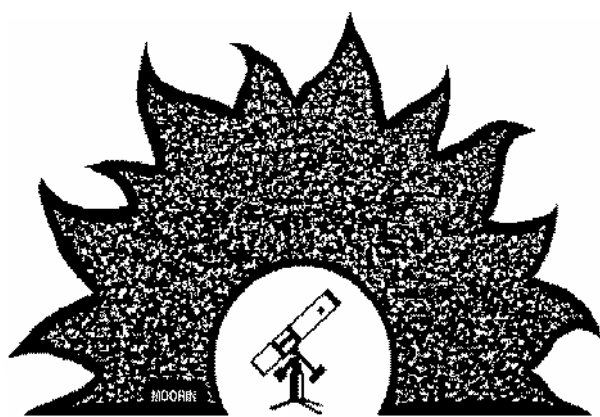




PAStimes

Phoenix Astronomical Society
www.pasaz.org

December 2007
Volume 60 Issue 4

PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Last meeting of 2007 to be December Sixth

The December meeting of PAS should be interesting. We have as our speaker Mr. Bobby McGehee. McGehee is a retired Physicist who has come up with what he calls the "New Universe Theory".

McGehee says on his website <http://www.newuniverstheory.com> "For many years I have pondered scientific discrepancies of the Big Bang theory. The "New Universe Theory with Laws of Physics" (NUT) was developed after NASA included on their APOD web site [1] the findings which prove the cool-down time for the dimmest, still observable, white dwarf stars in the M4 globular cluster have required at least 13 billion years [2]. White Dwarf stars are the remnants

of small, .9 to 1.44 Sol mass stars [3] which fuse hydrogen for as many as 10 billion years. Then they became 'Red Giant' stars to shrug off the outer layers of mass, and then they became white dwarfs with $\sim 1/2$ the mass of Sol and at about the diameter of earth. More massive stars (> 1.44 Sol) end their life as Neutron Stars, Quark Stars, or Black Holes.

This clearly demonstrates that some, if not most, faded White Dwarf star's ages add up to > 24 + billion years. Also, the universe existed for at least 2 star forming/fusion-lives/supernova generations before the M4 white dwarf progenitors. Yet, by the Big Bang backers own logic the BB can only be 13.7 billion years old [4]. The Universe had to have started several billion years earlier."



November 1st PAS Meeting Review

By Terri, VP

We had a very interesting meeting! Ross Tucker was scheduled to talk about one topic, earlier in the month. He then changed his planned topic when he sent the paragraph to Don for the newsletter. Then, when he arrived, we couldn't get his computer to get permission from the College to access the Internet, and the computer at the college in the Library wasn't being cooperative either, so he had to wing it. There were not many visuals, but Ross did a fantastic job!

The topic ended up to be Ham Radios and talking to the International Space Station. Ross did a great job of keeping the talk flowing. It was evident at times that he would have liked access to something visual but he covered very well. The first half of his talk was on Vacuum tubes and building a Radio Telescope. Thank you Ross for a very informative, unexpected presentation.

We had a very good turnout (see photos). Chet won 1/2 of the 50/50 raffle, which took in \$41 (Chet's share was \$20.50), Con-

gratulations Chet! Barbara brought the new \$3 Flashlights (see included photo) for which you can purchase from Barbara, Rod or Terri. The cost of purchasing the flashlights was figured into the cost we are selling them for. Our hope is to sell off all the flashlights at future star parties and any amount that comes in over the cost amount of the flashlights will reimburse PAS for the purchase of the new PAS bags for which we will be stuffing soon at a stuffing party to be our new Prize bags for Treasure Hunts (and a collection for the Girl Scout Troup in Mayer). I finally delivered the last purchased Pocket Sky Atlas to Olga. And I took in cash for the Year in Space Calendars. I did not get all the cash needed for the calendars, so the order is on hold.

Snack Fund: We took in \$1.36 this month. Last month was \$4.45 for which my Dad used \$5.76 of it to purchase water for the Nov PAS meeting. We have a balance of 5 cents towards Next month's snacks. So, since we have plenty of water (because my Dad is very good at getting great deals and purchased 2 for the price of 1 cases of water

this month), there will be NO SNACKS purchased by PAS. It is UP TO YOU to bring snacks to the December meeting. We will see you there! ***



Photo by Terri

Arizona Sky

By Leah Sapir

This month the summer triangle is fading off into the sunset, while the winter circle is coming into view. The fall constellations we discussed last month are still overhead, a little to the west of the zenith. But by mid-evening, and mid-month, the winter circle has made its appearance above the horizon.

Let's begin with Orion. The bright stars that make up Orion's belt, shoulders, and knees, are all giants and supergiants, at varying distances, and with actual luminosities varying from 1500 to 50,000 times that of the sun. The three stars of Orion's belt (Alnitak, Alnilam, and Mintaka) are blue giants about 1400 light years away. Rigel, the bright star forming Orion's right knee, is a blue supergiant about 700 light years away; and at the other corner, forming Orion's left shoulder, is Betelgeuse, a red supergiant around 400 light years away. Rigel is a very large young star, with a diameter as large as the orbit of Mercury, brightly burning its supply of hydrogen. But Betelgeuse is in the last stages of its life. It has begun to "cool down" and its outer layers have begun to expand to a diameter as large as the orbit of Mars.

The main attraction in Orion is the Orion nebula, a huge cloud of dust and gas, around 1400 light years away, surrounding the middle stars of Orion's sword. The nebula is easily visible through binoculars or a telescope. A telescope will also show us four young stars – the trapezium – that recently formed from the dust and gas of the nebula, and are lighting it up for us with their radiation. