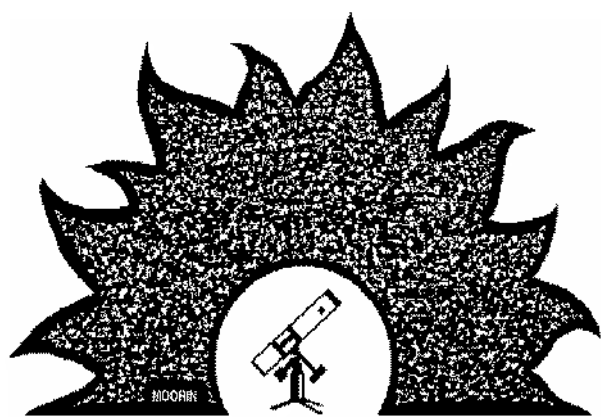




PAStimes

Phoenix Astronomical Society
www.pasaz.org

November 2014
Volume 66 Issue 3

PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Next PAS Meeting November 6

By Terri, Event Coordinator

At the November PAS Meeting we will have a superb Guest Speaker returning to us at the request of several PAS members. David always does a fantastic presentation, so bring a friend and a snack to share. Bottled water will be provided by

President Bruce. BYO, if water isn't what you wish to drink during the meeting. If you can not bring a snack to share, please donate some change, or \$1 to the snack fund.

It will be great a meeting. Remember that for this whole PAS Season (which runs with the grade school seasons of Sept to May), all meetings including PAS Meetings, MOM's, and Mike's Lectures are in Room LS-205. See you there!§

David A. Williams: A Short Biography

Dr. David A. Williams is an Associate Research Professor in the School of Earth and Space Exploration at Arizona State University, Tempe, Arizona. Dr. Williams is the Director of the Ronald Greeley Center for Planetary Studies, the NASA Regional Planetary Information Facility at ASU and the Director of the NASA Planetary Aeolian Laboratory at the Ames Research Center in California. David is currently performing research in volcanology and planetary geology, with a focus on

planetary mapping, geochemical, and remote sensing studies. He was involved with NASA's Magellan Mission to Venus and Galileo Mission to Jupiter, is a Co-Investigator on the European Space Agency's Mars Express orbiter mission, and a Science Team member on NASA's Dawn Mission to asteroid Vesta and dwarf planet Ceres. In 2014 David was elected to become a Fellow of the Geological Society of America; in 2014 asteroid 10,461 DAWilliams was named in his honor. §



Photo provided by David Williams

October PAS Meeting

By Terri, Event Coordinator

WOW! If you missed this meeting, you missed a GREAT one. Our Guest Speaker, Marc Murison came to us from the U.S. Naval Observatory in Flagstaff to tell us what they do there.

We opened this meeting at 7:30 and at 7:35pm, gave the floor to Marc. His presentation ran until 9:50pm, at which time he opened it up for Q&A. Many of the members departed about 10:10pm, but after the close of the meeting, a number of other members stayed to talk with Marc until the clean up crew arrived about 10:45. We continued our conversations out in the

parking lot until about 11:20pm. Marc, you are awesome!

So, what did Marc tell us? This was an introduction to what the Naval Observatory does and how important it is to all facets of life. Many members asked me to ask Marc to return for another presentation, and I have that planned.

Thanks to everyone who brought snacks to share and who donated to the snack fund. Water was provided by President Bruce. It was a fantastic meeting! Hope to see you at the next one!§



Marc Murison came down from Flagstaff to share what goes on at the Naval Observatory and how important, what they do, is to every day life. This was a most awesome presentation! Photo by Don Boyd

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November Upcoming PAS Events

By Terri, Event Coordinator, RSVP to Events@pasaz.org

RSVP to Events@pasaz.org

Nov 5: Taurids Meteor Shower Peak - 5 days before to 5 days after the Peak date of a Meteor Shower, you can see lots of Meteors. The Peak is best viewed the morning of, anytime after midnight.

Nov 6: PAS Meeting in Room LS-205, Doors open at 7pm, Meeting starts at 7:30pm. Read about the Guest Speaker on page 1 in this issue. Everyone welcome. Bottled water provided by President Bruce. Bring a snack to share.

Nov 9: Free Telescope Workshop at Bookmans 19th Ave and Northern in Phoenix, 3:30pm to 5:30pm. RSVP is required with Terri. When you RSVP, email the Make and Model of the telescope you need assistance with. We also assist with suggestions and advice on what telescope to purchase to do what you wish to do with it.

Nov 12: CTCA Private Star Party - PAStimes Star Tour Members Only

Nov 13: PVCC FREE Telescope Workshop at PVCC Main campus 32nd Street and Union Hills Rd 7pm to 10pm with Public Star Party.. RSVP is required with Terri Events@pasaz.org. When you RSVP, please leave your first name, and the make and model of your telescope. Bring your telescope and accessories to this event. We meet in G-147 and by the Telescope Dome on campus.

Nov 14: School Star Party (Private) - PAStimes Star Tour Members Only. PAS Member Volunteers welcome. RSVP by 2 days prior to event.

Nov 17: Leonids Meteor Shower Peak - 5 days before to 5 days after the Peak date of a Meteor Shower, you can see lots of Meteors. The Peak is best viewed the morning of, anytime after midnight.

Nov 18: School Star Party (Private) - PAStimes Star Tour Members Only. PAS Member Volunteers welcome. RSVP by 2

days prior to event.

