NWA 7325 came from Mercury, and not an asteroid or Mars. NWA 7325 is actually a group of 35 meteorite samples discovered in 2012 in Morocco. They are ancient, with Irving and his team dating the rocks to an age of about 4.56 billion years.

"It might be a sample from Mercury, or it might be a sample from a body smaller than Mercury but which is like Mercury," Irving said. A large impact could have shot NWA 7325 out from Mercury to Earth, he added.

Irving is a professor at the University of Washington and has been studying meteorites for years. The NWA 7325 meteorite is unlike anything found on Earth before. Meteorites from Mars are imbued with some Martian atmosphere, making them somewhat simple to tell apart from other rocks. Space rocks from Vesta, one of the largest asteroids, are also chemically distinct, but NWA 7325 does not resemble any space rock documented by scientists today.

Irving thinks that the meteorite was created and eventually ejected from a planet or other body that had flowing magma on its surface at some point in its history. Evidence suggests that the rock could have been formed as "scum" on the top of the magma, Irving said.

NWA 7325 has a lower magnetic intensity — the magnetism passed from a cosmic body's magnetic field into a rock — than any other rock yet found, Irving said. Data sent back from NASA's Messenger spacecraft currently in orbit around Mercury shows that the planet's low magnetism closely resembles that found in NWA 7325, Irving said.

Scientists familiar with Mercury's geological and chemical composition think that the planet's surface is very low in iron. The meteorite is also low in iron, suggesting that wherever the rock came from, its parent body resembles Mercury.

- by Miriam Kramer, SPACE.com Staff Writer, [www.space.com/20426-mercury-meteorite-discovery-messenger.html](http://www.space.com/20426-mercury-meteorite-discovery-messenger.html)

## **Collision Course? A Comet Heads for Mars**

Over the years, the spacefaring nations of Earth have sent dozens of probes and rovers to explore Mars. Today there are three active satellites circling the red planet while two rovers, Opportunity and Curiosity, wheel across the red sands below. Mars is dry, barren, and apparently lifeless.

Soon, those assets could find themselves exploring a very different kind of world.

"There is a small but non-negligible chance that Comet 2013 A1 will strike Mars next year in October of 2014," says Don Yeomans of NASA's Near-Earth Object Program. "Current solutions put the odds of impact at 1 in 2000."

The nucleus of the comet is probably 1 to 3 km in diameter, and it is coming in fast, around 125,000 mph. "If it does hit Mars, it would deliver as much energy as 35 million megatons of TNT," estimates Yeomans.

For comparison, the asteroid strike that ended the dinosaurs on Earth 65 million years ago was about three times as powerful, 100 million megatons. Another point of comparison is the meteor that exploded over Chelyabinsk, Russia, in February 2013, damaging buildings and knocking people down. The Mars comet is packing 80 million times more energy than that relatively puny asteroid.

An impact would transform the program-along with Mars itself. "I think of it as a giant climate experiment," says Michael Meyer, lead scientist for the Mars Exploration Program. "An impact would loft a lot of stuff into the Martian atmosphere—dust, sand, water and other debris. The result could be a warmer, wetter Mars than we're accustomed to today."

Meyer worries that solar-powered Opportunity might have a hard time surviving if the atmosphere became opaque. Nuclear-powered Curiosity, though, would carry on just fine. He also notes that Mars orbiters might have trouble seeing the surface, for a while at least, until the debris begins to clear.

A direct impact remains unlikely. Paul Chodas of NASA's Near-Earth Object Program stresses that a 1 in 2000 chance of impact means there's a 1999 in 2000 chance of no impact. "A near-miss is far more likely," he points out.

"Cameras on ALL of NASA's spacecraft currently operating at Mars should be able to take photographs of Comet 2013 A1," says Jim Bell, a planetary scientist and Mars imaging specialist. "The issue with Mars Odyssey and the Mars Reconnaissance Orbiter will be the ability to point them in the right direction; they are used to looking down, not up."

"The issue with the Opportunity and Curiosity rovers will be power for imaging at night," he continues. "Opportunity is solar powered and so would need to dip into reserve battery power to operate the cameras at night. Whether or not we will be able to do this will depend on how much

power the rover is getting in the daytime. On the other hand, Curiosity is nuclear powered, so it could have better odds at night-time imaging."

Researchers will be keenly interested to see how the comet's atmosphere interacts with the atmosphere of Mars. For one thing, there could be a meteor shower. "Analyzing the spectrum of disintegrating meteors could tell us about the chemistry of the upper atmosphere," notes Meyer. Another possibility is Martian auroras. Unlike Earth, which has a global magnetic field that wraps around our entire planet, Mars is only magnetized in patches. Here and there, magnetic umbrellas sprout out of the ground, creating a crazy-quilt of magnetic poles concentrated mainly in the southern hemisphere. Ionized gases hitting the top of the Martian atmosphere could spark auroras in the canopies of the magnetic umbrellas.

Astronomers around the world are monitoring 2013 A1. Every day, new data arrive to refine the comet's orbit. As the error bars shrink, Yeomans expects a direct hit to be ruled out. "The odds favor a flyby, not a collision," he says.

Either way, this is going to be good. Stay tuned for updates as the comet approaches.

