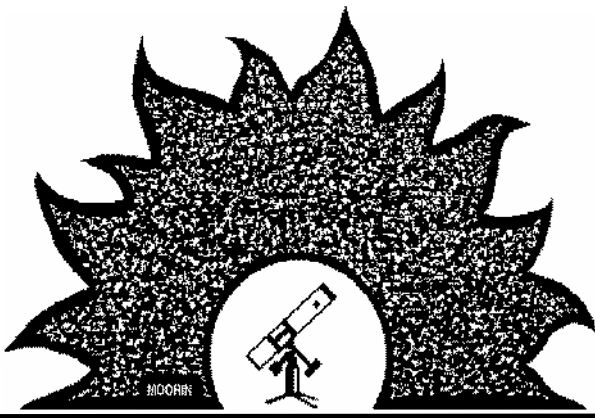




# PAStimes

Phoenix Astronomical Society  
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PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

## David Williams to Speak at Mar 7 PAS Meeting

By Terri, Event Coordinator

Topic: NASA Solar System Exploration Update

The last six months have seen some wondrous events in Solar System Exploration: The commissioning of the Curiosity rover's science instruments and the beginning of its exploration of Gale crater, the recent flyby of asteroid 2012 DA14 and the surprise meteor strike in Chelyabinsk, Russia, and new results from MESSENGER at Mercury, the Lunar Reconnaissance Orbiter, and Cassini at Saturn. Join Professor David Williams of ASU's School of Earth

& Space Exploration for a tour of recent discoveries from across the Solar System and Beyond!

The March PAS Meeting will enjoy Dr. Dave's presentation. Please invite everyone you know to attend. Seating may be limited since this is one of the AZSciTech events, so arrive early. Bring a snack to share. Water provided by President Bruce. Meeting room opens at 7pm and Dr. Dave takes the floor about 7:35-7:40pm. We'd love to see everyone there!.



Photo courtesy David Williams

## PAS Meeting Feb 7

By Terri, Event Coordinator

Attendance at this month's meeting was really good. We saw a bunch of people we haven't seen or heard from in a while, like: Steve Palmer, Mandy & Rockie Hervieux, Leah Sapir and Kevin Adams. We opened the meeting a little late, about 5 minutes to allow for anyone who might not have remembered we would be in a different room this time. We had a few brief announcements about upcoming events by Terri, Event Coordinator, after Bruce opened the meeting and welcomed everyone. Mandy announced how wonderful her daughter, Rockie, is doing in school at Echo Mountain 5th Grade with high honors and she was awarded for 100% attendance. Jenny announced and shared handouts from the Arizona SciTech Festival of 2013 (which runs from Feb 6 to Mar 17). All PVCC events that PAS is doing, are listed. We should have a huge crowd for the Feb 14 event at Black Mountain Campus. A few

other events were mentioned for which PAS Members are invited to.

Matt awarded Jerry a framed photo of back lit Saturn, and a card signed by everyone who attended the PAS Social this year, which was thanks to Jerry for providing the many door prizes for the Social and the Dart Trophies each year. Jerry wasn't supposed to be at the Social this year, but rain canceled his other event for the day, so he attended the Social, and we are glad he did, but it wasn't easy sneaking around having everyone sign his card under his nose. Then I also had Matt announce the plans for after the guest speaker in which we were watching a 15 minute video of William Shatner talking to an astronaut.

We then turned the floor over to Dr. Tom McCarthy with his topic of "Things that go bump into the Earth." This was a totally enjoyable, sometimes funny, very entertaining, energetic presentation. Wow.

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## March Upcoming PAS Events

By Terri, Event Coordinator

(PAS Events below, are listed from beginning of this month, to next PAS meeting)

**Mar 3:** Free Telescope Workshop at Bookmans 3:30 to 5:30pm. Bookmans is at 19th Ave & Northern, N.W. Corner. We meet in the musical instrument section. RSVP is required with Terri Events@pasaz.org. When you RSVP, mention the type of scope you are seeking assistance with so that we may match you up to a teacher who can help you. This is also a good class to attend to get ideas on what type of scope you should purchase.

**Mar 5:** CTCA (Private) 7:30pm to 9:30pm. RSVP with Joe. PAStimes Star Tour Members only.

**Mar 7:** PAS Meeting with Guest Speaker (see back page for speaker line-up) 7pm to 10pm PVCC Main Campus LS-201. Bring a snack to share. Bring a friend! Everyone welcome!

**Mar 8:** Estrella Observatory Star Party (PAS Members Only) 5:30pm Potluck, 7:30pm Star Party. RSVP is with Yves or Terri for this event. Sign up in Potluck & bring your scope!

**Mar 9:** Messier Marathon practice date, Dark Sky Observing Session for PAS Members Only, plus Night Sky Training Session (see additional article in this issue about this event) at Mike's home in Carefree. Potluck is 4:30. Observing & other events start about 6:30pm. RSVP is required. Sign up for the potluck.

**Mar 9:** 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. Star Party Etiquette is required.

**Mar 15:** Private Star Party, PAStimes Star Tours Members Only, RSVP with Terri to attend. 3 scopes needed. 7:30 to 9:30 in North Scottsdale.

**Mar 16:** The Messier Marathon at Mike's in Carefree. Open to anyone seriously wanting to do the Messier Marathon, or do a semi private star party. Meaning, if you have a scope, and are not a PAS member, but wish to attend this location over 2 Trees or Antenna's, RSVP with Mike to attend, but no additional public, meaning immediate families only. 4:30pm potluck, observing starts prior to sundown. Sign up

for the potluck.

**Mar 19:** CTCA Back up date for Mar 5.

**Mar 21:** Free Telescope Workshop 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 type of 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. And this is a public Star Party! Bring your friends.

**Mar 28:** Meeting of the Minds (MOM's) 7pm to 10pm PVCC Main campus Rm LS 201. It's a party! Bring a snack to share and come chat about PAS Business, plus a special presentation by Alex Vrenious.

