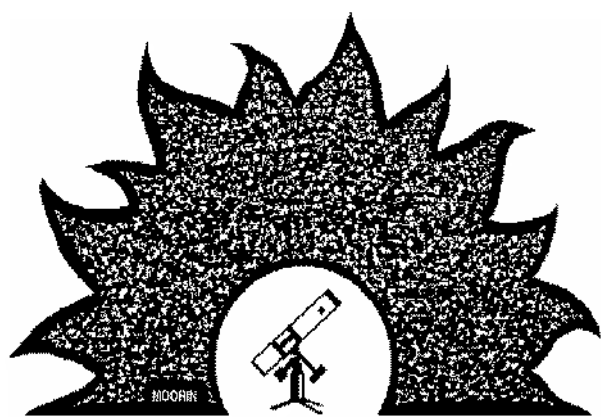




PAStimes

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PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

The Chemistry of the Cosmos

Earl DeLong, PAS member will present the December 2013 program for the Phoenix Astronomical Society. Earl is a retired chemist and amateur astronomer. He will use this knowledge to help explain how a Universe that started out chemically simple has become the complex chemical Universe of today. Please join us for this interesting presentation. See you there. ***

Most scientists say life's basic chemicals formed on the Earth. The astronomer Fred Hoyle said they came from space.

Oxygen is circulated around the helmet in space suits in order to prevent the visor from misting.



Many Thanks to Rick Tejera

By Terri Finch, Event Coordinator

At the November PAS meeting, Rick Tejera was our Guest Speaker and he did a raffle of a book he ordered from Amazon. Well, the book didn't come in in time for the meeting, so Rick offered to mail the book to the winner. William Finch won the book. So, instead of having Rick mail the book to us, I suggested to him that William and I could attend a SAC (Saguaro Astronomy Club) and pick it up there. So, Friday, Nov 15, we attended the SAC Meeting. There will be a review (Continued on page 4)

November 7th Meeting Review

By Terri, Event Coordinator

At the November 7th PAS Meeting, we had an awesome guest speaker. We are always happy to have Rick Tejera do a presentation to PAS. His info is awesome and useful. We had a great turnout with plenty of food and a super guest speaker. It was a perfect PAS Meeting!

We opened the meeting with a few announcements. Attendance was large this month. We had about 12 non PAS Member, probably students, attending this meeting. It was a very good meeting with lots of food. The food was supplied from the event the day before (see "Moon Caves" article, page 4). Thanks to everyone who brought snacks: Sam Insana brought popcorn, Darlene Ahlefeld brought the green grapes & puffs, Ed Wurst brought the cake.

During announcements, Jerry announced that 3 plaques will be provided at the PAS Social for the Dart Board game for

1st, 2nd and 3rd places. You don't want to miss your chance to get one of Jerry's plaques, as he does an awesome job creating and providing them to PAS. Also announced was the Discovery Magazine, now available for purchase at Barnes and Noble, or other book selling locations, in which the magazine has all the info you want or need to know about Comet Ison. It sells for \$7. Thank you Jerry Belcher, for that info. Rick, the guest speaker, announced the Messier Marathon on Mar 29, 2014 near the Antenna's site. That's the same night PAS is hosting a Messier Marathon at Mike's house.

We then turned the floor over to Rick who told us about "Beyond M42 - what to look for after all the easy stuff is found." Along with this topic, Rick included some great observing plan ideas, some programs to help you create the observing plan, and

ideas on how to keep tabs on what you've seen, when, where, observing conditions, etc. The attending members were all busy taking notes. I took a bunch of photos of the slides, but not all, that Rick showed, for which I will post in the PAS Photo Gallery if anyone is looking for this info, such as the observing list info, etc.

This presentation was well worth the
(Continued on page 9)



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December PAS Events

By Terri, Event Coordinator

To RSVP: Events@pasaz.org

Dec 3: CTCA of Nov 5. RSVP is with Joe. PAS Star Tour Members Only.

Dec 5: PAS Meeting 7pm to 10pm PVCC Main Campus LS-201. Bring a snack to share. Water provided by President Bruce. Bring a friend! Everyone welcome!

Dec 10: CTCA Back up date for Dec 3.

Dec 12: Free Telescope Workshop and public Star Party at PVCC main Campus - 32nd Street & Union Hills- 7pm to 10pm. RSVP is required with Terri Events@pasaz.org. When you RSVP - leave number in your party and make & model of the scope you are seeking help with. This is also a good class to attend to get ideas on what type of scope you should purchase. RSVP for the Workshop, the Star Party or both.

Dec 14: Geminids Meteor Shower Party in Carefree, at Mike's house. Potluck is at 6pm. Bring a main dish to share. Bring a drink to share (no alcohol). This is a Meteor Shower viewing party in a dark sky loca-

tion. No telescopes will be set up at this event. This is a public event, every welcome. RSVP is required with Mike at Primefactory@q.com.

Dec 17: School Star Party 6:30 to 8:30pm. PAS Members only. See more info at this link: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=1152&day=2013-12-17>

Dec 19: Tentative PAS Meeting of the Minds. In LS-201. This event is only held if there are enough topics to hold the meeting. If it is held, a notice will go out by email, and it will be a party, so bring a snack to share. Bottled water provided by President Bruce. 7pm to 10pm.

Dec 21: PAS Music Jam. RSVP is required by Dec 15 to play an instrument so that we can be sure to have enough copies of the music printed for everyone. Singers and audience members welcome. PAS Members only, and invited musicians.

Dec 22: Bookmans FREE Telescope Workshop. 3:30-5:30pm. Please RSVP

Events@pasaz.org by noon the day of the event. Bring something to take notes with, your telescope, accessories, questions. RSVP is required. When you RSVP, leave your name, and the make and model of the telescope you need assistance with.

Dec 28: Dark Sky Antenna's Star Party (Private) Event begins at sundown and goes to dawn. RSVP is with Eric for this event. Bring your own everything.

Dec 28: Comet Party in Carefree. This is a Public event. RSVP is with Mike Primefactory@q.com. Potluck is at 4:30pm. Dark is at 6:30pm. Viewing will begin right about sunset at 5:15 to catch the Comet. Bring a main dish and a drink to share, no alcohol please. Bring everyone you know! This event is based on the visibility of Comet Ison. If the Comet decides not to be visible on this date, a new date will be chosen for this event. RSVP is required so we can inform you of this change or if the weather cancels the event. ***

Estrella Observatory Star Party Oct 5

By Terri, Event Coordinator

An awesome evening! The weather was great, a bit chilly before going home but otherwise clear skies all night, not much, if any breeze, and a great turnout of people. Yves had put on Meet Up, an astronomy event. And so he had about 50 people from the public attend his event. The food was awesome, thanks to all who provided food from PAS, and the people were great. In attendance from PAS was William & Terri Finch with eyepieces and accessories, and Rodney Fong with his new scope Enceladus who is a 6" Orion Dob. We had another scope planned to attend, but work

got in the way, so Rick didn't get to show up. Rodney, William and I kept the crowd going with objects to see. We showed Albe-rio, Hercules Globular Cluster, Andromeda Galaxy, Perseus Double Cluster and a few other objects to the public. Prior to dinner, Rodney set up early, and so the three of us got to see Saturn and Venus before they set. The event was listed to start at 4:30 on the PAS calendar, but I found out that Yves thought it was starting at 6, so we got there about 4:45 and talked with Rodney until things got set up. And due to the crowd leaving early, Rodney, William and I de-

parted about 11pm. Awesome event. Many thanks to Yves for hosting it. We look forward to the next event on Nov 1st.

Lucia Gyax writes: I have been raving about this meet up to friends and co-workers; I thought it was absolutely amazing! I was impressed with Yves's telescope and equipment and also with both you and William's knowledge and ability to focus on constellations, galaxies, nebulae, rings, and everything else you showed us, not to leave out E.T.! §

PAS Music Jam Dec 21

By Terri, Event Coordinator & Private Music Instructor

Private Party, potluck is at 5:30pm. Sign up on PerfectPotluck.com with coordinators name "Finch" and password of "20131221." PAS Members who play musical instruments are invited to Mike's home in Carefree for a Music Jam. If you plan to attend and you are playing music with us, please RSVP your attendance with Terri and mention the instrument(s) you plan to play that night. It

is suggested you RSVP prior to the Dec PAS Meeting so that the music can be copied and provided to you at that meeting for review before the Jam. Singers are welcome and a few audience members will be nice to have. We are making a list of songs we would like to enjoy playing. Christmas songs, maybe a Jewish song, some sing-alongs, help us create a list. If you wish to attend to listen,

please remember it is for PAS Members only, so no additional guests are allowed to this event, immediate families only. And Sam is in charge of this event. RSVP's go to Terri Events@pasaz.org so that the music can be provided to you. Many thanks to Ed Wurst for making the copies of the music. Many thanks to Mike for hosting this event! See you there! ***

Astronomy Day in Carefree Oct 12

By Terri, Event Coordinator

Many thanks to the telescopes who attended this event: William Finch, Rodney Fong, Don Boyd with his new scope experiencing First Light, Terry Dancer, Earl DeLong, and Kevin Harcey. Also in attendance from PAS was Bob Senser, Mike Marron, Ryan Maugan. From the public we had 2 wonderful people we met at Yves's event the weekend before: Owen Dix and Lucia Gygax. Owen brought 3 friends with him, Jessica & 2 others, I didn't catch their names. We had 7 scopes attending this event. Later in the evening, Eric and Ora Steinberg attended and I wish to give a big, huge thank you to Eric for doing an awesome sky tour. I'd also like to thank those who participated in the potluck. We had some great food at this event. We also had a nice visit with Terry Dancer Sr, who attended the event and was very fun to talk with and share views with.

Before she set, we viewed Venus. We also saw many other objects, however, due to the 1 day past 1st Quarter Moon, the sky wasn't as great seeing as it could have been. This event was to celebrate a few things. It was Astronomy Day, as well as International

Observe the Moon Night, and it was Wink at Neil. For the Winking, we all turned towards the Moon and Winked at Neil Armstrong at 8pm. Many thanks to Mike for hosting the party. The party broke up about 11pm, and after packing up, Don, William and I left about midnight.

Earl writes: I attended Astronomy Day at Mike's house in Carefree. It was an enjoyable but somewhat chilly evening. I will need to purchase winter gear to be able to enjoy the hobby.

I started the evening using the Star Tour feature of my telescope. Each month has a list of twelve fairly bright objects. I then used the Cluster function of my telescope and observed star clusters in the constellation of Cassiopeia. The star clusters show nicely even in the first quarter moonlight. I was able to locate and observe NGC457 the ET cluster for the first time. Don found Uranus in his new 8 inch Astrograph. I decided to try and locate it using the Planet function of my telescope. This is another nice feature and makes locating the fainter planets fairly easy. I was successful finding and observing Uranus.

I finished the evening observing the first quarter moon unfiltered. The seeing was very good and a lot of remarkable features were seen. Terri and I were able to see the straight wall through our scopes. I was also able to locate the small double rayed crater in the Sea of Tranquility that marks the first landing on the moon (another tribute to Neil Armstrong and yes we all also winked at the moon and 8:00pm).

Thanks to Mike for opening his home and dark sky site to us. We look forward to our next event.

Don writes: My scope worked very well...the shorter dovetail bar made the scope much easier to use as I could rotate the eyepiece where I needed it to be. The gotos were dead on all night. I looked at the double cluster, M34, Uranus, Neptune, and the Ring Nebula. I am glad I did not buy a 10 inch scope as the 8 is difficult enough to put onto my GEM mount. I cannot wait to get this scope under darker skies.

Lucia writes: Thanks, I enjoyed this event and it was awesome seeing the sky through more telescopes from another location! Mike's place was pretty neat. ***

Bookmans Telescope Workshop Oct 13

By Terri, Event Coordinator

As William and I were headed out the door to go to Bookmans for the Telescope Workshop, I got an email from Angie Lee, who wanted to know if she could attend the event. I emailed her back with a Yes.

In attendance at this event, starting the afternoon with NO RSVP's, until Angie contacted me about 2:30pm, was Rodney Fong, Don Boyd, William & Terri Finch, and Kevin Harcey. Kevin showed up about 1/2 way through the event.

So, while we were waiting for Angie to

arrive, of which she did about 4:30, same time as Kevin, we discussed club business and other things about telescopes. Angie came in and we discussed what scope was best to start with and purchase. We had a great conversation and some time later, Becky & Tim showed up with their telescope. Don and Rodney assisted them and found out the scope needed fixing. When the attendees left, the conversation turned to powerful lasers.

It was a successful event. Thank you Don, Rodney and William for assisting with

information, advice, examples on the computer, etc at this event to make it a very successful event. And many Thanks to Bookmans for lending us their tables, chairs and set up area for this event.

Angie Lee writes: I'm so glad I stopped by! I will take your advice and attend the star parties to find out more before I buy anything. That seems like very sound advice. I put the 24th on my calendar and I will be sure to check for a possible cancellation before I depart. Thanks and have a great evening! ***

A Review of “RadarScope” App for Apple iPhone

By Alex Vrenios, PhD

We get about nine inches of rainfall per year in Phoenix. Most of our rain comes during the summer months during what we call the monsoon season. These storms can be violent, with high winds and flood waters that can put lives in danger and do considerable property damage. It is comforting to know where the local storm cells are, where they are headed and, if it's already raining, when the rain will end.

TV news has spectacular weather radar graphics, but the news is not always on when it's raining. TV channels 5.2 and 12.2 offer nearly continuous weather updates, but they always seem to be analyzing conditions in Flagstaff or Tucson when I want a local weather report. The RadarScope app on my iPhone uses weather radar data from the Internet to show me the same high quality graphics they show on TV, but whenever I want to see it.

The RadarScope displays a map with a

blue fiducial mark indicating your current GPS location, highways shown as blue lines and the names of surrounding cities in white. Green, yellow, orange and red shapes representing storm cells at various stages of intensity overlay the map, making it look very much like what a meteorologist shows on TV. There's even a time-loop mode available that gives one a sense of the intensity, speed and direction of the local storm cells.

A dual-function menu at the top of the screen has a button that toggles it between its two forms. The first menu form displays the name of the city at your GPS location, the NOAA radar station's call letters, the time of day and a red button showing the current number of weather warnings nationwide. As an example, my menu shows Phoenix, KIWA, 4:14 PM and the number 9 in a red button. You can tap this button (or on the corresponding 'box' on the map) to

get the type, expiration time or other information about these warnings. The second menu form displays a pencil, a circle and a share-tool icon. Tap the pencil icon to draw on the screen with your fingertip. Tap the circle to determine the distance between two points on the screen. Tap the share-tool icon to save a screen image to the camera roll, or to copy it for posting onto social media sites.

There are two menus, a color bar and a pull-up list at the bottom of the screen. The leftmost menu has an arrow, a radar screen and a triangle icon. When you tap the arrow, the blue GPS fiducial indicates the direction in which the top of your screen is pointing. Tap it again and the direction indicator goes away. Tap it a third time to reposition the map so the GPS fiducial is at the center of your screen. Tap the radar screen icon and the call letters of the local NOAA Radar station locations ap- *(Continued on page 5)*

“Moon Caves” by Dr. James Ashley Nov 6

By Terri, Event Coordinator

This event was not a PAS event but Jenny Weitz invited all of PAS to attend. So, I pick up my Mom and Dad, and William and I head over to the presentation. It was awesome to see James, the Guest Speaker, again. We have had him at PAS previously. In attendance from PAS was Sam Insana, Chet Schuler, Ofelia Waters, Mike Marron, Rodney Fong, Earl DeLong, Ed & Bette Wurst, Matt Kohl, Jerry Belcher, and William & Terri Finch.

The food was brought in from Jason's Deli. There was plenty of food for everyone and we even got dessert, but it had to be earner (more on that below). The attendance of the whole audience was probably about 35, and most of the non PAS Members, I'm guessing, were students of PVCC. It was a good turnout.

So, James Ashley presented for about 1.25 hours, and then Jenny did Q & A differently than usual. She had anyone with questions, write the questions on a 3x5 card and hand it in. So, James answered all the questions put to him and did a fantastic job.

Then, Jenny took over and said the group was doing a workshop. Several audience members left at this point, but those who remained, worked through the workshop. The first thing we did was come up with names of products that already existed

that have to do with astronomy, like Moon Pies, or Mars Bars. The example Jenny started us with was cars such as Saturn, Subaru, Ford Mercury, etc. So, in groups, we made lists of products. There were 8 groups of different amounts of people. After a few minutes, the groups used the products they listed to guess what products were in a box Jenny brought with her with 10 items in it that had to be identified. The premise was that the box didn't cost over \$20 total. Each group, 1 -8, read off their items until they got one right. Items like Venus womens razors, Sunlight Dish Detergent, etc. Earls Group won the box to split among their 4 members.

Then, in groups, we had to come up with a new product based on something we heard in Dr. Ashley's presentation. So, some of the items that were created was a special visor for the astronauts visiting the Moon that could monitor the health of the wearer, or a complete space suit backed by Michael Jordan so one could go to the Moon in style.

Then we were awarded dessert which was very good.

The third project was to come up with a product that would sell to the public, based on Dr. Ashley's presentation, that could be marketed, and we had to come up with a slogan / ad for it. One group came up with Crater Acne Cream.

When the activities concluded themselves, William, Rodney, Ofelia and I helped pick up the papers and pencils provided to everyone, and the trash, to help clean up. Jenny then offered us any food we wanted, so we collected some items for the next night's meeting. There will be plenty of food at the PAS Meeting this month.

It was an enjoyable, educational evening. I wish to thank Dr. James Ashley for an awesome presentation and thank Jenny Weitz for inviting PAS Members to attend. Here are some more events at PVCC you may wish to attend: <http://www.paradisevalley.edu/steam/events>. ***

Many Thanks to Rick Tejera

(Continued from page 1)

of this meeting in a future issue of PAS-times, the highlights.

The book William won is “Hidden Treasures” by Stephen James O'Meara. Wow, I really want to thank Rick for this book. It is awesome! It is a great inspiration to get out there and view some new objects in the night sky. This book goes along very well with Rick's presentation. Thank you, Rick, so much for raffling off such a wonderful, useful observing book. And for inviting us to the SAC Meeting. ***

A Review of “RadarScope” App for Apple iPhone

(Continued from page 4)

pear as white letters on either light blue or red rectangular buttons. (A red button means it is temporarily offline, probably for maintenance.) You may select a radar station by tapping on any of the light blue station buttons, turning it to a darker blue. Your radar data resolution is best within the range of the station you select (note the radar sweep), so choose the one nearest your GPS location. Tap the radar screen icon a second time to stop the sweeps and to display the data from the station you selected. Finally, tapping the triangle symbol starts a download of the six most recent radar images used to present a time-loop display of the local storm cells, giving you a sense of their intensity, speed and direction, just like on TV. Note that the triangle symbol becomes a square while these images are being displayed. Tap the square to turn it back to a triangle, stopping the time-loop display mode.)

Touch and hold one of the colors in the color bar legend at the bottom of the screen to display the intensity value represented by that color on the display. These values are dependent upon which feature you are displaying, which can be selected from the pull-up list attached to the triangle at the very bottom center of the screen.

The rightmost menu at the bottom of the screen contains only a gear icon, allowing access to the Settings menus. Radar Data lets you select the source: NOAA or iMapWeather, which is recommended by the documentation. Storm Tracks offers NOAA as the only source. Spotter Network lets you request the information that is dis-

played on the screens of other registered spotters. A small red dot appears on the map at the location of each registered spotter running a RadarScope app. (Spotters can register at spotternetwork.org and control what information is displayed when someone taps on their little red dot. I set mine to show my name and ham radio call sign, for example.) The Layers tab of the Settings menus allows you to select what details are displayed on your RadarScope screen like Cities, Highways, Warnings, User Locations, Spotters and Storm Tracks. The complexities of this simple gear icon are explained in the online documentation at radarscope.tv, under their Support tab.