- Author: Dr. Tony Phillips | Production editor: Dr. Tony Phillips | Credit: Science@NASA  
[http://science.nasa.gov/science-news/science-at-nasa/2013/26mar\\_marscomet/](http://science.nasa.gov/science-news/science-at-nasa/2013/26mar_marscomet/)

## Free Online Astronomy Course

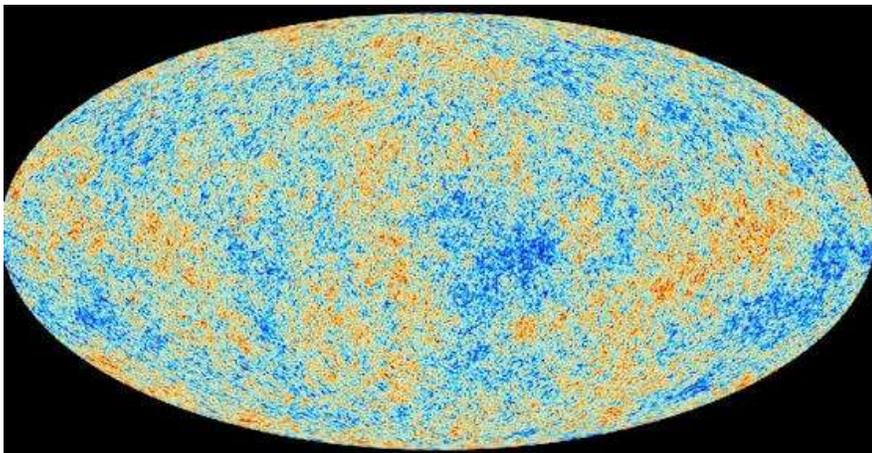
I'm teaching a free astronomy MOOC called "Astronomy: State of the Art." It started March 25, but people can sign up any time; it's intended for those with a keen interest in astronomy but not necessarily much background and the topics are tilted toward cutting edge areas like big new telescopes and exoplanets and dark matter/energy and so on. I'd like to attract additional people; with a MOOC the more the merrier! Here are the relevant links.

YouTube Intro/Overview: <http://www.youtube.com/watch?v=cyRQIWX5SxY>

Course Page on Udemy for signing up: <https://www.udemy.com/astronomy-state-of-the-art/>

- Prof. Chris Impey, University of Arizona, and Astron. Society for the Pacific Board Member

## Universe Older Than Previously Thought



*Left: This map shows the oldest light in our universe, as detected with the greatest precision yet by the Planck mission.*

The sharpest picture ever taken of the ancient afterglow left over from the cosmic explosion that created the universe closely matches predictions of the so-called standard model of the big bang.

Data collected by the European Space Agency's Planck space telescope appears to confirm a

relatively straight-forward version of inflation, the enormously rapid expansion of the universe an instant after it burst into existence. And it provides a more accurate estimate for the age of the universe - 13.82 billion years, about 100 million years older than previously believed.

The data also provide more precise values for the matter-energy density of the universe, showing slightly more normal matter and mysterious dark matter and slightly less dark energy, the enigmatic force believed to be speeding up the expansion of the cosmos.

But intriguing "anomalies" in the data collected by the Planck spacecraft suggest the standard model may need revision in at least some areas. The data appear to confirm a subtle asymmetry in temperature readings from one hemisphere of the sky to the other and show an unexpectedly large region of lower temperatures that begs explanation.

The standard model holds that the universe underwent an unimaginable expansion in the first tiny fraction of a second after it burst into being, swelling 100 trillion trillion times. Inflation then

cut off and a more leisurely expansion continued.

The cosmic microwave background radiation dates back to about 370,000 years after the big bang, when the temperature of the expanding universe dropped below about 5,000°. At that point, protons and electrons could stick together to make hydrogen and light could travel freely. Over the billions of years since the big bang, the expansion of the universe has stretched out that light, resulting in a pervasive microwave glow that is equivalent to a temperature of 2.7° above absolute zero.

"This light started out as a white-hot glow," said Charles Lawrence, U.S. Planck project scientist. "But during 13.8 billion years, the universe has expanded by 1,100 times and that white-hot glow has cooled by the same factor to a very cold glow that our eyes can't see. Planck was built to see it and measure it better than ever before."

Along with showing good agreement with the predictions of the standard model of the big bang, the Planck data have allowed scientists to sharpen their estimates of the mass-energy density of the universe.

Normal matter, that is, the atoms and particles making up the planets, stars and galaxies we see around us, amounts to about 4.9% of the mass-energy density of the cosmos, slightly more than previously believed.

Likewise, mysterious dark matter, which produces observable gravitational effects at galactic scales, makes up 26.8% of the mix, a bit more than previously thought. Dark energy, the enigmatic force believed to be speeding up the expansion of the universe, makes up the rest, about 68.3%. That total is slightly less than earlier estimates.

The Planck data clearly support the broad outlines of inflation, but it's not yet clear which of several competing versions may be correct.