**Apr 2:** CTCA (Private) 8pm to 10pm. RSVP with Joe. PAStimes Star Tour Members only.

**Apr 4:** PAS Meeting with Guest Speaker (see back page for speaker line-up) 7pm to 10pm PVCC Main Campus LS-201. Bring a snack to share. Bring a friend! Everyone welcome!§

## Astronomy Magazine Swap

By Terri, Event Coordinator for PAS

At the PAS meetings, the main, first Thursday of the month meeting with a guest speaker, I would like to start a monthly Magazine Swap between PAS Members. Every month, bring your outdated astronomy magazines of any type, that you no longer wish to keep, and swap for those

sitting on the table by the handouts. Bring 1, take 2 if you wish. The idea is to share them around every month so anyone who doesn't already get the subscription, can enjoy the magazines. It doesn't matter how old they are, just bring them in and each month, I will take home the pile to bring it

back the following month. Read them, enjoy them, then pass them on to the next PAS Member. We will begin this at the February PAS Meeting and continue it until further notice. Would love for you to bring a handful of magazines to swap. See you at the meeting!§

# “Meteorites on Mars”

## James Ashley Presentation of Jan 3

By Alex Vrenious

Tonight's presentation was really interesting. I for one would be pleased to hear his talk on Lunar Caves. I remember an article some time back about a natural arch (like Rainbow Bridge, e.g.) on the Moon, suggested by an old hand made drawing of a group of craters. Much observation later, it was decided that the arch didn't exist, and may have been due to some tricky lighting situation. But now, with caves on the Moon, who knows what kinds of other constructs exist? This is really cool stuff. §

## Night Sky Training Sessions (NSTS)

By Terri, Event Coordinator for PAS

After much discussion about these type of events, it was decided that PAS would have 2 events of this kind, this Spring, and see how they work out, before planning more events. So, here is what we are doing. Mark on your calendar Mar 9 and Apr 13. Location is Mike's home in Carefree. RSVP is required to attend, as we may limit the number of scopes who can attend each session. Requirements: 1) \$1 donation to Mike for use of his home - to cover cost of toilet paper and other necessities, 2) participants must be a current PAS Member, 3) Participants must have their own telescope or binoculars to use, 4) Participants need to have some form of a star chart to use that night, can be planisphere or other star chart from a book, as long as it shows what is up and available that night and 5) It is highly suggested you bring a red filtered flashlight, something to take notes with and on, like a notebook, and your own chair, table, and jackets. This is a Dark Sky Star Party. Those attending for the class, need to post in the RSVP that you are there for the class. Since this is a dark sky Star Party for PAS Members, others who do not wish to be totally involved, but still want to do a dark sky star party, may attend and enjoy the night sky with us.

What to expect at this NSTS event. First, those attending will set up their telescopes and everyone will be set up and aligned prior to the start of the actual event. Meaning, if you need help learning how to align, or adjust or set up your go-to, this is

the class for you. Once everyone is set up, then we will begin. We will pick the most obvious objects first, large, bright, etc. And we will all, as a class, go to the first object, let's say it is the Orion Nebula, for example. After everyone finds the Orion Nebula, and we have shared information like Stats, folk lore, etc, and compared eyepieces and filters, then we will move on to the next object. But while we are waiting for those who haven't caught up, we can talk about the object, we can view through everyone's scope, compare notes, etc, and get to know the object. And those who are not participating in the class, can also share other objects while the class is getting done with Orion.

How did we get there? How did we find the Orion Nebula? That is what the class is about. We will do several ways of finding the Orion Nebula. The first most important way, which is the purpose of this class, is to find it by star hopping. That means that you find a constellation or something else in the sky that you can identify, then hop, using stars, to get to the destination. We can talk about how to get there, show it with green lasers, and have everyone find the object together, because that is the purpose of this class. And the idea is NOT to hurry through this. We have all night. You stay as late as you want to. If you have to leave, that is fine. One goal I'd like to have during the class is finding some new items that we haven't seen before. So, for example, if Don wants to share the star

hopping part of getting to the E.T. Cluster, then others can learn where it is, and enjoy it as well. We are sharing knowledge and I'd like to consider setting up an event like this, maybe every other month, or every 3 months, so that we can really get to know the night sky. When you do a public star party and I hear from someone in our group, "What should I put my scope on now?" that's when I made the decision we need a class like this for those of us who may not know where to find objects. A star chart is only as good as the person using it. Just because the star chart says it is there, if you haven't looked for it previously, you may not know exactly where to look and like I heard from Albert Tucker, through email, he was mentioning that many PAS members, including himself and myself, find the objects we know how to find, quickly,

for public events and stick with those objects because at a public event, speed is important. Moving to a new object, most of the time, I don't even take the time to find out if Jupiter's red spot is visible or not. I find the object, focus it and let others look, and most of the time, not know, since I didn't take a moment to see if the red spot is there. So, that's what we want to do with this class. Find objects, new, old, doesn't matter, share what we know, make PAS more knowledgeable for doing events with the public and for personal enjoyment. So, sign up today. These events are listed on the PAS Calendar. We will see you there!§

## Ads in PAStimes

Ads in PAStimes run for a month and may be renewed on a month-by-month basis, if submitted by deadline, space permitting. Ads in PAStimes are FREE to members. All others are asked to make a small donation. Donations are to be sent to the Vice Prez who will forward them to the Treasurer.

# Antenna's Jan 8

By Eric Steinberg & Marc Levison

**Eric writes:** After days of watching the weather, we decided that Tuesday looked best for a dark-sky night. Luckily having the flexibility to drop everything and go, we headed out to Antennas, joining PAS-member Marc Levison there a little before 5 PM in balmy if initially breezy conditions. After a busy hour setting up telescope and sleeping quarters, we stopped to eat, relax and watch the glorious twilight that is a regular feature of the site.

Once the sun is down, the lack of obstructions and artificial light allow experiencing the three phases of twilight in their pure form. It's particularly striking that sometime after the beginning of Astronomical Twilight the stars seem to, as my wife puts it "pop." In a period of about five minutes they go from patchy, here and there stars to thousands, along with the Milky Way. It's one of our favorite parts of going there.

After that, it's time to align the scope and start observing. After some trial and error on previous evenings, and a number of modifications, the 22" scope performed really well. The wind pretty much died down, leaving the evening cool but comfortable. A strong conical band of zodiacal light stretched up from the western horizon to the zenith, so we started in the eastern half of the sky with Jupiter and the open clusters in Auriga. We observed until about midnight, took a sleep break (Actually, Ora slept; I attempted sleep) and got up for a couple more hours around 3:00. Seeing was fair to good at the start, but improved through the night.

Standout objects were –

Galaxies: M31, M51, M82, M101, M104 and NGC253 (Sculptor) with lots of detail and structure visible;

Nebulae: M42 – as good as it looks in town, it's just eye-popping out there, NGC2392 (Eskimo), NGC6826 (the blinking planetary), NGC2359 and the Horsehead – a standout in that we could make it out at all – lot's of averted vision needed even in the 22".

Clusters: M3, M5 and M13 – all bright with stars resolved to the center; M35, M36, M37 and M38.

Overall we viewed 60 objects before knocking off a little after 5. Temperatures bottomed at about 40, but some wardrobe improvements (as opposed to malfunctions)

kept us nice and warm for a really excellent viewing evening.

Please note, as has been mentioned elsewhere, there are no toilets or facilities of any kind there and strict dark-sky etiquette must be followed since there are often members from other clubs there doing imaging, and even for visual observers, a one-second flash of white light can wreck your night vision for 30 minutes.

Antennas is a beautiful site with very dark skies – for serious observers it's definitely worth the travel investment and primitive conditions.

**Marc writes:** Thoughts about the Antennas Observing Site

I live in North Scottsdale and think I have good dark sky views to the north and east over the McDowell Mountains. I can see the bright stars but can hardly see the Milky Way. The Antennas observing site is very much different.