Finally, yellow or green lined boxes outline regions of severe storm, or flash flood warning regions, respectively. To further define these warnings you can open the list from that numbered red button in the top menu, or you can tap on the actual outlined region to see the details, which list the type of warning, the state and county in which the warning was issued, and the estimated warning expiration time. (Remember: a watch means conditions are right for an event; a warning means such an event has been reported.) A storm cell may be associated with a white square with tick marks along a short white line emanating from it. The square is where the cell is now and the line is its predicted path. The tick marks along the line are its estimated position every fifteen minutes from now. Seeing one of these tells you where that cell is probably headed and how quickly it might get there.

Have no doubt that this is a complex

app. I understand about 80% of it and that's after studying the documentation and fiddling with it for about a month. It's not cheap, either, costing \$10 for the iPhone and iPad iOS version, and \$30 for the Macintosh OS X app. It is worth it to me because as I mentioned above, I get comfort from knowing the intensity, speed and direction of the active storm cells in my area: situational awareness. And, I am a ham operator and a registered storm spotter. (Not to be confused with storm chaser!) This app may prove to be helpful in the event of a major storm system or other weather emergency when the National Weather Service turns to their spotter network, their boots on the ground, for detailed information about a local event. Radar and other modern technology can supply just so much information. There is no substitute for the volunteers in the field who supply the rest.

You don't have to be a ham operator to become a certified spotter, either. Free classes are available through the Phoenix National Weather Service Office. See <http://www.wr.noaa.gov/psr/general/skywarn/index.php>, <http://www.spotternetwork.org>, <http://www.skywarn.org>, <http://radarscope.tv>, and <http://www.arri.org> for further information. If you are into real-time weather displays as I am, I highly recommend this impressive little app. I strongly suggest, however, that you study the online documentation at the RadarScope website to get the most out of it. ***

Night Sky Training Session Sept 28

By Terri, Event Coordinator

We had a great turnout and awesome weather for this event. It got a bit chilly at times, during the evening but it was totally enjoyable. And we couldn't have clearer skies, no clouds in sight, only a slight breeze, and great viewing.

In attendance from PAS were: Rick Cunningham with 8" Dob, William with 10" Dob & Terri Finch with 8" SCT, Sam & Frank Insana with 8" Dob, Terry Dancer with 8" Dob, Kraig Nelson, Rodney with his new scope Enceladus, 6" Dob, Eric Steinberg with his 22" scope, Don with his 6", James & Nancy Coleman with their scope, and Paul Facuna with his Celestron which he named Paul.

We enjoyed a wonderful dinner of pizza, chicken, pasta & salad. Thanks to all who participated in the potluck and many thanks, I'm sure by all, to Nancy for providing the freshly baked Chocolate Chip Cookies that everyone loved. Many thanks to Mike for hosting this event.

Dinner was at 5pm and around 6pm Venus and Saturn became visible, so we were setting up scopes around that time and several of us got to view these two planets.

As it became dark, we aligned everyone's scopes, then I gave the floor to Eric to do a night sky tour. Wow, Eric really knows the night sky and can see the constellations

a lot of us can't see, like Cancer is a fainter constellation. Thank you Eric for a well executed Night Sky Tour. Then, we looked for our first object. I knew that Paul and Rodney would need something simple so we went for Mizar in the Big Dipper. After everyone found it and made sure their scopes were aligned, we moved to some other objects.

Then, after a few objects, James & Nancy departed. Soon after Terry & his fiancée Laura Strelka left. Ora was next to depart. Then the rest of us hung out until about 2:45am, when Comet Ison was supposed to be visible. We didn't see it and gave up once the (Continued on page 7)

Arizona Sky

Leah Sapir



At the edge of the solar system, about one light year away, is a region where trillions of chunks of ice and dust slowly orbit the Sun, as they have been doing for the past 4 billion years. At this distance, the Sun is just a very bright star – about as bright as Jupiter as it appears in our sky. The icy objects are made of leftover material from the formation of the solar system. The region is called the Oort Cloud, after the Dutch astronomer Jan Oort who first theorized its existence.

Around 10,000 years ago, something gave a push to one of these objects, perhaps a gravitational wave from a passing star, and the chunk of ice slowly started to move toward the Sun. For thousands of years it silently travelled through empty space, eventually crossing the Kuiper Belt and the orbits of Pluto, Neptune and Uranus; and it had almost reached the orbit of Jupiter when it was first seen by humans. Vitali Nevski and Artyom Novichonok, amateur astronomers, were scanning the sky with one of the telescopes of the International Scientific Optical Network in Kislovodsk, Russia, when they discovered this faint, fuzzy object of 18th magnitude.

The International Scientific Optical Network, aka ISON, includes about 30 telescopes in eleven countries: the US, Bolivia, Spain, Italy, Switzerland, and six former members of the Soviet Union. It is an international project managed by the Russian Academy of Sciences, for detecting and tracking objects in space. Nevski and Novichonok reported their find in Sept 2012, and it was cataloged as C/2012 S1 (ISON). (Comets discovered as part of a sky survey are named after the project instead of the individuals who discovered it.) Following the discovery, the comet was detected in additional photos from both before and after the discovery date.

Since this is Comet ISON's first trip around the Sun, the outer layers have never melted off, so the comet's composition is exactly the way it was 4 billion years ago

when the solar system was born. Studying Comet ISON will tell us not only about the comet, but also about the solar system and its original composition.

And when the comet swings around the Sun, we will be able to study the solar wind and its effect on the comet.

Comet ISON is a "sungrazer" – its orbit will bring it very close to the Sun, where it will be subject to multiple stresses of heat, solar wind, and tidal forces (i.e. gravity that affects one side of the comet more than the other, because of being so close to such a large object). We don't know what will happen when Comet ISON swings around the Sun. Its distance from the Sun's surface at perihelion, on November 28, 2013, will be only 730,000 miles, less than one solar diameter. The comet might melt, it might disintegrate, or it might come out intact and even brighter than before. We can only wait and see.

We should try to get a good look at Comet ISON, because this will be its only trip around the Sun. As it moves back out towards the edge of the solar system, it will eventually pass through the Oort Cloud, its former home, and continue on out into space, never to be seen again – at least not by us!

NASA has organized a Comet ISON observing campaign (CIOC) with participation of both professional and amateur astronomers, using telescopes both on Earth and in space.

In January 2013, the comet was observed by NASA's Deep Impact spacecraft. At that time the comet's tail was 40,000 miles long, but Deep Impact's instruments were not able to detect either carbon dioxide or carbon monoxide. It was still too far from the Sun for us to expect to find water vapor.

From January through March, when the comet was still around 460 million miles from the Sun – just inside Jupiter's orbit – it was observed by the ultraviolet and optical telescope of NASA's Swift spacecraft. Measurements showed that the comet was losing around 112,000 lb of dust and 130 lb of water per minute. The large amount of dust compared to the small amount of water meant that the comet's water ice was still mostly frozen, and only the frozen carbon dioxide and carbon monoxide were evaporating (and releasing the dust frozen in them).

In April-May, when the comet was around 386 million miles from the Sun, it was observed by the Hubble Space Tele-



Hubble's view of Comet ISON (C/2012 S1) on April 10, 2013. This image was taken in visible light. The blue false color was added to bring out details in the comet structure.



Comet ISON with multiple tails, Nov 2013. Image credit: NASA/MSFC/Aaron Kingery



Novichonok [left] and Nevski with their telescope.

scope. The comet's nucleus was found to be much smaller than expected, only 3-4 miles across. The coma was 3100 miles across – larger than the Moon's diameter – and the tail was now 57,000 miles long.

In June it was observed by NASA's Spitzer Space Telescope, at a distance of 310 million miles from the Sun. These new observations showed that the comet was releasing 2.2 million pounds of carbon dioxide and 120 million pounds of dust every day, and the tail was now 186,000 miles long.

In July-August, the comet passed the



Arizona Sky

“frost line”. This is a point around 230 to 280 million miles from the Sun (about 2.5-3 AU, or halfway between orbits of Mars and Jupiter) where the Sun’s radiation is strong enough to make water start to boil. If the comet were visible, we would have seen it brighten, but during those months it was behind the Sun from our point of view and could not be seen from Earth. Some comets break up when they pass the frost line, but Comet ISON made it through intact.

By September 2013, the comet was visible with large binoculars from dark-sky sites in the Southern Hemisphere.

In late September, NASA launched a balloon called BRISSON (Balloon Rapid Response for ISON) to collect data in the infrared, visible, and ultraviolet wavelengths; but due to a technical difficulty the balloon was unable to collect data.

The comet passed by Mars at a distance of 6.5 million miles on October 1, and was imaged by NASA’s Mars Reconnaissance Orbiter, although the picture was not very detailed. It was also visible to ESA’s Mars Express Orbiter and the Mars rovers Curiosity and Opportunity, but they did not succeed in imaging it.

In mid-October, the comet was observed by one of NASA’s solar observatories, STEREO-A (Solar Terrestrial Relations Observatory). It was also observed and imaged again by the HST. The comet appears slightly green in images from October; this could be due to the presence of cyanogen and diatomic carbon.

In early November the comet was observed with NASA’s Chandra X-ray Observatory, to study particles in the solar wind. The solar wind particles are ionized, and they interact with the comet’s atoms and molecules and produce X-rays that can be detected by Chandra.

The comet’s closest approach to Mercury will be in mid-November, and will be

observed by MESSENGER in the second half of the month. At this point the comet will also of course be close to the Sun; it will be evaporating quickly and will be influenced by the pressure of the solar wind. Either or both of these factors can make the comet prone to break up. It will be observed at this point by many telescopes both in space and on Earth.

On November 20, NASA launched a sounding rocket called FORTIS (Far-ultraviolet Off Rowland-Circle for Imaging and Spectroscopy). A sounding rocket is equipped with various instruments of measurement, and rises to a high altitude for observations above the atmosphere. FORTIS rose to 172 miles for 6 minutes. It will provide a spectroscopic analysis of ultraviolet light from Comet ISON when it is near the Sun. This can give us information about the comet’s composition, such as volatile chemicals on the comet’s surface, and various types of atoms or molecules in the comet that have not been previously detected.

After November 21, the comet can be viewed by NASA’s solar observatories in space, including the previously-mentioned STEREO, as well as SOHO, the Solar Heliospheric Observatory, which is a joint project of NASA and the European Space Agency. Some of the images will use coronagraphs, where the image of the Sun itself is blocked out with a disk, similar to the view during a total eclipse. This enables us to see the corona, which is the Sun’s atmosphere. NASA’s Solar Dynamics Observatory (SDO) will get detailed images of the comet at perihelion, providing information about the comet’s behavior when it is subject to solar radiation and pressure in the corona. All of these observations will give us valuable information not only about the comet but about the Sun and solar wind as well.

At the same time, solar telescopes on

Earth will observe the comet in optical, infrared and radio wavelengths, enabling us to learn more about the composition of the comet and its coma.

Besides the radiation and pressure that the comet will experience when it is near the Sun, it can also be influenced by a coronal mass ejection, if this takes place when the comet is at perihelion. This is a huge cloud of solar particles, and if it happens at the right moment it could detach the comet’s tail.

Chandra will again observe the comet from mid-December to early January. At that time the comet will be passing through a region where a hot solar wind from the Sun’s equator mixes with cooler winds from the Sun’s poles.

In December 2013 and January 2014, if the comet survives its trip around the Sun, it might get as bright as -3 to -5 in magnitude, which is about as bright as Venus. Its orbit will carry it into the Northern Hemisphere. Right now (mid-November) it is around 5th magnitude and only visible before dawn. In early December, right after it comes out from the Sun’s glare, it will continue to be visible only before dawn, low in the southeast. But in late December and early January, it will be visible all night long. Its closest approach to Earth will be on December 26, 2013, when the comet will be 40 million miles away – a little more than our distance to Venus.

By January, Comet ISON will be starting to fade and move away from us, on its return trip to the Oort Cloud and beyond. But let’s hope that it will leave us with memories of 2013 as “the year of the comet”!

Join us next time when we continue to explore the Arizona sky. And in the meantime, wishing you clear skies and happy observing!

Night Sky Training Session Sept 28

By Terri, Event Coordinator

(Continued from page 5)

Moon moved into the view. But the evening was well worth the wait for the Comet. The Moon was absolutely gorgeous! We hope to have the next event as successful, fun and

educational as this one was. If you have ideas on how to improve or make this event better, email me Events@pasaz.org. I may just make some changes to the next event to

accommodate your suggestions. Thanks to all who hung out to wait for the Comet. What an awesome event! ***

Saturn’s moon Titan has plenty of evidence of organic (life) chemicals in its atmosphere.

Life is known to exist only on Earth, but in 1986 NASA found what they thought

might be fossils of microscopic living things in a rock from Mars.



The most volcanically active place is out-of-this-world!