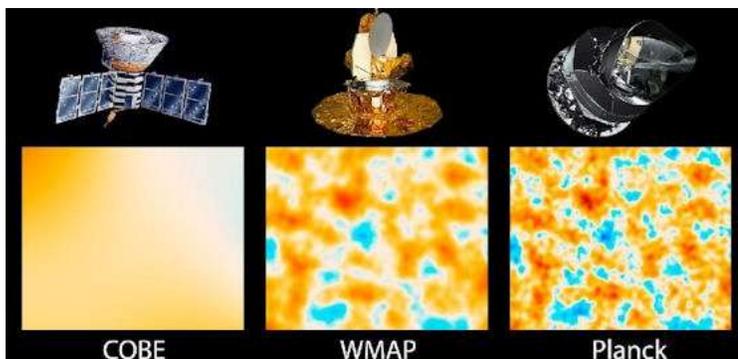
"The temperature variations from place to place in the map that Planck has made tell us new things about what happened just 10 nano nano nano nano seconds after the big bang when, in a gazillion times less time than it takes me to say this, the universe expanded by 100 trillion trillion times," Lawrence said.

That incredibly rapid expansion explains the very subtle temperature variations - on the order of a few 100 millionths of a degree - seen in the Planck data. During the extremely rapid period of inflation, very slight differences in density in the primordial fireball, caused by random quantum fluctuations at sub-atomic scales, would have been smoothed out to produce the generally homogenous picture of the cosmos we see today.

"One of the reasons a lot of people find inflation such a compelling idea is that it explains both the fact that the universe is so amazingly smooth, but also that it's not completely smooth," said Martin White, U.S. Planck scientist at the University of California in Berkeley.

Inflation should have produced a universe with the same sorts of variations in all directions. The subtle temperature anomaly confirmed by Planck, in which one hemisphere of the sky appears very slightly different from the other, is at odds with that belief.

"Although the universe is described amazingly well by a simple model, with the precision of Planck's measurements we see some things that don't quite fit together perfectly," Lawrence said. "They'll be the subject of much future investigation."



*This graphic illustrates the evolution of satellites designed to measure ancient light leftover from the big bang that created our universe 13.8 billion years ago. Planck has created the sharpest all-sky map ever made of the universe's cosmic microwave background, revealing light patterns as small as one-twelfth of a degree on the sky.*

*- By William Harwood, CBS News, some graphics supplied by Science@NASA*

## **Reading the Weather Using the Sun, Moon and Stars**

Some years ago, on the night before an impending big snowstorm, the phone started to ring incessantly at the News 12 Weather Center in Westchester, NY, where I work. But the inquiries being posed that night were not viewers asking about the impending big snow, but rather about something that was up in the sky at that hour.

I threw on my coat and stepped outside to take a look. A full moon was shining brightly, and next to the moon was a very bright Jupiter. But that's not what all the phone calls were about. Rather, people were asking about a large and unusually bright ring, or halo that surrounded the moon. "I've never seen this before," said one woman, adding, "is the moon giving off some strange rays?" Another caller expressed the opinion that the halo might be weather-related, adding: "I guess the fact that it's so bright means a lot of snow is coming, right?"

It is indeed amazing how a relatively common sight like a lunar halo can sometimes stop people in their tracks and look up. And a person who watches the sky carefully enough may sometimes notice a connection between the sun, moon and impending weather. Here are a few examples, each accompanied by a little folklore. Let's start with halos.

### **"The bigger the ring, the nearer the wet."**

Halos are produced when light from the sun or the moon strikes ice crystals suspended high in the atmosphere at altitudes above 25,000 feet. Such ice crystals are present within a rather thin, uniform veil of cirrostratus cloudiness. The practical value of halos for weather forecasting follows from the fact that cobwebby cirrostratus clouds usually precede a warm front and its accompanying precipitation. Actually, a halo in winter doesn't have absolute significance; but during warmer months, it usually foretells the coming of a thickening cirroform ceiling of warm air overhead; in most cases, a long-duration period of drizzly rain should eventually arrive in about 12 to 18 hours.

But your chances of accurately predicting precipitation depend chiefly on your location; the closer you are to normal storm tracks, the more likely a halo predicts rain. Precipitation tends to develop more quickly with an associated halo that appears in winter as opposed to summer because weather systems tend to move with a greater speed across the country then.



The precise size of the halo is due to the shape of the ice crystal. Light enters one side of the crystal and is refracted (bent) because light travels more slowly through ice than through air. This light leaves the crystal through another side and is refracted again. This light is usually bent at an angle of  $22^\circ$ , creating the most commonly observed halo.

*Caption: A classic lunar halo photographed in December 2003 in Ontario, Canada. CREDIT: Lauri Kangas*

Halos seldom have much color; they are commonly soft white circlets in the sky. But sometimes, especially with solar halos, they can appear like vivid rainbows with a dull red appearing on the inside and bluish white on the outside. (Of course, if you attempt observation of a ring or halo around the Sun, make sure you block the Sun out with your hand so that you don't end up looking directly at it and risk blinding yourself!)

There's another halo sometimes called the "great halo," which is not seen very often. It appears at an angle of  $46^\circ$  from the sun or moon and forms on the same principle as the normal  $22^\circ$  halo. In the great halo, light either enters the top of the crystal and then emerges from one of the sides, or it enters one side and then passes out the bottom.

To see both a regular halo and a great halo, the sun or moon must be shining through two layers of cirrostratus and, at low sun angles if the ice crystals in the clouds are just right, one may see arcs, sun pillars and other curious effects. When other circlets form on the circumference of the primary halo, they are known as mock suns or sundogs. A more technical term for these is parhelia, from the Greek parēlion, meaning "beside the sun."