To get there you drive about 100 miles west of Phoenix, leaving in the afternoon so that you can arrive before dark descends. The actual site is about an acre or more in size of flat stone that has been cleared of desert vegetation. Low hills surround the site to the north, east and south. Open desert opens to the west to distant low hills. The highway is well off in the distance to the north. Only the flashing red lights of the cell towers disturb the darkness and the sound of the wind is the only noise breaking the silence.

This is a primitive site. There are no toilet facilities. As evening settled over the Antennas site a brisk but warm wind from the west gradually settled down and made the evening quite pleasant. The night sky was clear with no clouds to be seen.

I have only been into astronomy for one year and am still learning my way around the nighttime sky. Once darkness descended, however, the first thing I was impressed by was the clarity of the Milky Way. At this time of the year night begins with Cygnus in the northeast. Altair was faintly visible further in the western sky. The Milky Way extended from Cygnus across Cassiopeia, and Perseus. Auriga and its brightest star Capella were visible in the east-northeast. Vega was visible low in the northwest as darkness descended.

As the night progressed the Milky Way passed along Orion and Canis Major. The

Milky Way is bright in the Arizona desert, making it difficult to pick out the bright stars of constellations from the background of stars. Gradually, however, I was able to identify many of the commonly identified constellations as the sky darkened. In addition to those mentioned above and to the northwest I was able to identify Andromeda, Triangulum, Aries, Pegasus, Pisces, Aquarius and Cepheus high above in the sky. Soon in the east there were Auriga, Taurus and Orion, Gemini, Cancer and Canis Minor. In addition, Jupiter stood out with distinction near Aldebaran, the Hebrides, and M45, the Pleiades.

As we observed Jupiter early in the evening high in the eastern sky, I could be seen crossing the Jovian disk onto the front side of the planet! This was my first observation of the evening!

M31 was magnificent filling much of the field of view of my 18 mm eyepiece. M110 was right alongside. In addition I was easily able to view M1 as well as NCG 1647 and 1746 in Taurus, M44 (Beehive) and M67 in Cancer, and M35 and NCG 2158 in Gemini, amongst many other sights. Several open clusters filled the FOV of my 18 mm eyepiece.

After observing for several hours and I decided to get some sleep about 11 PM. I slept in the back of my SUV between 2 sleeping bags. The nighttime temperatures dropped to 40 degrees F or lower and I was decked out in my ski clothing including jacket, hat, gloves, wool socks, and neck gator! Fortunately I ski so I put my ski clothes to good use.

I awoke about 3 AM and began observing again. Now the constellations were entirely different! Orion was large in the western sky. High overhead was Ursa Major, Draco, Bootes, Canes Venatici, Leo, Corona Borealis, Virgo, Corvus, and Hydra. All of the stars of Ursa Minor were visible.

As dawn approached Scorpio, Libra, and Serpens Caput rose in the eastern sky along with Venus. The relationship between Hercules and Draco was easy to see. Saturn was high in the southeastern sky. Vega was now visible again low in the northeast.

In addition to these constellations, I was also able to identify southern constellations very difficult to discern in the light pollution of Phoenix from my home in the northeast valley. Eridanus, Columba, and

*Continued from page 4*

Cetus were easily identified!

Saturn was its usual beautiful self. In addition, many other views were spectacular including the triple galaxies M105, M95

## Antenna's Jan 8

and M96 along with the Leo Triplet M65, M66, and NCG 3628. Other special sightings included M13 in Hercules and M3 in Coma Berenices.

A thin crescent moon finally rose in the east as the eastern sky lightened and dawn approached. It was a very enjoyable night at the Antennas viewing site! Can't wait to do it again!§

*Continued from page 1*

Where does Dr. McCarthy get his energy? I told him that if I did a presentation with as much energy as he used for his presentation this night, I'd be so dead tired by the time I got home. Many thanks to Dr. McCarthy for his presentation as it was awesome! I asked him to come back and do another one for us in the near future and he said he would. And I loved his Tie - very appropriate for the occasion.

After the presentation, we had a 5 minute break while some of us ran to the bathroom, and then we watched the astronaut / Shatner thing. We closed the meeting.

Many thanks to Bruce for providing the case of water. Thanks to Mikey Webb for being the Host at this meeting. We miss John PULis. Mikey did a wonderful job even though I forgot my sign-in board and pages. Many thanks to Jenny who stayed through the whole presentation and helped with set-up. The cake, donuts, and cookies were provided by Ed Wurst, thank you. Darlene

brought puffs, grapes and something else I can't remember at the moment. And we missed a few people at this meeting. There was no popcorn, as Sam and Frank Insana weren't at this meeting.

We did our first Magazine Swap. Bring some magazines, swap for some others, take the whole pile if you wish, but plan to bring it back to the next meeting.

Many, many thanks goes to Jenny for finding us a bigger room to use. We had plenty of room at this meeting. We hope to fill it up in the next few months. So, bring a friend to the next meeting. We hope to see you there!

**Darlene Ahlefeld** writes: PAS welcomed Dr. Thomas McCarthy, who spoke to us about things that go bump into the earth.... And alot of theses bumps are fairly recent, like the one in Russia, complete with illustration of a man watching it all from a distance at which he would have been totally obliterated. Ah, the leaps in

knowledge since the earliest 1900's. Even more recent are the near bumps that could have wiped out the dinosaurs all over again but changed from a 4 to a 0 (on the is-it-going-to-wipe-us-out-or-not-scale) maybe it's not time for the earth to be destroyed again. Someone out there watching over us? Then there is (was, by now) the ball of rock and stuff scheduled to hurtle past us at about 17,000 miles, in proximity to our comsatellites, oh my. Hope your smart phones are still smart. At the end of the presentation Dr. McCarthy demonstrated how gravity works with a tray connected to lines and a glass of water. He didn't ask for victims, uh - volunteers, to try the experiment.... I think it takes a little more practice than we had time for that night. The "free to teachers for postage and handling" shuttle tile from NASA was a hit; our speaker heated the tile and we all felt the heat from the other side while he apparently felt no discomfort.§

## The Constellation Perseus

By Earl DeLong

During January, the constellation of Perseus is near the zenith directly overhead. To me, it appears as the letter "Y" with the open end of the "Y" facing south. One leg of the "Y" is shorter than the other.

In Greek Mythology, Perseus was the legendary founder of Mycenae and the first Greek (super)hero. He was able to defeat and kill the Gorgon (ghoul) Medusa.

The nearby constellations of Cassiopeia and Andromeda also relate to Perseus. Andromeda was the beautiful daughter of Cassiopeia. Cassiopeia boasted that her daughter was even more beautiful than the Nereids. This enraged Poseidon and he sent Cetus the sea monster to attack Andromeda who was bound in chains on the beach. Perseus was able to rescue Andromeda by slaying the sea monster.

Perseus was the son of Zeus and Danae. Danae was the daughter of Acrisius (King of Argos). The Oracle of Delphi

warned Acrisius that one day he would be killed by his daughter's son. Danae become pregnant by Zeus and bore Perseus. Acrisius locked both Danae and Perseus in a wooden crate and cast them into the sea hoping to rid him of the curse. However, the wooden crate washed up on the isle of Seriphos and both Danae and Perseus were spared death.

The constellation of Perseus is one of 48 constellations listed by Ptolemy. It is the radiant of the Perseid meteor shower in August. It also contains the famous variable star Algol ( $\beta$  Per). Algol is an example of an eclipsing variable star. It is a three star system Beta Persei A, B, and C. Star A is the brightest and is eclipsed by star B (which is dimmer) every 20 hours and 49 minutes. The brightness of Algol dips from magnitude 2.1 to 3.4 during the eclipse. The double cluster is another bright object in Perseus. NGC 869 and NGC 884 are 7000

light years away and are easily visible in binoculars. §

### Some Great Astronomy Websites

By Leah Sapir

Here are some excellent astronomy websites, both for reference and browsing: <http://nineplanets.org/> - extensive information about all the objects in the solar system/ <http://stars.astro.illinois.edu/sow/sowlist.html> - Prof Jim Kaler's website about stars, with a detailed profile of every visible star.

<http://www.atlasoftheuniverse.com/index.html> - extensive information about deep sky objects, from "our neck of the woods" to the edge of the universe.

<http://simbad.u-strasbg.fr/simbad/> - Simbad database of every known deep sky object. You can also scroll down and click on the "Aladin applet" to get a sky chart of the object.

# CTCA Jan 8

By Joe Collins

CTCA/PAS Solar Viewing & SkyTour Event Tuesday January 8th, 2013 Report by Don Boyd, Phoenix Astronomical Society (PAS) Member, and Joseph T Collins, CancerFighter @ CTCA WRMC & PAS Member

Attendees: PAS members: Joe Collins and Don Boyd Volunteer: Renee Collins. We had a combined total of twelve CTCA patients, care-givers, and employees join us on the 5th floor garden terrace for solar viewing, and at the first floor cafeteria patio for the SkyTour event.

Don Boyd <dazphotog@aol.com>: Solar Viewing-People were really impressed by how many sunspots there were.

SkyTour- For the night time event I showed The Pleiades (M45), and Almaak (a binary star). With all the lights from the parking lot and the building it was very difficult to see anything. I tried the Double Cluster in Perseus but it was just completely lost in the lighting. I think it is probably wise to hold the SkyTour events on the patio when it is expected to be as cold as it was Tuesday. It was nice to be able to warm up by the fire pits. Hopefully February will be warm enough to go back up to the Roof-top Garden.

Joe Collins <jcollins79@cox.net>: Solar Viewing- Don Boyd showed sunspots to three customers with his solar filtered tele-

scope up on the 5th floor garden terrace. There were many sunspots (the official count was 196) due to a recent burst of solar activity. According to Spaceweather.com there are two active regions that may spawn M-class or X-class flares in the next 24hours.

SkyTour- Because of the anticipated cold weather, we changed venue for the night program to the patio area adjacent to the CTCA cafeteria where there are several natural gas heater rings to keep people warm. This location also affords access to the cafeteria for refreshments. We setup our telescopes on the shuffleboard court which provided a rigid flat surface and was far enough away from the buildings and trees that we could canvass a decent portion of the night sky. Due to the artificial light sources: street/parking lot lights, decorative lights and reflections, this is not the ideal location for viewing the stars, but the night was clear and moonless, it was warmer, and there was less wind than on the 5th floor, so it was pretty decent nevertheless. I showed 9 customers views of Jupiter and its moons, including the transit of Io; M42, Polaris, and a few other objects on our handout. Additionally, Don Boyd showed double stars, double cluster and M45. Unfortunately, there was too much light glare and reflections to show deep space objects. We ended the program at 9:30pm, a few hours

too early to see the guaranties meteor shower to the north. By-the way on the patio we have better sky viewing to the north than on the 5th floor.

Tech Tonight- Joe used the iPad to show detailed information about Jupiter and its moons on the new and recently released Sky & Telescope App "JupiterMoons". We discovered another advantage of doing events from the patio area instead of the 5th floor garden terrace- access to CTCA guest WiFi; consequently, we can do astronomy searches and show customers more information on the iPad than we can up on the 5th floor.

People- Thanks goes to Jennifer Kehren who provided plenty of copies of our handouts and meal tickets. The CTCA Cafe cook was new and served us up delicious hanger steak with mushroom sauce and salmon with scallops in cream sauce for dinner! Thanks to the CancerFighter Group for providing us meals and refreshments. Thanks also deserve to go to Blas (CancerFighter/Ambassador) who sent us customers from his newcomer dinner group out to patio for stargazing. This was a fun group this night!

Next time- We are looking forward to coming out again next month on Tuesday February 5th. If the weather looks to be cold, we will try out the patio area again! §

# PVCC Black Mountain Star Party Jan 15

By Sam Insana & other PAS Members who attended

Sam writes: On January 15, 2013, PAS had a star party at PVCC Blk Mountain starting at 7 pm. The temperature started out at 40 degrees and dropped rapidly. We had 5 telescopes and a meteorite display. On hand was Sam and Frank Insana, Mike Marron, Earl, Darlene, Robert Ewing, Eric and Ora, Don and Dave. 2 of Sam's golfing buddies showed up and stayed 2 hours looking through all the telescopes and seeing the meteorites. The highlight objects viewed were the moon, Orion nebula, Andromeda galaxy, Pleiades, Perseus double cluster, gamma Andromeda double star, M81 and M82, and Jupiter. People from the Bad Donkey came over to view the objects and so did some PVCC students. Also some

general public showed up to view. Sam provided hot chocolate and hot apple cider for all the PAS staff. Sam also bought a large pepperoni pizza and gave PAS people a few slices each. Around 9:30 pm it got so cold and the public was gone, so PAS packed it up one half hour early. The viewing was fine with dark skies and only a few clouds. There also was very little wind, but the cold was tough for us Phoenixians.

The Bad Donkey moved its large truck out of our viewing area and also gave PAS a 15% discount. Frank and Sam ate at 5 pm, before setting up at 6 pm. Although school was in session, and there were hundreds of students on campus, very few showed up to view. Next time we need to make sure there

are posters or signs on campus advertising our event.

Don Boyd writes: I showed the Double Cluster, The Pleiades, the Rosetta Nebula (but could not see the nebulosity only the central cluster), M1 (very faint), and Sam wanted to see the California Nebula so I tried it...not sure if I saw it or if there were clouds in the area, did not see the shape at all.

Darlene Ahlefeld writes: I tried it out last night and worked well. Used Starry Night to cruise the skies, Paul was impressed. Didn't have many last night but I wowed 'em with the moon and Orion Nebula. Finished up with the double star in the big dipper (saw last last time at BMC).§



# Tackling the Really BIG Questions

By Diane K. Fisher

How does NASA get its ideas for new astronomy and astrophysics missions? It starts with a Decadal Survey by the National Research Council, sponsored by NASA, the National Science Foundation, and the Department of Energy. The last one, *New Worlds, New Horizons in Astronomy and Astrophysics* was completed in 2010. It defines the highest-priority research activities in the next decade for astronomy and astrophysics that will “set the nation firmly on the path to answering profound questions about the cosmos.” It defines space- and ground-based research activities in the large, midsize, and small budget categories.

The recommended activities are meant to advance three science objectives:

1. Deepening understanding of how the first stars, galaxies, and black holes formed,
2. Locating the closest habitable Earth-like planets beyond the solar system for detailed study, and
3. Using astronomical measurements to unravel the mysteries of gravity

and probe fundamental physics.

For the 2012-2021 period, the highest-priority large mission recommended is the Wide-field Infrared Survey Telescope (WFIRST). It would orbit the second Lagrange point and perform wide-field imaging and slitless spectroscopic surveys of the near-infrared sky for the community. It would settle essential questions in both exoplanet and dark energy research and would advance topics ranging from galaxy evolution to the study of objects within the galaxy and within the solar system.

Naturally, NASA’s strategic response to the recommendations in the decadal survey must take budget constraints and uncertainties into account.

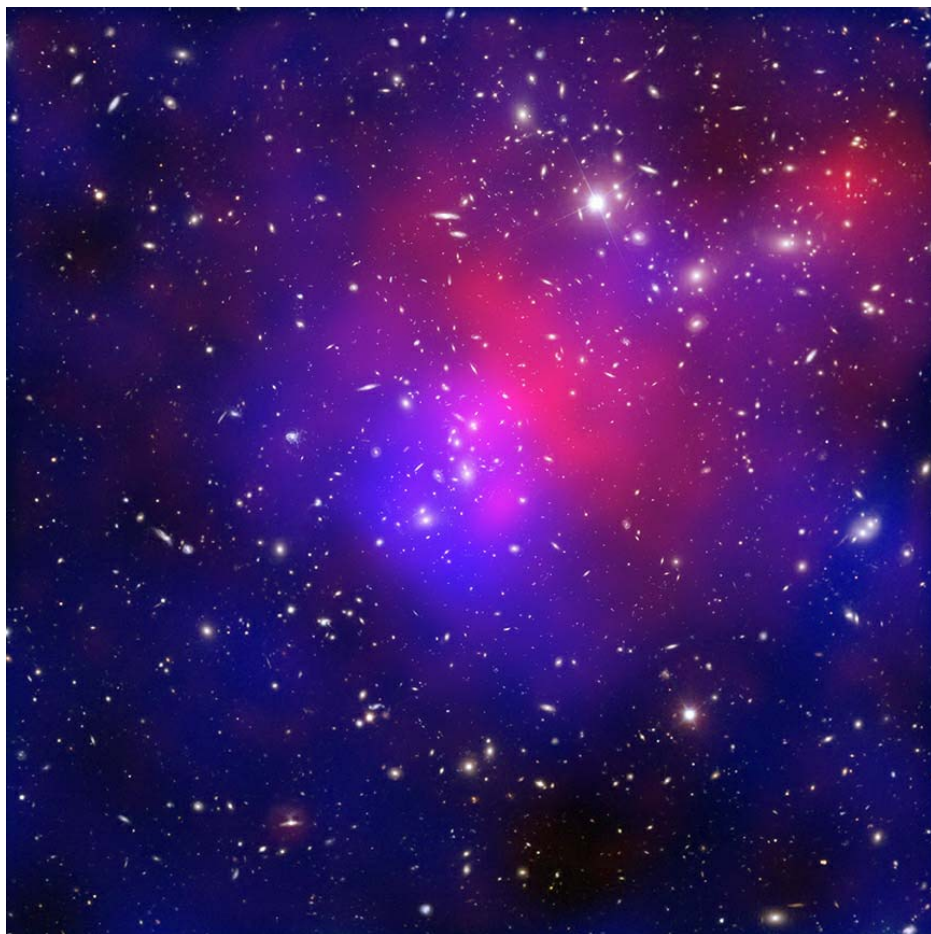
The goal is to begin building this mission in 2017, after the launch of the James Webb Space Telescope. But this timeframe is not assured. Alternatively, a different, less ambitious mission that also address the Decadal Survey science objectives for WFIRST would remain a high priority.

The Astrophysics Division is also do-

ing studies of moderate-sized missions, including: gravitational wave mission concepts that would advance some or all of the science objectives of the Laser Interferometer Space Antenna (LISA), but at lower cost; X-ray mission concepts to advance the science objectives of the International X-ray Observatory (IXO), but at lower cost; and mission concept studies of probe-class missions to advance the science of a planet characterization and imaging mission.

For a summary of NASA’s plans for seeking answers to the big astrophysics questions and to read the complete Astrophysics Implementation Plan (dated December 2012), see <http://science.nasa.gov/astrophysics/>. For kids, find lots of astrophysics fun facts and games on The Space Place, <http://spaceplace.nasa.gov/menu/space/>.

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



Clusters of galaxies collide in this composite image of “Pandora’s Cluster.” Data (in red) from NASA’s Chandra X-ray Observatory show gas with temperatures of millions of degrees. Blue maps the total mass concentration (mostly dark matter) based on data from the Hubble Space Telescope (HST), the European Southern Observatory’s Very Large Telescope (VLT), and the Japanese Subaru telescope. Optical data from HST and VLT also show the constituent galaxies of the clusters. Such images begin to reveal the relationship between concentration of dark matter and the overall structure of the universe.



Darlene Ahlefeld, seen at PAS Halloween Party Oct 27, 2012, dressed as Pleiades Open Star Cluster. (Photo by Terri)

# Arizona Sky

By Leah Sapir

This month, a potentially bright comet will be crossing the edge of our sky: Comet PanSTARRS (C/2011 L4), which until now has been seen just in the southern hemisphere. In March it will be visible in the northern hemisphere, but only in evening twilight. On March 12 the comet will be directly to the left of the crescent Moon, and on subsequent evenings it will move past Pegasus and Andromeda. Current estimates predict a magnitude of around 3, which sounds impressive, but we won't be seeing it in a dark sky. Find a place with a clear western horizon, and bring binoculars – you'll probably need them.

The comet was discovered in June 2011 by astronomers from the University of Hawaii, using the Panoramic Survey Telescope and Rapid Response System (Pan-STARRS). This is a computerized collection of telescopes and cameras in Hawaii, established by the US Air Force Research Labs to survey the sky for Near Earth Objects (NEOs).

The word “comet” means a “hairy star”. In ancient times, the strange, fuzzy shape and sporadic appearance of comets convinced people that these must be an evil omen. Most astronomers assumed that comets were a type of atmospheric phenomenon, but in 1577 Tycho Brahe proved for the first time that a comet seen in that year was actually more distant than the Moon.

In 1705, Edmond Halley used the laws of motion recently published by his friend Isaac Newton, to calculate the orbits of 24 comets. He then realized that a comet that had been seen in 1682, had the identical orbit to those seen in 1531 and 1607. In fact, going back in history, he realized that the same comet had been seen approximately every 76 years, and he predicted that the comet would appear again in 1758 or 1759. Halley died in 1742, and did not live to see the return of the comet, right on schedule in December 1758; the famous comet was afterwards named after him.

An earlier apparition of Halley's Comet is shown in the Bayeux Tapestry, which was embroidered to commemorate the Norman Conquest of England in 1066. Chinese records document

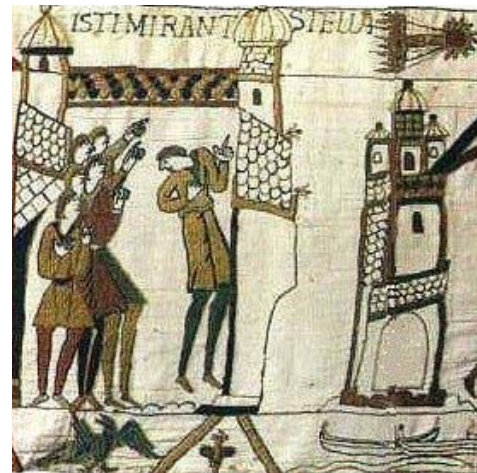
the comet's appearance 2250 years ago.

In the 18th century, comet hunting was very popular. The slow motion of comets across the sky made them seem more interesting than stationary objects such as nebulae. Charles Messier, an avid comet hunter, composed his famous list so that pesky objects like star clusters and nebulae wouldn't get in the way of his search for comets. Messier discovered 13 comets, and Caroline Herschel discovered 8. (Her brother William didn't discover any comets; but he discovered and catalogued many other objects, both in the solar system and beyond.)

Even after it was established that comets are part of the solar system, their origin was a mystery. But in 1950, Dutch astronomer Jan Oort noticed that the aphelion of long-period comets was usually at around 50,000 AU (around 0.8 LY). He theorized that there is a region in the solar system, about one light year away, containing large numbers of comet nuclei. Although this region, now known as the Oort Cloud, has never been observed directly (since the comet nuclei are too small and distant for us to see), we know it must be there as the source of long-period comets, i.e., those with an orbital period greater than 200 years. There are apparently trillions of comet nuclei in the Oort Cloud.

Moreover, following the discovery of Pluto in 1930, it was theorized that other small icy objects might occupy a region beyond Neptune. Among the astronomers who raised this idea were Frederick Leonard, Kenneth Edgeworth, and Gerard Kuiper. This region, now known as the Kuiper Belt, is located from 30 to 50 AU from the Sun. It contains at least 35,000 icy objects with a diameter of at least 60 miles (100 km), and maybe a trillion smaller ones. The Kuiper Belt is the source of comets with orbital periods less than 200 years.

The objects in the Oort Cloud and Kuiper Belt are leftovers from the formation of the solar system. Bits of material in the solar system disk collected to form small bodies called “planetesimals”, and these combined to form the planets. In the area beyond Neptune, the planetesimals never formed a large planet – either because of gravitational disturbances from Neptune, or because the material was so sparse. Therefore they remain as “Kuiper Belt Objects” (KBOs). On the other hand, after the



*Halley's Comet in Bayeux Tapestry (picture*

*formation of Uranus and Neptune, planetesimals remaining near those planets were thrust out by the giant planets' gravitational influence to a much farther distance, forming the Oort Cloud.*

Comets are sometimes described as “dirty snowballs”. They are composed of frozen water, methane, ammonia, carbon dioxide, cyanogen, other ices, and dust. In some ways their composition is similar to that of Pluto; and even Uranus and Neptune have the same proportions of water, methane, ammonia and hydrogen as comets do, supporting the view that comets are the leftover planetesimals from the construction of these planets. Neptune's moon Triton is quite likely a captured comet.

From time to time, a gravitational “nudge” pushes one of the small, icy objects from the Oort Cloud or Kuiper Belt – a comet nucleus – into a long, elliptical orbit approaching the Sun. For the Oort Cloud, the gravitational influence can come from a passing star; for the Kuiper Belt, it can be due to Neptune.

As the comet starts to approach the Sun, especially after it passes the orbit of Mars, the Sun's warmth begins to vaporize the outer layers of ice and frozen-in dust, forming a large cloud of gas and dust around the still-frozen nucleus. Solar radiation causes the cloud of material to fluoresce, making it visible to us as the comet's coma. Sometimes the coma looks greenish, due to the presence of cyanogen. The coma can be 60,000 miles in diameter; and it can be surrounded by a very sparse cloud of neutral hydrogen millions of miles across.



# Arizona Sky

The solar wind, which is a stream of charged subatomic particles, mostly protons and electrons, ionizes some of the gaseous coma material and blows it away from the comet to form a bluish tail known as the gas or ion tail. The gas tail is usually long and straight, pointing away from the Sun, and can be several hundred million miles long. At the same time, the pressure of sunlight acts on the dusty part of the coma, forming a yellowish dust tail. The dust tail fans out along the comet's orbit, and can be up to 5 million miles long. Although the tails may look bright and substantial, the material in the tail is actually less dense than the best vacuum we can create in a laboratory.

When we see a comet, it looks like the tail is streaming out behind it, but actually the tails always point away from the Sun, regardless of the direction of the comet's motion. The tail also makes the comet look as if it is speeding across the sky. In fact, its actual speed, moving through space, can be 200,000 miles per hour, especially at perihelion. But in their path across the sky, comets only move by a few degrees per day. (Those few degrees represent an enormous distance through space, though.) At aphelion, the comet's speed is much less, about 1% of its perihelion speed.

Comets have long, elliptical orbits, which can be in the ecliptic or steeply inclined to it. As a result, comets can be seen in any part of the sky. The orbital period can be anywhere from a few years to thousands of years; and some comets have hyperbolic orbits that take them out of the solar system completely after their first perihelion, but these are rare.

The comet with the shortest known orbital period is Encke's Comet, which orbits the Sun every 3.3 years. Encke's comet was observed by Pierre Mechain in 1786, but the first one to calculate its orbit was Johann Franz Encke in 1819.

Comet nuclei can be tens of miles wide, although most have a diameter of a mile or less. On each pass by the Sun, a comet loses several feet of its surface material. This is not much, but it adds up after a large number of orbits. A smaller comet can survive for 500 or so orbits, a larger one several times that, depending on its initial radius and its proximity to the Sun at perihelion. Eventually only a rocky core will be left, resembling an asteroid – and it is possible that quite a few asteroids started out as comets.

After a comet has passed by, it leaves behind a trail of dust along its path. Since meteors are bits of space dust that burn up as they pass through Earth's atmosphere, we see plenty of

them – a meteor shower – when Earth crosses the dust trail left by a comet. The Perseid meteor shower in August is formed by Comet 109P/Swift-Tuttle; the Leonids in November are from Comet 55P/Tempel-Tuttle. Halley's Comet gives us two annual meteor showers: the Orionids in October, and the fainter Eta Aquariids in May.

Several comets have been visited by space probes, which have even brought back samples.

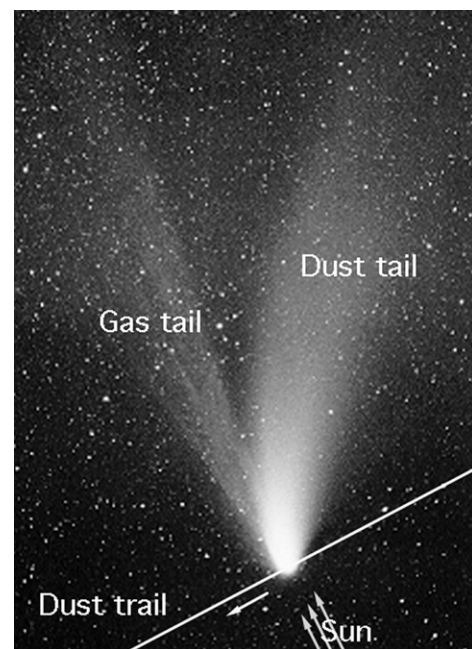
Elsewhere in the solar system... the planets are playing hide-and-seek this month. Mars and Uranus are still in the west after sunset – sort of... Mars is very close to the horizon in evening twilight throughout the month, and Uranus is visible after dark only in the first week of March. In mid-month Uranus will be visible only in twilight, and in the last week it disappears completely from view.

In the meantime, Mercury and Neptune are starting to reappear as morning stars, but only in the pre-dawn twilight. Mercury is most visible – if you can call it that – in the second half of the month, but still only during twilight. Towards the end of the month, Neptune will start to rise while the sky is still slightly dark, and will be more visible in April. Venus has been a morning star for the past few months, and will be an evening star in April. But this month Venus is sticking close to the Sun and won't be visible at all.

On the other hand, Jupiter and Saturn haven't deserted us! Jupiter is high in the west – almost overhead – at sunset, and will be up till around midnight. In the meantime, Saturn is rising earlier: 11 pm at the beginning of March, and 9 pm by the end of the month. In April it will be up all night.



Nucleus of Halley's Comet, Imaged by European spacecraft Giotto (image credit: NASA)



NASA Diagram (Artist Concept) of Comet's Tails (picture credit: NASA)

Since we are short on planets this month, we are also a bit short of conjunctions. However, Jupiter is still keeping company with the Hyades, and will continue doing so all month. On March 2, the Moon will accompany Saturn across the sky from midnight to dawn. The Moon will meet with the Pleiades on March 16 from sunset to 11 pm, and with Jupiter and the Hyades on March 17 from sunset to midnight. Then, on the night of March 22-23, the Moon will join the Beehive Cluster from sunset till around 3 am. And on the night of March 28-29, the Moon will again accompany Saturn across the sky, from 10 pm to dawn.

Wishing you clear skies and happy observing!§

# PVCC Telescope Workshop Jan 17

By Terri, Event Coordinator

Attendance at this event was: Telescope Teachers (William Finch, Tim Jones, Earl DeLong), Star Party helpers (Tim Jones, Frank Insana, Earl DeLong), and Indoor assistance was (Terri Finch, Mike Marron, Bob Christ, & Darlene Ahlefeld). Public attendance was 6 telescopes needing help with the owner of the scope and the rest of the family members, plus 12 honors students of Jenny's and about 5 other students of another astronomy teacher. It was a great turnout. The sky was awesomely clear. The temperatures weren't too extremely cold, about 50 degrees.

The event started with the setup of the telescopes. The public was joining the setup, and Earl had a 6" PVCC scope for which he was setting up to help with the 4 boys from Bookmans who needed to view Jupiter and it's moons and track the path of

the moons around Jupiter. Tim, with his scope, assisted with showing Ben, who was the only one of the 4 boys that showed up at the event, Jupiter through his scope. Bob and Darlene had brought their laptops and were using them to show the path the moons take around Jupiter. I believe we helped Ben with his project.

The attending scopes that needed help, one young boy, Jack, near the end of the event, came indoors and asked a bunch of questions about telescopes. He is thinking of purchasing a 100mm telescope and we explained a bit about how seeing works, and how light gathering works, and we talked about viewing the Moon.

Attendance by the RSVP's was: Marcia Cunningham + 1 with a Celestron Powerseeker 70, Rebecca Damian & Jack with the Powerseeker 114AZ, Jim Mckown who

brought in his Celestron CPC 1100 GPS Goto, for which it needed to be collimated. Bob assisted with this scope in trying to collimate it by eye. Very impressive scope. And Amy McNair +1 and an unknown scope at the time of RSVP.

I'd say the event was a success, with a lot of great information shared about scopes and viewing. Mike Marron had a crowd around his Meteorites the whole night. We were done about 9pm, when the crowd left. Many thanks to Jenny for supplying use of G-147 and the Dome area for this event. Many thanks to the many PAS members who attended and helped out.

**Rebecca Damian** writes: Jack said "I loved it. I enjoyed it very much." We'll be there for the next one in February. Thank you.§

# Cholla Middle School Star Party Jan 30

By Terri, Event Coordinator for PAS

Cholla Middle School was holding a Curriculum Event and included PAS as part of the event. We arrived at 5pm for set up and food from Jason's Deli. The food was great, many thanks to the Cholla PTA for providing it. Our Contact Paul Vachon, a 7th Grade Teacher there at Cholla, helped the whole night. I was amazed at his energy levels. He maintained the food traffic, talked about the night sky, and was really an awesome person to do this event for. Thank you Paul, for having us at your event.

In attendance from PAS was William Finch with his 10" scope, Terri Finch with her 8" scope, and Eric Steinberg with his 22" scope. Helpers were Earl DeLong and Ora Steinberg. Eric and Ora were awesome with foot traffic control and handouts. I had brought some February star charts and Paul provided me with a bunch more, that were January star charts, and the pile was very minimal by the end of the night. Earl passed them out for us. Ora had the position of passing out, to every child, a Space Place post card for which I had stamped the PAS Stamp on the back of and I talked about how they could go to our website & attend other free astronomy events like this one.