Volcanoes are some of the most powerful and destructive natural phenomena, yet they're a vital part of shaping the planetary landscape of worlds small and large. Here on Earth, the largest of the rocky bodies in our Solar System, there's a tremendous source of heat coming from our planet's interior, from a mix of gravitational contraction and heavy, radioactive elements decaying. Our planet consistently outputs a tremendous amount of energy from this process, nearly three times the global power production from all sources of fuel. Because the surface-area-to-mass ratio of our planet (like all large rocky worlds) is small, that energy has a hard time escaping, building-up and releasing sporadically in catastrophic events: volcanoes and earthquakes!

Yet volcanoes occur on worlds that you might never expect, like the tiny moon Io, orbiting Jupiter. With just 1.5% the mass of Earth despite being more than one quarter of the Earth's diameter, Io seems like an unlikely candidate for volcanoes, as 4.5 billion years is more than enough time for it to have cooled and become stable. Yet Io is any-

thing but stable, as an abundance of volcanic eruptions were predicted before we ever got a chance to view it up close. When the Voyager 1 spacecraft visited, it found no impact craters on Io, but instead hundreds of volcanic calderas, including actual eruptions with plumes 300 kilometers high! Subsequently, Voyager 2, Galileo, and a myriad of telescope observations found that these eruptions change rapidly on Io's surface.

Where does the energy for all this come from? From the combined tidal forces exerted by Jupiter and the outer Jovian moons. On Earth, the gravity from the Sun and Moon causes the ocean tides to raise-and-lower by one-to-two meters, on average, far too small to cause any heating. Io has no oceans, yet the tidal forces acting on it cause the world itself to stretch and bend by an astonishing **100 meters** at a time! This causes not only cracking and fissures, but also heats up the interior of the planet, the same way that rapidly bending a piece of metal back-and-forth causes it to heat up internally. When a path to the surface opens

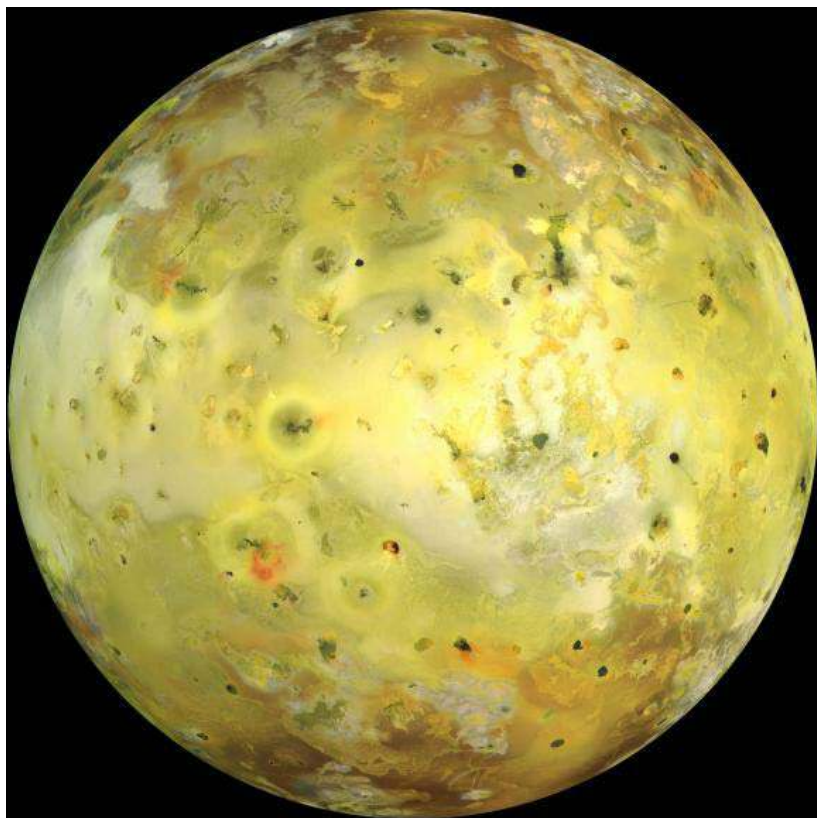
up, that internal heat escapes through quiescent lava flows and catastrophic volcanic eruptions! The hottest spots on Io's surface reach 1,200 °C (2,000 °F); compared to the average surface temperature of 110 Kelvin (-163 °C / -261 °F), Io is home to the most extreme temperature differences from location-to-location outside of the Sun.

Just by orbiting where it does, Io gets distorted, heats up, and erupts, making it the most volcanically active world in the entire Solar System! Other moons around gas giants have spectacular eruptions, too (like Enceladus around Saturn), but no world has its surface shaped by volcanic activity quite like Jupiter's innermost moon, Io!

Download photo here:
<http://photojournal.jpl.nasa.gov/catalog/PIA02308>

Learn more about Galileo's mission to Jupiter:
<http://solarsystem.nasa.gov/galileo/>

Kids can explore the many volcanoes of our solar system using the Space Place's Space Volcano Explorer:
<http://spaceplace.nasa.gov/volcanoes>



Io. Image credit: NASA / JPL-Caltech, via the Galileo spacecraft.

New Competition at the PAS Social Jan 18

By Matt Kohl

Do you like to cook? Do you often bring homemade dishes to the Social? Would you like to win a prize (or prizes) for doing so? This year we will attempt to start a new Social tradition. The rules are simple. Everyone attending, upon arrival, will be given a slip of paper labelled "Main Dish" and "Dessert" (for simplicity's sake, Side Dishes will fall under the Main Dish category). All homemade food will be designated a number. Attendees will write down the number for the food they enjoyed the most for both categories. NO voting for the food you/your family brings, please. The people whose food receives the most votes in each category wins a prize. You may even win two if you bring food for each category. Homemade = you didn't buy it already prepared. ***

PAS Annual Swap Meet & Silent Auction

By Terri, Event Coordinator

Every December PAS Meeting, PAS hosts a Swap Meet. Bring your Astronomy items to the swap meet with a piece of paper for the Silent Auction. On it, describe the item for sale, and put your opening bid. Please, one item per piece of paper. Place paper and item on a table around the room - along the sides of the room on the designated tables. Prior to the meeting & after the meeting closes, silent bidding will happen. The bidder places their bid on the page, with initials or first name and last initial. Highest bid wins the item. Cash is preferred for these transactions. Everyone is welcome to buy, sell and trade at the PAS Swap Meet. You don't have to be a PAS Member to be involved.

Before the meeting starts and after it concludes, we will try to leave a half hour for finishing trading of astronomy goods, we do the bidding. Before you leave, take your item, or the money, or the trade, and enjoy the evening. Good luck with the sales!

Some quick thoughts about this year's PAS Swap Meet.

Another idea I had is a Swap Meet idea. Bring items for sale, with a set price. \$1.25 for this, or \$2.50 for that. Put good pricing on it, and then place them on the other side of the room, on tables, for sale. I will be setting up one side of the room as the Silent Auction and one side as the Swap Meet,

meaning prices are set, no bidding, just purchase as is.

For this, bring your items for sale, put a price tag on it, lay it on the table of Sale items. I will create a sign that says SWAP MEET ITEMS - PRICED AS MARKED. Then, you can haggle the prices like you would at a garage sale, or purchase the prices as they are listed. Please do not remove the items from the table until they are paid for (those of you buying the items). So, if you see something you are interested in, you might want to find out who is selling it. In fact, on the price tag, we ought to put our first name, so the buyer knows who to pay. If your price is firm, put Firm on the price tag.

So, the 2 sides of the room will be divided up, and tables will be the

length of the room both sides, with one side being the Silent Auction

and the other side being the Swap Meet. Read the signs, put your items where they belong. Left side of the room tables (as you walk in) will be the Silent Auction, and Right side of the room tables, will be the Swap Meet / Garage Sale set up.

You can sell anything astronomy, rock-etry, or science related at this swap meet. And you don't have to be a PAS member to join in the fun. An example of items for sale. Have you wanted to purchase caps for the

ends of your eyepieces, to keep them safe? You lost yours, or misplaced them.... but the only pack you can purchase is a set of 20 of them, and you don't need 20 of them. Sell of the extras at your cost, at the swap meet.

What if you found a nice, cool set of filters and wanted to sell off your old filters in trade for new ones. Bring them along, set a price, sell them off. This is your chance. Telescope parts, telescopes, astronomy books, astronomy games, anything astronomy or science can be bought, sold, traded at this Swap Meet.

Now, if you don't sell your item and want to donate it to PAS, this is a good event to do that. If you wish to donate your items, that don't sell, such as parts of telescopes, leave them with Bruce before you go, but get a receipt from Mike for your donation (if you need one). I will bring copies of the Donation Receipt to the meeting, fill it out, show it to Bruce, give it to Mike. We will see you at this year's Swap Meet. Let's sell, sell, sell!

Here are some items you might see at this year's Swap Meet: Celestron metal "field" tripod (for 5" SCT) w/extra parts and Orion zipper bag, Celestron Digital Camera Adapter, 4" OTA Ring Set, 4 piece Filter Set from Orion NIB, Moon Filter, 2" and 1.25" end caps for your eyepieces, 60mm Telescope & more. ***

The Planets This Month

Venus will still be gracing our evening skies this month, shining brightly in the west after sunset. Through a telescope we can see its crescent phase. Catch Venus while you can, because it is starting to set earlier - 8:15 pm at the beginning of December, and 6:45 at the end of the month. Neptune and Uranus will also be up in the evening. Neptune sets at 11:30 at the beginning of December, and 10:30 at the end of the month; Uranus sets about two hours later.

Jupiter, in the meantime, is up all night, rising at 8 pm at the beginning of December, and 6 pm at the end of the month. So prepare for a treat and enjoy following the choreography of the Galilean moons through a telescope or even binoculars!

Mars is still a morning star, but gradually rising earlier: 1:30 am at the beginning of December, and 00:30 at the end of the month. It is about 150 million miles away and still quite small, but will be reaching opposition in April, and then it will be just

60 million miles away and easier to view.

Saturn is a morning star, rising around 5 am all month; and Mercury is now fading into the sunrise after being a morning star in November. Watch for Mercury's return to the evening sky in the second half of January!

The new moon will be on December 3, first quarter on December 9, full moon on December 17, and last quarter on December 25. Wishing you clear skies and happy observing!

November 7th Meeting Review

(Continued from page 1)

wait. I've been asking Rick to do it for so long, then we set it up about a year in advance, it got a conflict in dates, and then finally, we got Rick to PAS for this presentation and it was well worth waiting for. I'm so happy Rick could do this talk for us.

And it was informative and very useful info. Can't wait to hear from Rick again, on another topic.

Many thanks to those who brought food. Rick raffled off a book he bought on

Amazon just for this meeting. William Finch won the book. Don Boyd won the 50/50 raffle. It was an awesome meeting. Thanks to all who attended. See you for the next meeting, December, in which we have the PAS Swap Meet.

CTCA Oct 1

By Joe Collins

Short Report for CTCA-PAS SkyTour
Tuesday Oct 1, 2013

Conditions were perfect. 21 customers attended. Event was staffed by Don Boyd and Mike Marron of PAS.

Here is feedback from Mike, who was manning the meteorite display in Ricardo's Café: I had 11 people stop by my meteorite display. One "old cowboy" (a CTCA employee or Hope Team volunteer) was especially impressed- he spent most of the time conversing with me- he couldn't get enough of my meteorites and stories about them.

Here is feedback from Don, who manned his Newtonian reflector telescope on the 5th floor garden terrace: We had 10 people for the star party and a couple of guys were very interested...both had been star-gazers in their youth...and 1 man worked on automating a telescope in the mid 80's, but he got into electronics because of the money and did not pursue the hobby. I think I rekindled his interest. JB was very helpful. She got us meal tickets and even found a couple of boxes to cover the lights. She gave us a plenty of handouts...I showed Venus and Saturn before they set...Saturn was very low so it looked terrible but the

people that got to see it were very pleased with the view. I then showed the Perseus Double Cluster, M6 (the butterfly Cluster), ET, the double star Almack, Alcor and Mizar, M13 (very difficult to see because of the lights), Andromeda (I could barely see the central core) and then just before I started to pack up, The Pleiades.

Joe and Renee Collins, the Cancer-Fighter reps. for the event, unfortunately were unable to attend due to car trouble enroute to the event. Nevertheless, this event was a success! Our next event is Tuesday November 5th. ***

Lone Mountain School Star Party Oct 11

By Terri, Event Coordinator

It was a beautiful evening for viewing. We got to the school about 20 minutes before set up time, so about 5:40pm. Eric Steinberg and Earl DeLong were already setting up. After our arrival, Don Boyd rolled in, on the basketball courts, and then Mike wandered in, walking. The goal was 6 scopes, so it was 5 scopes and Mike. Mike set up inside the auditorium. We started setting up and then 6pm came and we were informed the pizza was available. So, Eric & Earl took the first shift, and went in to get their pizza while we set up and watched the scopes. When they came back out, Don, William and I went in, grabbed our pizzas, drinks, dessert, veggies, hit the bathroom and came back out to finish setting up. Before we knew it, it was 7pm and there was a crowd. So, the pizza had to wait. Around 8pm it started getting very chilly, so we found our jackets and continued with the event. We must have had at least 300 people attend this event. I stayed on the Moon, the whole MOon, all night and did Q & A. Sometime during the night, William moved to the MOon and someone asked me to find the E.T.Cluster. I gave it a try but with a fork mount, the angle was all wrong, so I gave up and went back to the Moon. I gave away over 1/2 of the box of Q & A prizes I had brought with me. One boy, didn't catch his name, was so interesting and interested in astronomy, I gave him several awards just for the info he was sharing with me. He'd come up to my scope and I'd say I have the Moon, of course in the dark I

didn't know it was him until he was speaking to me, again. And he'd go on about something science or astronomy related and we'd get into these great discussions, and then as he was walking away to the next scope, about 15 minutes after he got to mine, i'd hand him a prize. He'd thank me, go to the next scope, and work his way around to me again. I saw him at least 3 times that night, and each time he got a prize from me. When the kids are that excited about science, I don't mind giving more prizes to help them stay excited. Some of the things I gave him will be very useful to him.