**"Red sky at night is the sailor's delight; Red sky in the morning is a sailor's sure warning."**

Many people may be surprised when it is pointed out that this well-known weather saying was first alluded to in the Bible. In Matthew 16:2, Christ is quoted as saying: "When it is evening, you say, 'The weather will be fair, for the sky is red.' And in the morning you say, 'It will be stormy today, for the sky is red and lowering.'"

Interestingly, this oft-quoted weather saying does have some scientific backing. The red sunset mentioned by Christ was a view of the sun through dust-laden air that would reach him the next day. In most places, weather patterns usually tend to move from west to east. So, if "tomorrow's air" lies westward, as cloudiness that will bear precipitation, the sun shining through it appears to be a diffuse disk of gray or a mellow yellow, while if the air to the west is dry, the sun appears as a ruddy hue.

Generally speaking, 7 out of 10 red sunsets usually indicate good weather in northern climates. Conversely, the ruddy colors seen at sunrise can usually be attributed to cirroform cloudiness scattering the light at the edge of an approaching warm front.

This adage also works for rainbows. If you see a rainbow at night, or more accurately in the late afternoon or early evening, then you're looking to the east where showery weather which likely has just passed you by is now retreating. Sunlight from the west, shining through the raindrops (which act like tiny prisms) is producing the rainbow effect. And the clearing skies, which enable you to see the sunshine, are now advancing toward you.

But if you see a rainbow in the morning, it means that you're looking to the west where the showery weather is occurring and moving toward you. The sun is now to your east and will soon give way to unsettled or cloudy weather approaching, signaled by the rainbow, from the west.

### **"Twinkle, twinkle little star"**

Most people would probably consider a sky filled with twinkling stars to be the perfect setting for the observational astronomer. However, such a sight is perhaps the worst scenario for viewing the sky. This is especially true during the winter when the atmosphere is clear and transparent and the temperature cold. Then the twinkling or scintillation effect is especially noticeable. The cause lies in the fact that the temperature, water vapor and density of the different layers of the atmosphere are constantly changing. As the beam of light from a star passes through the air, it is refracted, or bent, irregularly, with the resultant effect of scintillation.

If you tried observing with a telescope on such a night, you'd be very disappointed. Looking at a particular star or planet through such a turbulent atmosphere, the image would appear to constantly dance, or shimmer, even if you were using a low-power eyepiece. Such nights of poor seeing are usually encountered immediately after the passage of a storm or a sharp weather front. It is better to wait at least 24 to perhaps 48 hours after such a weather system has moved on, to allow the local atmosphere to "calm down" so as to get a steadier image.

Ironically, it is on summer nights that appear rather hazy and with fewer stars that will often yield the best telescopic views. While not as transparent or pristine as cold, crisp winter nights, the atmosphere is usually much steadier and tends to provide much better telescopic views.

### **No Beehive tonight . . . so prepare for unsettled weather!**

Cancer is the least conspicuous of the 12 zodiacal constellations. Aside from being in the Zodiac, it is probably only noteworthy because it contains one of the brightest galactic star clusters, appearing to the eye as a misty patch of light. But binoculars quickly reveal its stellar nature. It is Praesepe, better known as the Beehive Star Cluster, containing hundreds of small stars.

Interestingly, the Beehive was also used in medieval times as a weather forecaster. It was one of the very few clusters that were mentioned in antiquity. Aratus (around 260 BC) and Hipparchus (about 130 BC) called it the "Little Mist" or "Little Cloud." But Aratus also noted that on those occasions when the sky was seemingly clear, but the Beehive was invisible, that this meant that a storm was approaching. Of course, we know today that prior to the arrival of any unsettled weathermaker, high, thin cirrus clouds (composed of ice crystals) begin to appear in the sky. Such clouds are thin enough to only slightly dim the sun, moon and brighter stars, but apparently just opaque enough to hide a dim patch of light like the Beehive.

- Joe Rao, *OurAmazingPlanet Contributor*

## How NASA got an Android handset ready to go into space

It's what science fiction dreams are made of: brightly colored, sphere-shaped robots that float above the ground, controlled by a tiny computer brain. But it isn't fiction: it's the SPHERES satellite, and its brain is an Android smartphone.

Two and a half years ago, the Human Exploration and Telerobotics Project (HET) equipped a trio of these floating robots with Nexus S handsets running Android Gingerbread. (HET is a project at NASA's Ames Research Center that uses SPHERES, which stands for "Synchronized Position Hold, Engage, Reorient, Experimental Satellites," and that project itself is called SmartSPHERES). Despite their name, these SPHERES aren't traditional satellites—they're currently being used inside the International Space Station (ISS) to investigate applications like telerobotic cameras and high-latency control, and to measure sound and radiation levels.

More generally, the Android phones will help HET test out new ways of sensing and modeling the ISS so that robots can eventually become an integral part of the space station's operations. Space exploration is still largely a human-controlled operation, but by equipping each of these self-contained satellites with their own Nexus S, they can navigate autonomously while researchers provide high-level commands from Earth. There are currently two Nexus S smartphones at work in the ISS right now. Hardware upgrades for SPHERES aren't possible without flying completely new equipment up to the ISS, but adopting Android allowed some quick software fixes that would have otherwise been impossible.