What is a curriculum event? Paul ex-

plained that it was an event in which each department of the school was sharing what they plan to do with the kids of that school, as far as curriculum goes. So, each department, each building had an event in it and the attendees were to go from building to building learning about the curriculum. It seems to me that only the very interested in astronomy people were at our telescopes, because I saw people wandering around the campus, attending the indoor portions, but not visiting our scopes. There were probably more than the 250 we saw in attendance, at this event.

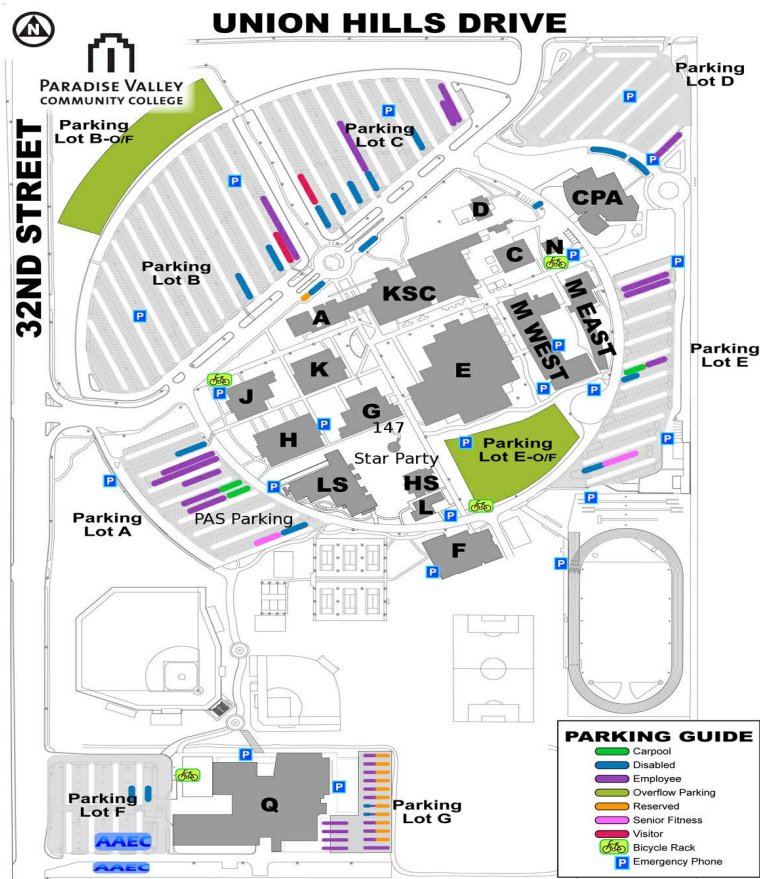
The night was clear, but we had building lights to deal with. Orion Nebula and Jupiter were the main objects. The temperatures were a bit chilly, like 60 degrees or lower. There were people there without jackets. Between the three scopes, we had those 2 objects in view all night long. The line to William's scope and Eric's scope was unending. We estimate a minimum of 250 in attendance, plus we had teachers and custodians looking through the scopes at the end of the event. The event was scheduled from 6pm to 8pm, but it wasn't dark enough to do anything at the beginning. Jupiter became the main item for at least a ½ hour, then Orion came into view. So, the first few

people to look through the scopes, saw only Jupiter, but they saw it in 3 different ways. I know Eric zoomed in on it, and I used a filter to bring out the banding. William used my Zoom eyepiece to bring it in closer, too. He said it was too bright and put a filter on to dim it down. The event went to 8:30, which was good because it gave us an hour of dark. Dark wasn't until 7:15 this night.

This event included the nearby grade schools, so we had kids and parents of all ages. They had this book they needed signed. I wrote Paul an email and told him to remind me to bring the PAS stamp next time, so I can stamp the books rather than having Ora and Paul sign them. Everyone who attended was so intrigued and interested, it was really nice to have that kind of crowd. Many thanks to Paul for having us at this event. Many thanks to William, Earl, Ora and Eric for joining me in doing this event. We are looking to set up another event with Paul maybe for Comet Ison in Dec 2013. If you want to attend, sign up as soon as the event is posted to the site. I mentioned to Paul a 4th scope might have been nice due to the crowd we had at this one. Awesome event. Hope to do more of them at this school.

## 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

March 2013

| Sunday                                      | Monday | Tuesday                                       | Wednesday                                     | Thursday                                  | Friday                                         | Saturday                                                |
|---------------------------------------------|--------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------|------------------------------------------------|---------------------------------------------------------|
|                                             |        |                                               |                                               |                                           | 1                                              | 2                                                       |
| 3<br>Telescope Workshop<br>3:30pm to 5:30pm | 4      | 5<br>CTCA (Private)                           | 6                                             | 7<br>PAS Meeting 7pm to 10pm              | 8<br>Star Party (Private)<br>Potluck 5:30pm    | 9<br>Night Sky Training<br>Event (Private)<br>4:30pm    |
| 10                                          | 11     | 12<br>Best evening view<br>of Comet Panstarrs | 13<br>Best evening view<br>of Comet Panstarrs | 14                                        | 15<br>N. Scottsdale Private<br>star Party 7:30 | 16<br>Messier Marathon in<br>Carefree Potluck<br>4:30pm |
| 17<br>St. Patrick's Day                     | 18     | 19<br>CTCA (Private)<br>Back Up Date          | 20                                            | 21<br>Telescope Workshop<br>7pm to 10pm   | 22                                             | 23                                                      |
| 24                                          | 25     | 26                                            | 27                                            | 28<br>Meeting of the<br>Minds - Be there. | 29                                             | 30                                                      |
| 31<br>Easter Sunday                         |        |                                               |                                               |                                           |                                                |                                                         |

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To:

## 2013 PAS GUEST SPEAKER LINE-UP

By Terri, Event Coordinator [Events@pasaz.org](mailto:Events@pasaz.org)

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

**Apr 4: Chet Schuler** "Filters for use on Telescopes."

**May 2: Paul Wieland** "Space is not just a vacuum."

**Sept 5: Members Night §**

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## What's Up For March

By Rod Sutter, PAS Past President

| Name           | Date            | Rise         | Set          |
|----------------|-----------------|--------------|--------------|
| Mercury        | 03-15-12        | 05:41        | 17:03        |
| Venus          | 03-15-12        | 06:37        | 18:17        |
| Mars           | 03-15-12        | 07:02        | 17:17        |
| <b>Jupiter</b> | <b>03-15-12</b> | <b>10:23</b> | <b>00:30</b> |
| Saturn         | 03-15-12        | 22:01        | 09:21        |
| <b>Uranus</b>  | <b>03-15-12</b> | <b>09:01</b> | <b>19:31</b> |
| Neptune        | 03-15-12        | 05:55        | 16:50        |
| Pluto          | 03-15-12        | 02:35        | 12:51        |

All Times Arizona Time

Planets in bold are visible during evening hours.

March 15 2012

Sunrise: 06:38

Sunset: 18:37



Q3: March 4



New: March 11



Q1: March 19



Full: March 27