So, the event closed at 9pm sharp as the principal came out, announced the lights were coming on, and then we started packing up. It took William, Don and I about an hour to pack up. Don was taking his time, as he knew I would be hurrying but it still would take an hour, always does, if I do it right, and make sure everything is put away properly. So, about 10pm, we were rolling off the basketball courts. While packing, there was a group of teachers just laughing and having a super great time, waiting at the gate opening. We could hear them giggling and having a great time. I wish to thank Lone Mt School for a 2nd year of a great event. I heard the pizza was from Costco, and I never had such good cheese pizza. Thanks to Colleen Neiman, our contact at this school. I'm sure she will want to set up another event soon. Also, this is the school

that sends us a copy of the Survey they do with the parents who attend, to find out how to better improve their events.

Don writes: I had my new scope working thanks to Mike lending me his weights. Scope was not working all that well because Orion sent me a dovetail bar that was too long. With the Telrad on the back end of the scope I could move the scope back and forth about an inch. And also trying to rotate the scope so that the eyepiece was in a good position I ruined the alignment and the scope would not do a goto after that. I viewed the Perseus double cluster most of the night.

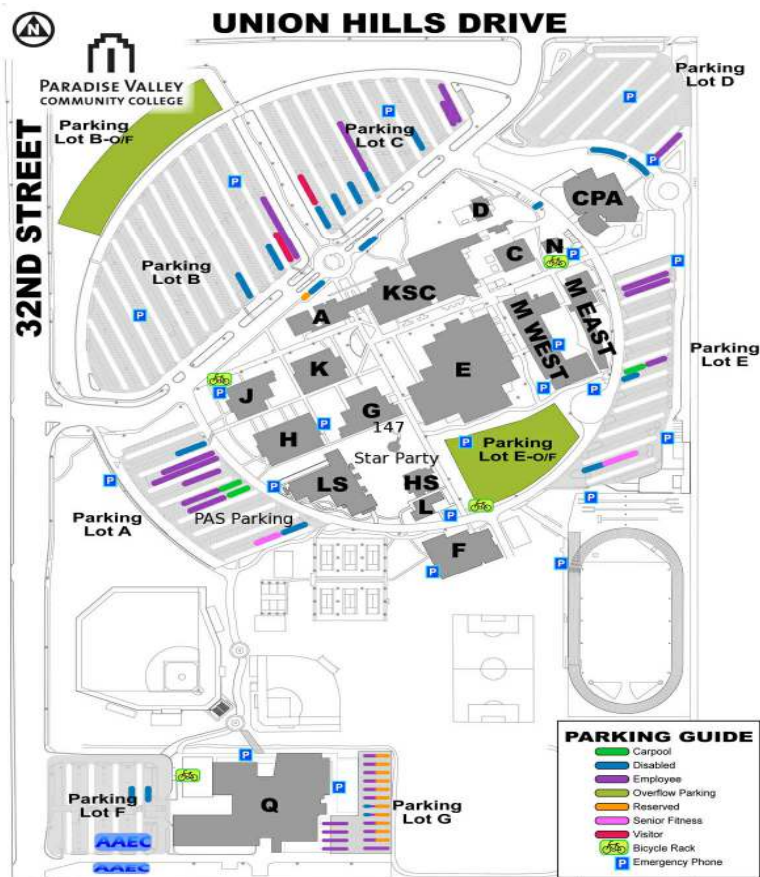
Earl writes: The club had a successful return visit to Lone Mountain School. The weather was chilly and this probably decreased the crowd a little from last year. The visitors that braved the weather, were very interested and appreciated us sharing our hobby with them.

I started the evening showing the moon using a dark green filter. Everyone said I had the best view of the evening. Once the crowd thinned (people went back into the school to warm up and enjoy the hands on demonstrations), I turned my telescope on the double star Alberio. We then viewed star clusters M30, M15, M13 and the Andromeda Galaxy M31. All showed up fairly well in the first quarter moonlight.

Thanks again to the friendly and helpful staff. We look forward to our next visit.***

Map of PVCC Main Location

18401 N. 32nd Street | Phoenix, AZ 85032



Map of PVCC Black Mountain

34250 N. 60th Street | Scottsdale, AZ 85266



See page 2 for more details

December 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3 CTCA	4	5 PAS Meeting	6	7
8	9	10 CTCA Backup Date	11	12 Free telescope workshop	13	14 'Public Meteor Shower Party
15	16	17 School Star Party (Private)	18	19 Meeting of the Minds (Tentative)	20	21 PAS Music Jam
22 FREE Telescope Workshop	23	24	25 Christmas Day	26 Boxing Day	27	28 Public Comet Viewing Party
29	30	31				

Don Boyd
PAStimes Editor
3039 W. Peoria Ave 102-188
Phoenix AZ 85029

To:

2014 PAS GUEST SPEAKER LINE-UP

By Terri, Event Coordinator Events@pasaz.org

Do you have an idea for a Guest Speaker? Email me the details.

Jan 2: Speaker: TBA

Feb 6: Speaker: TBA

Mar 6: Speaker: TBA ***

PAS is incorporated in the state of Arizona as a non-profit, scientific and educational organization. Our newsletter PAStimes is published monthly from September to May and distributed by US PS and the Internet. All Issues are available for download on our website www.pasaz.org Ads for astronomy equipment are provided as a courtesy to sellers and buyers, and do not constitute any endorsement by PAS. All Photos by Don Boyd unless otherwise credited. All articles and photos are copyright their authors or PAStimes.

What's Up For December

By Rod Sutter, PAS Past President

Name	Date	Rise	Set
Mercury	12-15-13	06:54	16:47
Venus	12-15-13	09:49	19:53
Mars	12-15-13	01:06	13:11
Jupiter	12-15-13	19:02	09:14
Saturn	12-15-13	04:37	15:18
Uranus	12-15-13	13:12	01:34
Neptune	12-15-13	11:37	22:41
Pluto	12-15-13	08:29	18:42

All Times Arizona Time

December 15 2013

Sunrise: 07:24

Sunset: 17:22



New: December 02



Q1: December 09



Full: December 17



Q3: December 25