### Why the Nexus S?

The SPHERES have been in flight since 2006. They were designed by MIT for use on the ISS, where they use compressed CO<sub>2</sub> thrusters. The project had mainly served to try out experimental software, but the needs of the HET SmartSPHERES project soon exceeded the capabilities of the decade-old processor contained inside the satellites. "By connecting a smartphone, we can immediately make SPHERES more intelligent. With the smartphone, the SPHERES will have a built-in camera to take pictures and video, sensors to help conduct inspections, a powerful computing unit to make calculations, and a Wi-Fi connection that we will use to transfer data in real-time to the space station and mission control," wrote DW Wheeler, lead engineer in the Intelligent Robots Group at NASA Ames.

"We knew of other projects that were using the Nexus One, and HTC had done some interesting things in that phone that didn't make it ideal for us," Mark Micire, project lead of the Intelligent Robotics Group, said. "It has to do with HTC's battery technology—it has to be a proprietary battery or it won't boot up."

Micire and the team also figured out that the Nexus S would be much easier to disassemble. "You basically pop it open," said Micire. "It's literally six screws on the outside and it comes apart." Samsung had also separated the circuit boards inside the Nexus S, which made it easier to navigate around the various components featured inside the phone. "We look at the SPHERES as a robot that needed a brain, and that's where Android phones came in."

### Cellphone lobotomies

One of the biggest challenges of getting a manufacturer's proprietary hardware to work with your own is not knowing exactly what's inside. "When you go with something that already exists, there's a lot of reverse engineering that has to happen," explained Micire. "Especially in the case of phones: as much as I love our phone manufacturers, they're not always forthcoming about what's actually under the hood."

In this case, the Nexus S had to be forced into permanent airplane mode before it could go up

into space, but that couldn't involve a software solution. "When you get on an airplane and they tell you that you have to put it into airplane mode because it'll cause interference with the avionics and stuff—same things on ISS, except they require it to be a hardware switch," said Micire. At the time, before the phone had even premiered, iFixit posted its teardown of the Nexus S. Micire and his team were able to essentially use the high-resolution photos on the site to figure out which chip they had to disengage to disable the cellphone capabilities of the phone. They then waited in line on launch day to secure two phones so that they could perform their own "cellphone lobotomies" to physically remove the offending component. From there, all the team had to do was test the phone to prove to the flight safety crew that it wouldn't cause interference on station. It passed. "The phone is none the wiser," said Micire. "It just thinks it doesn't have cell phone service."

### **Space only takes AA batteries**

*The battery pack strapped on to the Nexus S.*



Micire also had to figure out how to power up the phone without using a lithium-ion battery pack. "Getting a lithium-ion battery certified for the station was going to probably be greater than two years," he explained. Alkaline batteries had already been approved for space travel because they degrade "more nicely." Rather than explode and catch on fire, alkaline batteries will instead leak electrolyte fluid, which is easier to contain. The team on the

developed a battery pack for the Nexus S that would replace the lithium ion one with six AA batteries. The pack is wrapped in a felt-like material that is specifically made to absorb any leakage that might occur, and a few Velcro patches are attached to it so that it can stay fixed to the SPHERES.

The cellular chip and battery pack weren't the only hardware hacks. If the Nexus One's glass touchscreen were to shatter in space, the lack of gravity would leave all those broken shards of glass up in the air. Micire explained that the scenario would be hazardous. "Those tiny little shards are just floating within the ISS and now you have astronauts that are breathing them in." The team used a type of Teflon tape to cover up the chassis of the Nexus S to simultaneously protect the phone and contain any broken pieces from floating about.



*The Nexus S runs an app that records activity on the gyroscope, accelerometer, and 3D compass.*

Before the Nexus S was ready to work, the performance of components like the gyroscope, accelerometer, and 3D compass also needed testing to confirm that they worked in microgravity. The team used a data logger application (available in the Google Play store) to record the data on the sensors and gather measurements. "By recording we were able to show that the sensors did behave as we expected."

### **What's next?**

In the end, the project was possible due to Android's usefulness beyond mobile phones. "We made the right decision by going with Android because the ability to remove the lithium battery and have it run off of alkaline batteries I think would have been a lot more difficult with the Apple products... and having it work without a driver under Windows XP," said Micire. Earlier he had mentioned how impressed he was by how Android was being embraced by the embedded developer community: "you just get so much that comes for free with the platform." Micire later added: "It's humbling to say that even NASA can't outrun the advancements that are happening with the mobile phone."

- by Florence Ion, <http://arstechnica.com/gadgets/2013/03/how-nasa-got-an-android-handset-ready-to-go-into-space/>

## In Depth Interview with Neil Armstrong

This link leads to a 4 part interview with Neil Armstrong put together by CPA Australia early last year. During the fourth episode, he talks you through the moon landing. Enjoy!

[www.cpaustralia.com.au/thebottomline](http://www.cpaustralia.com.au/thebottomline) -or-

<http://cl.exct.net/?qs=4f68d2cb4b5194594d88bbe3432a4854782e2e1089b12a397511f5410250755d>

## NASA Voyager Status Update on Voyager 1 Location

"The Voyager team is aware of reports that NASA's Voyager 1 has left the solar system," said Edward Stone, Voyager project scientist. "It is the consensus of the Voyager science team that Voyager 1 has not yet left the solar system or reached interstellar space. In December 2012, the Voyager science team reported that Voyager 1 is within a new region called 'the magnetic highway' where energetic particles changed dramatically. A change in the direction of the magnetic field is the last critical indicator of reaching interstellar space and that change of direction has not yet been observed."

To learn more about the current status of the Voyager mission:

<http://www.jpl.nasa.gov/news/news.php?release=2012-381>

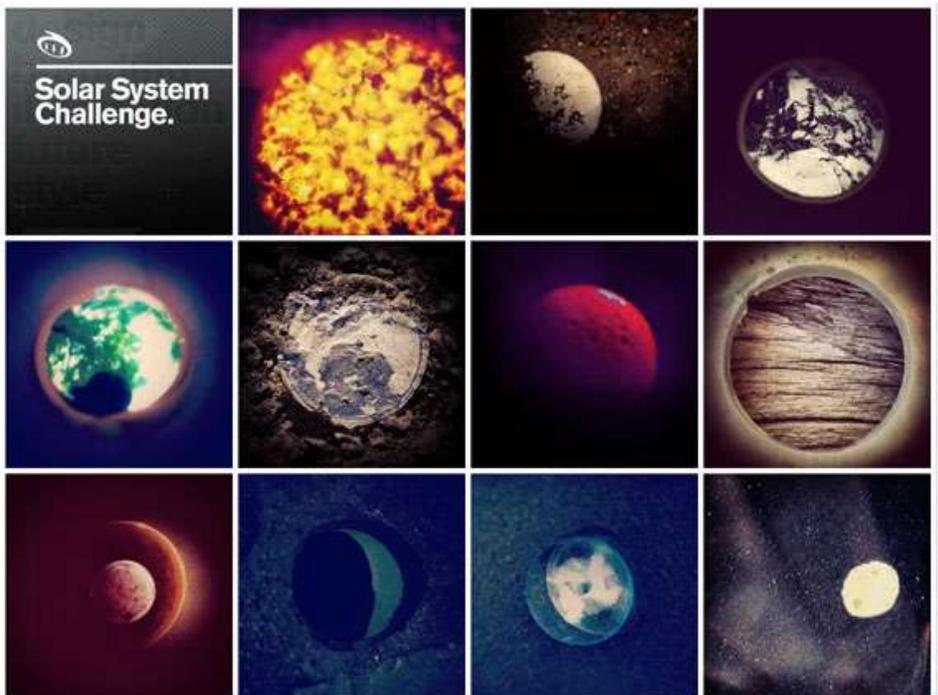
## Flying Over the Earth at Night

Many wonders are visible when flying over the Earth at night. A compilation of such visual spectacles was captured recently from the International Space Station (ISS) and set to rousing music. To view the video, go to the Astronomy Picture of the Day website (<http://apod.nasa.gov/apod/ap130331.html>).

Passing below are white clouds, orange city lights, lightning flashes in thunderstorms, and dark blue seas. On the horizon is the golden haze of Earth's thin atmosphere, frequently decorated by dancing auroras as the video progresses. The green parts of auroras typically remain below the space station, but the station flies right through the red and purple auroral peaks. Solar panels of the ISS are seen around the frame edges. The wave of approaching brightness at the end of each sequence is the dawn of the sunlit half of Earth, a dawn that occurs every 90 minutes.

## The Everyday Solar System Challenge

Simon Wright is a graphic designer in Australia. He decided he needed to challenge himself to give his brain a workout, so he created what he calls his *Solar System Challenge*: without using Photoshop or any additional after-effects (with the exception of Instagram), create a set of pictures of everyday objects that look like the planets in the solar system. The results are pretty cool.



If you go to his Facebook page where he has those shots:

[www.facebook.com/media/set/?set=a.515956461767509.131272.379992358697254&type=3](https://www.facebook.com/media/set/?set=a.515956461767509.131272.379992358697254&type=3)), you can see them in more detail. Once you are on his page, you can click on each one to get an explanation of what it is and which planet it is. I tried to guess how he did each one before

reading the description.

My favorite is the picture for the Sun. I won't spoil it, but I never ever would have guessed how he did it, but when I read the description I laughed. Funny how obvious something is after you already know the answer. Also, these photos remind me of Christopher Jonassen's photo series "Devour", where the bottoms of well-used cooking pans look very much like fanciful alien worlds. I like Wright's gumption. We all need to challenge ourselves sometimes, whether it's to get us out of a rut, inspire new ways of thinking and seeing, or simply as a fun exercise to see what happens. What will you do to challenge yourself today?

- By Phil Plait

[http://www.slate.com/blogs/bad\\_astronomy/2013/03/09/photos\\_everyday\\_objects\\_that\\_look\\_like\\_solar\\_system\\_planets.html](http://www.slate.com/blogs/bad_astronomy/2013/03/09/photos_everyday_objects_that_look_like_solar_system_planets.html)

## Hubble has 3 more years to make amazing discoveries, NASA says

*Astronauts aboard the shuttle Atlantis took this picture of the Hubble Space Telescope in 2009 after they finished the final servicing mission for the powerful instrument.*



Scientists and space junkies got some good news from NASA: The space agency announced it would keep the Hubble Space Telescope's science operations going at least through April 30, 2016.

The three-year extension will cost NASA \$76 million.

Launched in 1990 from the shuttle Discovery, Hubble has contributed to many scientific breakthroughs. My personal favorite is the 1998 discovery that the universe is expanding at an accelerated rate, pushed apart by a mysterious force called dark energy. Cosmologists deduced this by measuring the strength of light from dozens of distant type 1a supernovae and realized that these exploding stars were farther away than had been expected. The scientists behind this discovery won the 2011 Nobel Prize in Physics.