Nov 20: Public Astronomy Lecture at PVCC Main Campus in room LS-205. Set up is 6:40pm, Lecture begins at 7pm. Please hold your questions to the end of the presentation. Everyone welcome. Bring a snack to share. Bottled water provided by President Bruce. This lecture is being recorded. The next lecture done by Mike Marron will be on Dec 11th.

Nov 21: School Star Party (Private) - PAStimes Star Tour Members Only. PAS Member Volunteers welcome. RSVP by 2 days prior to event.

Nov 26: Back up date for CTCA on Nov 12.

Nov 28: PAS at DBG Luminaria - Luminaria is a public event at the Desert Botanical Gardens and there is a fee to attend. Contact DBG for more details.

Nov 29: PAS at DBG Luminaria §

Dinner prior to the Oct 2 PAS Meeting

By Terri, Event Coordinator

Attendance at this dinner was amazing! We had Marc Murison, the PAS Guest Speaker for the night. William and Terri Finch, Darlene Ahlefeld, Jerry Belcher, Matt Kohl, Jay Standifer, Mike Marron, Alex and Diane Vrenios, Ed, Bette and Bruce Wurst, and Ora Kurland in attendance. Dinner was pretty good, but some of us feel it is too expensive for a monthly get together before the meeting, so for next month, we are considering a different loca-

tion. There is a discussion about this going on in the PASMmembers listserv. William, Terri, Darlene, and Marc arrived around 4:30pm to make sure the table was set up, though Deer Valley Airport Restaurant was all ready for us. We had a great dinner and then the fun began: we left the restaurant with Marc (who is not familiar with Phoenix at all) following us to the meeting. At a light, as we got on the 101 we lost Marc! From there it was a very "interesting" time

getting hooked back up with him to direct him to the meeting location and then to the room. We did it, but it was very entertaining. I hope Marc took it well, as he was probably feeling a bit frustrated. Marc, we do apologize. For future reference, I will ride with anyone coming from outside of Phoenix who doesn't know the area. In any case, the antics of the evening did not mess up the great meeting we had. Thanks again Marc!§

Mercury Facts

Provided by Matt Kohl

Most Mercurian craters are named after famous writers and artists. According to IAU rules, all new craters must be named after an artist that was famous for more than

fifty years, and dead for more than three years, before the date they are named. Johann Sebastian Bach, Ludwig van Beethoven, Salvador Dali, Charles Dick-

ens, Ernest Hemingway, John Lennon, Pablo Picasso, J. R. R. Tolkien & Vincent van Gogh are just a few of over 200 people that have had craters named for them.

Astronomy Lectures: Nov 20 and Dec 11

Lectures are in Room LS-205 and begin at 7pm

By Terri, Event Coordinator, Lecture descriptions provided by Mike Marron.

Everyone welcome! Mike Marron will be doing two lectures that will be held at PVCC Main Campus, 18401 N 32nd Street, Phoenix AZ 85032 in Room LS-205. Set up will be at 6:40pm. Lectures begin after a few short announcements at 7pm and are expected to run to 9:45 when we will open it up to Q&A. The Lectures are being recorded, so please hold your questions until the end of the presentation. Bring a snack to share and bottled water will be provided by President Bruce. If you wish to have a

different drink, BYO.

On **November 20, 2014**: Earth Shattering Evolution covers the formation of the solar system from the Herbig-Haro jet that condensed into the sun, gas giant planets, their moons, the trans-Neptunian objects and our comets through 4.6 billion years of major impacts that grew the solid planets and moons. This lecture has the most detailed explanations that you will ever encounter for how the sun and planets were formed.

On **Dec 11, 2014**: Tails of Plasma covers the lives of Population I and II stars and their jets. The surprising origins of various galactic types such as dwarf, spiral, and elliptical galaxies can be read in the jets they made. Malin-type dark galaxies reveal the hidden secrets of an older universe that has much more mass than can be accounted for by bright galaxies. This lecture has the most detailed explanations you will ever encounter for how stars and galaxies are born and evolve.§

Year in Space Calendar Orders

By Terri, Event Coordinator

Terri will be collecting monies for the Year in Space Calendar orders. The Calendars available can be seen at <http://yearinspace.com/> - we will be ordering the Desk Calendars and the Wall Calendars. To get in on this order, you must pay in cash for your calendars by the deadline of Nov 15 so that we receive the calendars in time for delivery to you at the December PAS Meeting. There are many events be-

tween now and Nov 15 to catch me at. Put your order in by email, but pay for it in person, please.

I notice the pricing has gone up by \$1 this year. 1 Calendar order is now \$14, 2+ Calendars are \$13, and 10+ Calendars are \$12. Most years we meet the 10+ order, but just in case we do not make it to 10 calendars this year, I am collecting \$13 per cal-

endar, and will reimburse you \$1 if we make it to 10+ calendars ordered. We would love to have your Calendar order.

These are terrific Calendars. I have enjoyed owning both the desk calendar and the wall calendar for many years. When you place your order, be sure to let me know which one you are ordering, or both. They make great gifts for the holidays.§

Meetup.com 1 Month Review

By Howard Moneta

Hi everyone. The next four public events are all posted on meetup.com. If you feel so inclined, please RSVP "yes" for the events that you are planning to attend - we figure that the events will look more exciting to the public if they have some RSVPs.