Other big discoveries include:

**A measurement of the Hubble constant.** This is a number that takes the speed at which a distant galaxy appears to be receding from us and compares it to its actual distance. If you know this, you can figure out how fast the universe is expanding – and thus, how old it is. In 1999, a team of astronomers used Hubble to figure out that the universe is between 12 billion and 14 billion years old. In 2002, another group narrowed the range to 12 billion to 13 billion years. (This week, researchers using the Planck space telescope came out with a new estimate of 13.8 billion years based on measurements of the cosmic background radiation.)

**How galaxies evolve.** The telescope has zeroed in on a tiny region of space known as the Hubble Deep Field, which contains galaxies that were born when the universe was still very young. By examining these smaller galaxies – some as old as 10 billion years – scientists have found important differences between their structures and the spiral and elliptical galaxies near the Milky Way, which are younger. The observations have led scientists to theorize that these early galaxies became the building blocks for the ones that came after, perhaps through mergers and other collisions.

**Confirming the existence of supermassive black holes.** Hubble's observations of dozens of galaxies have convinced scientists that such black holes are common in the centers of galaxies, and that their mass is proportional to the mass of the bulge of stars in a galaxy's middle.

**Figuring out how planets are formed.** Scientists had believed that planets – including those in our own solar system – formed out of the disk of dust and other material that surrounded young stars. In 1994, Hubble provided visual evidence to support this theory, observing that such disks were common around young stars in the Orion Nebula.

**Detecting the atmosphere of an exoplanet.** When a Jupiter-like planet passed directly in front of its home star, the light from the star was filtered by the planet's atmosphere. By analyzing the resulting changes, scientists were able to figure out the composition of the exoplanet's atmosphere.

Though still going strong after nearly 23 years, Hubble has a replacement on which scientists are working hard. The James Webb Space Telescope will have a mirror that's six times bigger, with more than 100 motors to focus it. The new telescope is way over budget and way behind schedule, but NASA officials expect it will launch in 2018.

- By Karen Kaplan, *Los Angeles Times*

<http://www.latimes.com/news/science/sciencenow/la-sci-sn-hubble-space-telescope-extended-discoveries-20130323,0,2113406.story>



## Your Daily Dose of Astonishment

By Diane K. Fisher

As a person vitally interested in astronomy, you probably have the Astronomy Picture of the Day website at [apod.nasa.gov](http://apod.nasa.gov) set as favorite link. APOD has been around since practically the beginning of the web. The first APOD appeared unannounced on June 16, 1995. It got 15 hits. The next picture appeared June 20, 1995, and the site has not taken a day off since. Now daily traffic is more like one million hits.

Obviously, someone is responsible for picking, posting, and writing the detailed descriptions for these images. Is it a whole team of people? No. Surprisingly, it is only two men, the same ones who started it and have been doing it ever since.

Robert Nemiroff and Jerry Bonnell shared an office at NASA's Goddard Space Flight Center in the early-90s, when the term "World Wide Web" was unknown, but a software program called Mosaic could connect to and display specially coded content on other computers. The office mates thought "we should do something with this."

Thus was conceived the Astronomy Picture of the Day. Now, in addition to the wildly popular English version, over 25 mirror websites in other languages are maintained independently by volunteers. (See [http://apod.nasa.gov/apod/lib/about\\_apod.html](http://apod.nasa.gov/apod/lib/about_apod.html) for links). An archive of every APOD ever published is at <http://apod.nasa.gov/apod/archivepix.html>. Dr. Nemiroff also maintains a discussion website at <http://asterisk.apod.com/>.

But how does it get done? Do these guys even have day jobs?

Dr. Nemiroff has since moved to Michigan Technological University in Houghton, Michigan, where he is professor of astrophysics, both teaching and doing research. Dr. Bonnell is still with NASA, an astrophysicist with the Compton Gamma Ray Observatory Science Support Center at Goddard. APOD is only a very small part of their responsibilities. They do not collaborate, but rather divide up the calendar, and each picks the image, writes the description, and includes the links for the days on his own list. The files are queued up for posting by a "robot" each day. They use the same tools they used at the beginning: Raw HTML code written using the vi text editor in Linux. This simple format has now become such a part of the brand that they would upset all the people and websites and mobile apps that link to their feed if they were to change anything at this point. Where do they find the images? Candidates are volunteered from large and small observatories, space telescopes (like the Hubble and Spitzer), and independent astronomers and astro-photographers. The good doctors receive ten images for every one they publish on APOD. But, as Dr. Nemiroff emphasizes, being picked or not picked is no reflection on the value of the image. Some of the selections are picked for their quirkiness. Some are videos instead of images. Some have nothing to do with astronomy at all, like the astonishing August 21, 2012, video of a replicating DNA molecule.

Among the many mobile apps taking advantage of the APOD feed is Space Place Prime, a NASA magazine that updates daily with the best of NASA. It's available free (in iOS only at this time) at the Apple Store.

**Right:** The January 20, 2013, Astronomy Picture of the Day is one that might fall into the "quirky" category. The object was found at the bottom of the sea aboard a Greek ship that sank in 80 BCE. It is an Antikythera mechanism, a mechanical computer of an accuracy thought impossible for that era. Its wheels and gears create a portable orrery of the sky that predicts star and planet locations as well as lunar and solar eclipses.

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



## Night Sky Network

Astronomy Clubs bringing the wonders of the universe to the public



Night Sky Network Comet Watchers:

You are the backbone of eyes-to-the-skies astronomy outreach. NASA, ASP, and our partners are proud to support your amazing outreach events with a variety of free materials: Quarterly prizes for logging your events, Outreach ToolKits, Handouts from NASA partners, and Publicity for events you post on the Night Sky Network Calendar.

(Comet Pan-STARRS Image credit: G. Ionas, New Zealand)

### Is your Club Qualified for the Sunny Quarterly Prize?

Get ready for longer days with this cornucopia of Sun resources. Handouts, solar viewing glasses, UV beads for showing off our nearest star's energy, books, extra sunspot viewers, and much more! To qualify for the drawing, log your outreach events held between January 1st and March 31st, 2013. Each event where your club used Night Sky Network ToolKits and resources increases your chances of winning. Five winning clubs will be chosen at random from the logged events that used NSN ToolKits and resources.

Log your events by Sunday, April 7th to qualify! Winners announced April 8th.

### More Sunny Giveaways: Request Free Bookmarks and Posters

The NASA Sun-Earth Days team has released sets of bookmarks and posters for you to use as giveaways and incentives at your upcoming events. To request a set, Club Coordinators log into the Night Sky Network and select Request Outreach Handouts.

### Does your Club have ALL the ToolKits yet?

If your club hasn't yet received all the ToolKits yet, all you need to do is log at least two outreach events using NSN resources this quarter. You will automatically qualify for a new ToolKit. Your ToolKit will be shipped to your club's shipping address the second week of April.

### Free Online State-of-the-Art Astronomy Course from Dr. Chris Impey

This course with Professor Impey and a team of instructors from Seward Observatory starts March 25th! Access the free online course and outline here:

[www.udemy.com/astronomy-state-of-the-art/](http://www.udemy.com/astronomy-state-of-the-art/)



Wishing you clear skies for the comet!

Vivian White & Marni Berendsen, The Night Sky Network Team

[nightskyinfo@astrosociety.org](mailto:nightskyinfo@astrosociety.org)

The NASA Night Sky Network is a nationwide coalition of over 425 amateur astronomy clubs. The NASA Night Sky Network is managed by The Astronomical Society of the Pacific.

## **SWFAS Minutes**

Meeting Date: 03/07/2013

**CALL TO ORDER:** The monthly meeting of the Southwest Florida Astronomical Society was held at the Calusa Nature Center and Planetarium, Ft Myers Florida, on Thursday, 03/07/2013. The meeting convened at 7:30pm, President Brian Risley presiding, and Lee Kraemer, secretary.

**MEMBERS IN ATTENDANCE:** There were approximately 40 members in attendance.

**OPENING REMARKS:** Brian Risley, President  
Review of February events  
Carol Stewart and the Planetarium  
Club Bar- B- Que April 13th  
Comet PANSTARRS observing, near horizon

**Upcoming Events:**

Fri Mar 8th Moore Observatory ESC Charlotte Campus Meadow Park Elementary – Tony Heiner  
Sat Mar 9th STEMtastic Lee County School Public Education Center (Colonial/Metro)10:00am-2:00 pm (Setup 8:00 am)  
Sat Mar 9th Star Party at Caloosahatchee Regional Park, dusk  
Sat Mar 9th Spring Stargazing CNCP (Carol Stewart) 7:30-9:00pm  
Fri Mar 15th 7pm – Big Cypress National Preserve (Ochopee) 6pm Public Observing  
Fri Mar 15th Astronomy for Amateurs Hickeys Creek Park 8:15 pm (Kelly Flaherty)  
Th April 4th Meeting at CNCP Program Astro-Geology Jack Berninger  
Sat April 6th Star Party at Shell Point Village (Dusk)  
Sat April 13th – CRP Picnic - Time to be determined.  
Sat April 13th – CRP Star Party (Lakeland Christian School will be at CRP and wants to come)  
Sat April 27th – Skyline Elementary 25th Anniversary (Carol Stewart) Solar Observing

**VICE PRESIDENT'S REPORT:** Bruce Disette, Vice President

**NEWSLETTER EDITER'S REPORT:** Carole Holmberg, Newsletter Editor

**SECRETARY'S REPORT:** Lee Kraemer, Secretary (read and submit minutes for approval)

**TREASURER'S REPORT:** Tony Heiner, Treasurer, reported a balance of \$2583.60

**VIEWING COORINATOR'S REPORT:** Chuck Pavlick, Tony Heiner, and Bruce Disette, Viewing Coordinators - CRP Clouded out.

**LIBRARIAN'S REPORT:** Maria Berni, Librarian

**CLUB HISTORIAN:** Danny Secary

**EQUIPMENT COORDINATOR:** Brian Risley

**WEBSITE COORDINATOR:** Dan Fitzgerald

**ASTRONOMICAL LEAGUE COORDINATOR (ALCOR):** Carol Stewart

**Evening Program:** *Twelve Greatest Astronomical Events* – Jack Berninger

**ADJOURNMENT:** Thursday April 4th, 2013 was set as the next regular meeting. The meeting was adjourned.

- Lee Kraemer, Secretary

Southwest Florida Astronomical Society, Inc.  
P.O. Box 100127  
Cape Coral, FL 33910

[www.theeyepiece.org](http://www.theeyepiece.org)