Choosing to RSVP on meetup.com is completely up to you. RSVP on meetup.com should be in addition to, not instead of, your normal PAS website RSVP.

The Meetup.com site is an experiment to see if we find value in continuing to maintain the group beyond our initial six

month period. Our Facebook, Twitter, and Meetup announcements are viewed by a different audience than other types of outreach. Events that are posted on meetup.com are announced through email to everyone who joins the group and if people RSVP "yes" on the site, they will receive a reminder email prior to the event. It will take some time to build the user base but it seems promising. We have gained 25 subscribers in the month that it has been active. The best thing that we can do is keep posting events, adding our RSVPs and then

putting on a good show for the people who attend. Remember, meetup.com is one more way that we advertise the club.

We had one public RSVP to the Bookmans solar event a couple of weeks back with a positive review posted by the attendee on the meetup site. The BMC star party this Thursday has four public RSVPs so far.

<http://www.meetup.com/Phoenix-AstronomicalSociety/>

Let me know if you have questions, thoughts, or ideas.

Membership Dues for PAS

By Terri, Event Coordinator

A quick reminder... if you haven't taken care of your 2015 Membership Dues, please do it at the next several events because once Dec 31 gets here, you will be removed from all the access you have to the Private info on the Calendar, the Roster, the SIGs and other fun stuff exclusive to PAS Members. If you are unsure if your Mem-

bership has been paid up, drop Terri or Mike an email to find out. Also, if you paid your 2015 Membership and didn't get some form of confirmation, email or receipt, check the Roster or with Mike or Terri. We want our PAS Members to stay current - PAS doesn't run on friendship alone and we of course have expenses - your Mem-

bership Dues pay for your portion of them. Here's the link to the Current PAS Roster: <http://www.pasaz.org/forums/downloads.php?do=file&id=48>. It is current as of the date on the file, and the upload date. Thank you all for continuing to support PAS and enjoy the benefits of being a PAS Member.

Arizona Sky

By Leah Sapir

This year and next year – 2014 and 2015 – are great years for anyone who likes lunar eclipses. And who doesn't? ;) On April 15 and October 8, we saw the first two in a series of four consecutive total lunar eclipses. The two remaining eclipses of this tetrad will be coming up on April 4 and September 28, 2015.

On the average, there are two to four lunar eclipses (and two to five solar eclipses) every year, though not all of them are total. A series of four consecutive total lunar eclipses is rare, but does happen from time to time. The next such tetrad will occur in 2032-2033.

A lunar eclipse can take place only during a full moon, when the sun is on one side of the Earth and the moon is on the other, and the moon can pass through the Earth's shadow. Similarly, a solar eclipse can take place only during a new moon, when the moon can pass between the Earth and the sun.

The Earth's shadow has two parts: the darker umbra, surrounded by the fainter penumbra. In a total lunar eclipse, the moon passes through both parts: first the penumbra, then the umbra, then out again through the penumbra. During the penumbral stages, the Earth's shadow on the moon is barely visible. But as the moon enters the umbra, it darkens as if it is going through its phases; the shadowed part that has already entered the umbra looks almost black in comparison with the brighter portion that is still only in the penumbra. Then, when the whole moon has entered the umbra, the moon suddenly glows with a reddish or golden light. This is because the only light reaching the moon at that time is the light that has been refracted around the edge of the Earth by the Earth's atmosphere – the reddish light of of sunrises and sunsets around the world.

Besides total eclipses, there are two other type of lunar eclipses: partial and penumbral. In a penumbral eclipse, the moon passes only through the penumbra and does not enter the umbra at all. This type is hardly noticeable. In a partial eclipse, only part of the moon enters the umbra. That part of the

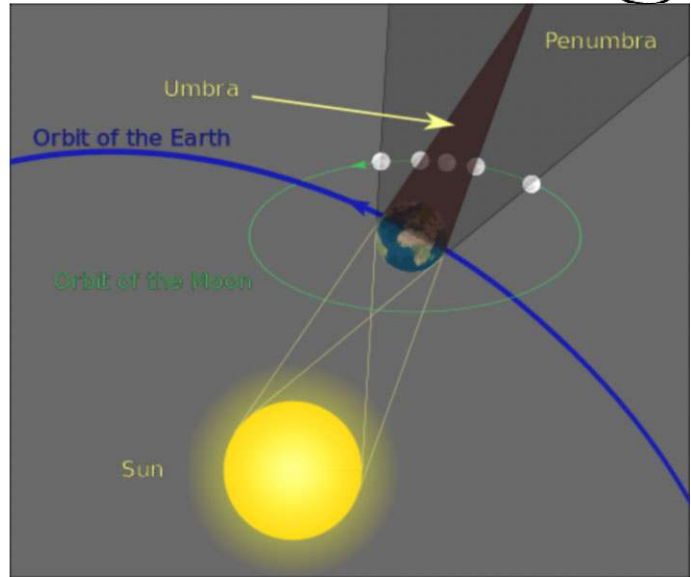
moon will be darkened, but the moon will not reach a stage where it glows red; that only happens when the whole moon passes through the umbra.

Since the moon regularly orbits the Earth every month, we may wonder why there are only about two eclipses of each kind every year, instead of two eclipses a month, with a lunar eclipse at every full moon and a solar eclipse at every new moon.

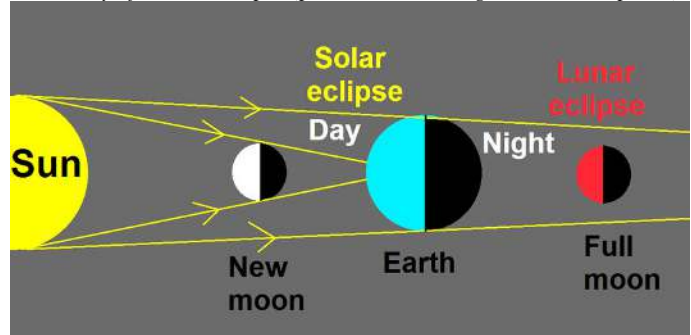
The reason is that the plane of the moon's orbit is tilted slightly (by about 5 degrees) relative to the plane of the Earth's orbit. This is true of all objects in the solar system – although they all orbit in approximately the same plane, the exact plane of each orbit is slightly tilted relative to each of the others.

The plane of the Earth's orbit around the sun is called the "ecliptic" (because this is where eclipses take place). From our point of view, looking up at the sky, the ecliptic is the part of our sky where the sun, moon and planets are generally found. So on the one hand, when three or more planets are visible at the same time, we can often see them spread across the sky in a relatively straight line along the ecliptic. But due to the slight tilt of each orbital plane, they are not exactly in a straight line. We can see this when they are close together in the sky. Although sometimes they might be in a row, we might sometimes see them instead side-by-side, or the three planets can form a triangle.

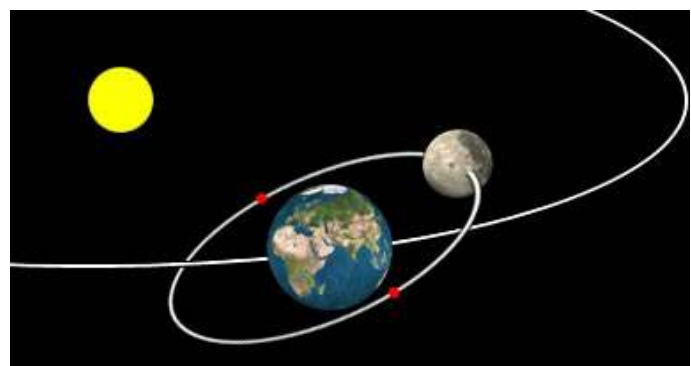
This slight tilt of one orbital plane relative to another is also the reason that transits of Venus or Mercury happen only



Geometry of a lunar eclipse (picture credit: Sagredo and wikipedia)



Solar eclipse vs lunar eclipse (picture credit: Tomruen and wikipedia)



Lunar nodes: the two nodes, where the plane of the moon's orbit intersects the ecliptic (plane of the Earth's orbit), are shown in red. (picture credit: Lee Green, Twin City Amateur Astronomers)

occasionally (about twice in 120 years for Venus, and about once in 10 years for Mercury) rather than once in every orbit.

For any two orbital planes (e.g., the plane of Earth's orbit around the sun, and the plane of the moon's orbit around the Earth) there are two points where the orbits intersect. These two points are called the "nodes"; and we can see a lunar eclipse only if the moon passes through one of



Arizona Sky

these nodes when it is in the full moon phase. At that point the sun, Earth and moon are all lined up in a straight line and the moon will pass through the Earth's shadow, rather than slightly above or below it. Since the Earth is so much larger than the moon (and casts a large shadow), the eclipse will be visible from the whole nighttime side of the Earth.

Similarly, we will see a solar eclipse if the moon passes through one of the nodes when it is in the new moon phase. Since the

new moon and full moon phases are only two weeks apart, lunar and solar eclipses tend to come in pairs; there will usually be a solar eclipse either two weeks before or two weeks after a lunar eclipse, because the moon will still be pretty close to a node at that time. For example, there was a partial solar eclipse on October 23, two weeks after the lunar eclipse. In Phoenix only 33% of the sun was covered by the moon on October 23; the maximum eclipse, in the eastern US and Canada, was about 80%.

Since the moon casts a much smaller shadow than the Earth, a solar eclipse is visible only in a small area where the moon's shadow travels over the Earth's surface. Areas close to the path of the moon's shadow will see a partial eclipse.

Fun factoid: the situation of three celestial objects in a straight line, as in an eclipse, has a special name – syzygy (pronounced “siz-a-jee”). Try saying that ten times fast, and impress your friends!§

PAS Swap Meet in December

By Terri, Event Coordinator

PAS Members: PAS holds a yearly Astronomy Swap Meet which is coming up on December 4 at the PAS Meeting. It would be awesome to have your items put into the December Newsletter, prior to the swap meet, to hopefully help you sell them off quickly. Please consider sending me an email (Events@pasaz.org) with a small de-

scription of your item(s) for sale and we will put it into an article to get attention in the December Newsletter. Your deadline to get this list to me will be November 15, so start thinking about it now. In the past, some great items have been sold. You can also bring your items to the Swap Meet even if you don't make the deadline to post

them in the newsletter. The Newsletter is just one more way to get those items listed and out to the purchasing public! Remember, I also send these items out to a public list of over 475 email addresses. Send me those items, today!

The Lunar Eclipse of April 14, 2014

By Alex Vrenios

I knew the eclipse was coming for a while now. While I had my doubts about it being a clear night, I started preparing for the event a few days ago - thought experiments, mostly.

My Nikon D700 (a birthday gift from my wonderful wife, Diane), was chosen as my bridge to “digital,” replacing my old Nikon F film camera. It supported all the old Nikkor AI lenses that I've managed to accumulate over the last four decades. It was new enough to allow a full-frame exposure but not so new as to distract me with HD video capabilities. But I digress.

My 500mm fixed aperture f/8 seemed the right choice of lens. I could mount this all on a tripod and set the self-timer to ensure a sharp image. I decided to take one shot of the bright, full moon and three partially eclipsed moons, one each at 1/4, half and 3/4s obscured. Then I could add a final shot at totality to the mix and design some sort of a montage as the final commemorative image. (It all seemed so simple - a thought experiment, remember.)

It was almost 10PM now and I checked and rechecked my time calculations just to be sure I knew when to make each shot. I set up the camera and tripod early for a test

shot of the full moon. When you use an older lens on this camera you have to focus manually and set the exposure to aperture-priority. I did that and got a badly overexposed image. I selected a different exposure matrix and took another shot. Again, it was badly overexposed. It was getting close to the eclipse start time and I was getting nervous. Then it occurred to me that I could switch to Manual mode and I'd get the exposure right after a few quick tries. That worked, so I left it on manual for the duration.

The first two semi-obscured moon shots went smoothly, but the next shot was just too high up for the tripod. Something was not holding tight enough so I got out a smaller, lighter tripod which seemed to align properly right away and I got the shot. It worked for the final, totality shot too, but lying on my back on the patio bricks made it difficult to align. I said a few magic words and I finally got what I wanted. I imported them



all into my photo sorter/editor, made a few minor exposure tweaks and let it all rest until I could figure out how to combine them all into one final image.

It was a successful night, in spite of the pitfalls though if I had it to do all over again I would have mounted the camera and lens on my telescope and set it to track the moon; 20-20 hindsight. §

Lunar Eclipse

from Wikipedia, Provided by Matt Kohl

On April 15, 2014, the moon passed through the southern part of the Earth's umbral shadow. It was visible over most of the Western Hemisphere, including east Australia, New Zealand, the Pacific ocean, and the Americas. In the western Pacific, the first half of the eclipse occurred before moonrise. In Europe and Africa, the eclipse began just before moonset. Mars, which had just passed its opposition, appeared at magnitude -1.5 about 9.5° northwest of the moon. Spica was 2° to the west, while Arcturus was 32° north. Saturn was 26° east and Antares 44° southeast.

The moon entered Earth's penumbral shadow at 4:54 UTC and the umbral shadow at 5:58. Totality lasted for 1 hour 18

minutes, from 7:07 to 8:25. The moment of greatest eclipse occurred at 7:47. At that point, the Moon's zenith was approximately 3,000 kilometres (1,900 mi) southwest of the Galapagos Islands. The moon left the umbra shadow at 9:33 and the penumbra shadow at 10:38.

The peak umbral magnitude was 1.2907, at which moment the northern part of the moon was 1.7 arc-minutes south of the center of Earth's shadow, while the southern part was 40.0 arc-minutes from center. The gamma of the eclipse was -0.3017.

The eclipse was a member of Lunar Saros 122. It was the 56th such eclipse.

The April 15 eclipse is the first eclipse in a tetrad; that is, four consecutive total eclipses with no partial eclipses in between. There will be one eclipse every six lunar cycles during the tetrad - on October 8, 2014, April 4, 2015, and September 28, 2015. The lunar year series repeats after 12 cycles, or 354 days, causing a date shift when compared to the solar calendar. This shift means the Earth's shadow will move about 11 degrees west in each subsequent eclipse.

This tetrad started during the ascending node of the Moon's orbit. It is the first tetrad since the 2003–04 series, which started in May. The next series will be from 2032 to 2033, starting in April. §

Lunar Eclipse of Apr 15 2014

By Terri Finch

I had a very interesting evening with my friends who live in my townhome complex. The eclipse began at 11pm on Apr 14 with totality from 12:17am to 1:15am. When totality ended and the Moon started showing light on one edge, Liz Lopez and I gave up and went to bed. William couldn't stay up that night, as he had to work the next day. Many thanks to Liz for lending me her camera to take the photos seen in this newsletter and in the PAS Photo Gallery.

In the beginning, Liz and I set up chairs right outside our adjoining units. Julie joined us on and off, but couldn't stay for the whole time. After fighting the lights of the complex for about 45 minutes, we moved to the grassy area by the pool for a better view.

That's when things got really good. As the eclipse progressed, I shot a few photos with my digital camera and cell phone but neither of those cameras did any good. Liz was too shaky to take the photos, so she handed me her camera and I got 4 very good photos out of the 36 or so I took during the eclipse.

It was an awesome evening - one to remember. The temperature was comfortable with a light jacket, and the company (Liz) was delightful. Looking forward to the next Lunar Eclipse we can see from Phoenix. I've viewed other lunar eclipses, but this was my first successfully photographed one. The Lunar Eclipse photos

from our members, some are in this Newsletter, while all that were submitted, are in the PAS Photo Gallery:

http://www.pasaz.org/forums/gallery.php?g2_itemId=14208&g2_GALLERYSID=d1a656e4c6a63ff73637264f2b1e871. Please Enjoy!



Lunar Eclipse of Apr 14 at Totality.
Photo by Terri Finch, borrowing Liz's camera.

Lunar Eclipse of Apr 14, 2014. I tried to capture this eclipse with my cell phone and with my digital camera, but neither were good enough to get a great photo. My Friend Liz Lopez was attending this event with me and lent me her camera. Thank you Liz. Photo by Terri.





Photo taken by Beth Myers.

Copyright ©2014 Beth Myers



Photo taken by Yves Klein



Photo by Yves Klein: "I took these pictures with my 11" telescope and Atik 460EX and Hyperstar from Starizona. The exposure time was around 0.001 and 0.005 Seconds."



Eclipse of April 2014 over Byron Power Plant. The moon has been "enhanced" by the photographer, thus it is best to call it an illustration and not a photo. Image provided by Paul Dempsey via Earl DeLong.



National Aeronautics and
Space Administration



Where does the sun's energy come from?

Every 1.5 millionths of a second, the sun releases more energy than all humans consume in an entire year. Its heat influences the environments of all the planets, dwarf planets, moons, asteroids, and comets in our solar system.

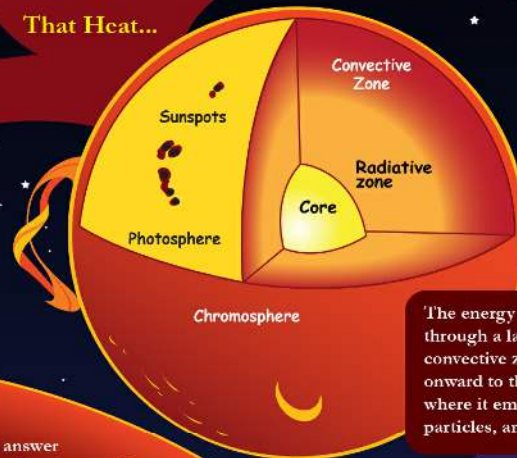
And that light travels far out into the cosmos—just one star among billions and billions.

Create a 'solar wind' that pushes against the fabric of interstellar space billions of miles away.

Allows gases and liquids to exist on many planets and moons, and causes icy comets to form fiery halos.

Powers the chemical reactions that make life possible on Earth.

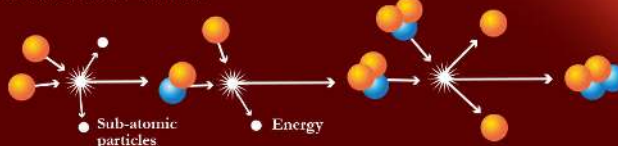
That Heat...



The energy travels outward through a large area called the convective zone. Then it travels onward to the photosphere, where it emits heat, charged particles, and light.

How does a big ball of hydrogen create all that heat? The short answer is that it is big. If it were smaller, it would be just be a sphere of hydrogen, like Jupiter. But the sun is much bigger than Jupiter. It would take 433,333 Jupiters to fill it up!

That's a lot of hydrogen. That means it's held together by a whole lot of gravity. And THAT means there is a whole lot of pressure inside of it. There is so much pressure that the hydrogen atoms collide with enough force that they literally meld into a new element—helium.



Nuclear Fusion

This process—called nuclear fusion—releases energy while creating a chain reaction that allows it to occur over and over and over again. That energy builds up. It gets as hot as 15 million degrees Fahrenheit in the sun's core.

Space Place
in a Snap!

The Planets This Month

By Leah Sapir

Mars is still hanging around in our western sky after sunset, staying up till a little after 8:30 pm for much of the month. The red planet is still first-magnitude, but it is becoming smaller and more distant: only about 5 arc seconds in diameter, and about 160 million miles away (compared to 15 arc seconds in April, when it was 60 million miles away).

Uranus and Neptune are also evening stars, but we need a telescope to see them. Both are high in the southeast after sunset. Neptune sets around 2 am at the beginning of November and midnight at the end of the month; Uranus sets about three hours later.

Jupiter was a morning star last month,

but it is rising earlier and will start to enter our evening sky towards the end of November. It rises a little after midnight at the beginning of November, and around 11 pm at the end of the month.

Elusive Mercury will be visible as a morning star in the first half of November, rising around 5:30 am. During the first week of November it will even be visible for a bit in a dark sky before dawn. But by the middle of the month, Mercury will already be fading into the sunrise.

Saturn and Venus are too close to the sun to be visible this month; Saturn will start to return as a morning star next month, and Venus as an evening star.

One of this month's highlights is the annual Leonid meteor shower, expected to peak on the morning of November 17-18. Meteors will probably be visible a few nights before and after that date as well. The moon will be a waning crescent that won't interfere with meteor viewing - this should be a great opportunity to see some meteors. Get out your lawn chair, dress warmly and watch the sky after midnight!

The moon will be full on November 6, and the next new moon will be on November 22.

Wishing you clear skies and happy observing!§

25th Annual Flagstaff Festival of Science

By Sam Insana, PAS member

This event took place September 19-28, 2014 with over 80 programs and events, all free to the public. Some of the more interesting astronomy-related events included Lowell Observatory programs, the US Naval Observatory, NAU Observatory, Meteor Crater, Current Events in Robotic Exploration of the Solar System, Following the Water on Mars, and an Apollo astronaut

training site visit. Sam, Vera and Frank Insana were present for 3 days of the Festival. We attended the Lowell Observatory Open House, an update on all the Rover missions to Mars at the Museum of Northern Arizona, programs called "Volcanoes of the Solar System", "How Astronomy Influences the Calendar", "How to Use Computers and Electronic Sensing Devices

to Save Plants that are Going Extinct on our Planet", and 3 different programs on the Grand Canyon (to Frank's delight). The weather was beautiful for that last week in September, and we hiked Lockett Meadow to see the wildflowers and Inner Basin to see the many colors of the fall foliage. We recommend this festival to anyone interested in astronomy and other areas of science.

Cherry Road Star Party Sept 23

By Howard Moneta

On Tuesday afternoon, Eric Steinberg and Howard Moneta traveled up to Cherry Road in the Prescott National Forest, about 1.25 hours drive from Phoenix. We arrived an hour before dusk which gave us plenty of time to set up our equipment, eat our packed meals, and talk a little bit about what we planned to observe that evening. It was a beautiful clear night with the first stars beginning to appear around 6:45pm when the summer triangle (Vega, Deneb, and Altair), popped into view over head. To give an idea of what observing in a dark sky location means, the entire constellation of Scorpius was in sight before the sun had even fully set. The Milky Way was visible the entire night. It was so vivid that it looked like someone had taken a brush and painted a strip across the sky. I viewed my favorites such as the Andromeda Galaxy, the Hercules Cluster, The Wild Duck Cluster, and the Ring Nebula in extreme detail. Being at Cherry Road gave me a chance to see new things. Some of the objects I

viewed for the first time included the Swan Nebula, Lagoon Nebula, Trifid Nebula, Cat's-eye Nebula, Dumbbell Nebula, Eastern and Western Vail Nebulas, Neptune and its moon Triton, several beautiful globular and open clusters, and the Sculptor and Pinwheel galaxies. My favorite sight was the blinking effect from the Blinking Planetary Nebula. Because of the structure of the human eye, going from straight to averted vision causes the nebula around the center star to appear and disappear. At around 3 AM, I got up to look at Jupiter and the Orion Nebula, both were beautiful overhead.

At first light, Eric and I packed our telescopes into our cars and headed back to Phoenix. I got back into town just in time for the morning traffic - when I did finally get home, a nap was in order followed by this review.

Cherry Road is nearby and the views are out of this world. P.A.S. members, consider joining us on our next trip.

Eric adds: Though not as dark as Antennas, skies there are indeed beautiful and transparency tends to be excellent giving lots of definition for DSO's and a blazing Milky Way. Unfortunately, seeing was poor this evening so planetary viewing and planetary nebulae were not at their best. Looking great however were M33 (Pinwheel Galaxy), the Sculptor Galaxy (NGC 253) and the Helix Nebula (NGC 7293) which I had not observed before. Do go, but keep in mind that from October through April this site is COLD at night.

Sci-Fi Movie Trivia: Armageddon (1998)

Rockhound's line about sitting on a million pounds of fuel in a rocket built by the lowest bidder is a variation of an actual radio transmission by Mercury astronaut Alan Shepard, just prior to lift-off.

Telescope Workshop at PVCC Sept 25

By Terri, Event Coordinator

Many thanks to my telescope team members for this event: William and Terri Finch, Don Boyd, Rodney Fong, Mike Marron, Howard Moneta and Bob Senzer. In attendance, also was Jenny Weitz. Our Public RSVP was Sean Sarram, who brought his Orion Skyview 8" scope. We had a great session - Rodney, Howard, and Don helped Sean indoors for quite a while and then about 9pm, moved his scope outdoors to assist in finding some objects to align on. The sky was perfectly clear, though the trees in the area by the Telescope Dome on campus have definitely grown larger.

Many thanks to Sean for attending and making this a successful event with his questions and interest. Sean is the newest member of PAS- welcome, Sean!

Sean writes: Hi Terri, Just wanted to send a quick note to thank you and everyone for such warm welcome. I really enjoyed the meeting and learned so much in just one evening. Everyone was very kind, helpful and shared their knowledge freely. Looking forward to more educational evenings as I venture into this journey with my children. Thanks again. Sean Sarram



Rodney and Don assist Sean with his telescope at the PVCC Telescope Workshop of Sept 25. Photo by Terri

Orangewood Elementary School Star Party Oct 3

By Terri, Event Coordinator

An excellent viewing night was had by all. Attendance was probably about 200. The temperature was pleasant and the pizza, (provided by our contact, Dianna Bonney) was tasty and well appreciated. Many thanks to Dianna for inviting us to do this event again for her school.

In attendance from PAS were: William Finch with 10" Dob, Terri Finch with 8" SCT, handouts, and Q&A, Rick Cunningham with his 8", Kevin Witts with his 8", Don Boyd with his 8", Eric Steinberg with his 22" and Terry Dancer with his 5" refractor. Also attending were Mike Marron with his meteorites and Rodney Fong as a volunteer assistant.

Set up was 5:30, with event set to be from 6:30 to 9pm. The sky was mostly clear all night and the viewing was great considering the city location! About 8:45 we packed it in slightly early, as all the attendees had departed.

Indoors, the PTA was selling Moon Pies, Pizza, and other space-related snacks. Outside, we had the 6 scopes so I was really busy - even the Q&A fell to the side because so many were looking through my scope. Kevin brought an interesting demo in which

he had flour in an aluminum baking pan and marbles to drop into it with hot chocolate powder to show crater details. This was awesome, but messy. Kevin also had a huge magnetic board that had models of the planets stuck to it. He had groups of kids set up the solar system in the order of the planets from Sun to Pluto.

We showed many items, although I stayed on the Moon all night, and kept it red. I didn't have time to align my scope after initially finding the North Star so my alignment wasn't the greatest, but the Doctor (my scope) stayed on the Moon long enough that I didn't have to keep checking on it. I showed the whole Moon in the field of view.

Rick took the North Star and pointed out that you could see the companion around the North Star, if you looked carefully. This was a great idea.

Eric was kept busy showing the moon at high magnification, Uranus and Neptune; he really draws a crowd being the one with "The Cannon." Terry was also busy most of the evening as well. Overall, the evening flew by rather quickly because we really didn't have time to stop and think much.

Again, thanks to Dianna and Orangewood PTA for such a fine event. We are looking forward to doing this again next school year. And many thanks to my Telescope Team! They were definitely appreciated!



Kevin prepares his cratering demo, which was a great hit at this school. Photo by Terri Finch

Sci Fi Movie Trivia

Sci-Fi Movie Trivia: Armageddon (1998) - NASA shows this film during their management training program. New managers are given the task of trying to spot as many errors as possible. At least 168 have been found.

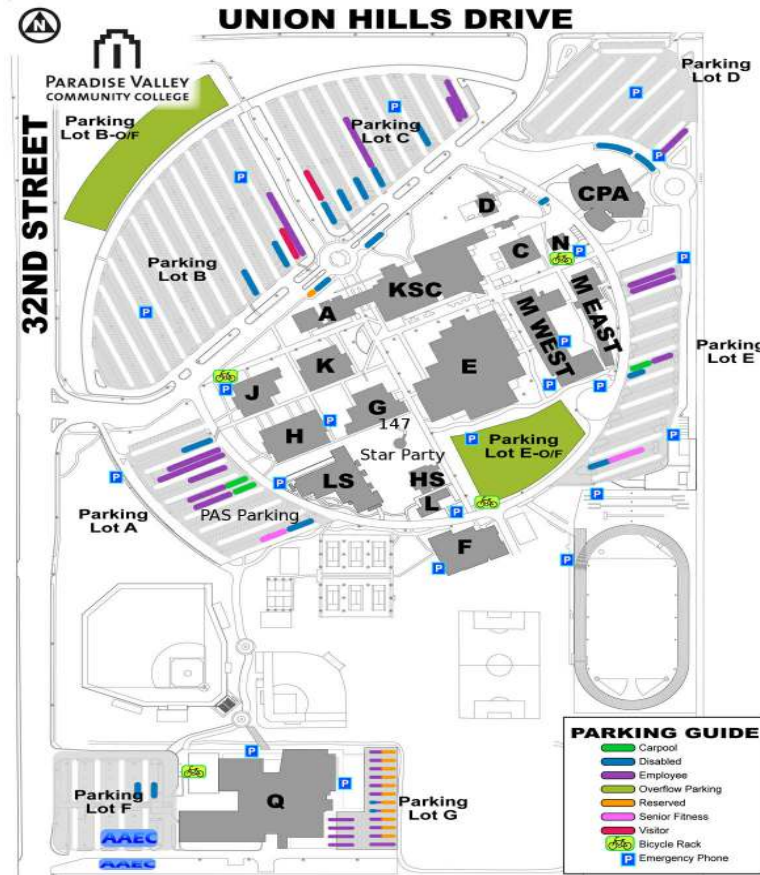
Sci-Fi Movie Trivia: Armageddon (1998) - Regarding the film's premise, Ben Affleck asked director Michael Bay, "Wouldn't it be easier for NASA to train astronauts how to drill rather than training drillers to be astronauts?" Bay told Affleck to shut up.

Map of PVCC Main Location

18401 N. 32nd Street | Phoenix, AZ 85032

Map of PVCC Black Mountain

34250 N. 60th Street | Scottsdale, AZ 85266



November 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4 Election Day	5 Taurids Meteor Shower	6 PAS Meeting	7	8
9 Telescope workshop	10	11	12 CTCA (Private)	13 Telescope Workshop	14 School Star Party (private)	15
16	17 Leonids Meteor Shower	18 School Star Party (Private)	19	20 Public Astronomy Lecture	21 School Star Party (private)	22
23	24	25	26 CTCA Back up (Private)	27 Thanksgiving Day	28 PAS at DBG Luminaria	29 PAS at DBG Luminaria
30						

Don Boyd
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To:

2014/2015 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.

Dec 4, 2014: Eric Steinberg: "When things go Boom! Novae, Supernovae & Their Remnants."

Jan 15, 2015: Roger Anzini: "Astro System Dobsonian "TeleKit"

Feb 5, 2015: Jeff Stillman: "Art of Astrophotography"

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What's Up For November?

By Rod Sutter, PAS Past President

Planets

Name	Date	Rise	Set
Mercury	11-15-14	05:50	16:48
Venus	11-15-14	07:23	17:42
Mars	11-15-14	11:03	20:50
Jupiter	11-15-14	23:48	13:17
Saturn	11-15-14	07:16	17:46
Uranus	11-15-14	15:31	04:02
Neptune	11-15-14	13:49	01:01
Pluto	11-15-14	10:42	20:51

All Times Arizona Time

November 15 2014

Sunrise: 06:59

Sunset: 17:25



Q1: October 30



Full: November 30



Q3: November 14



New: November 22

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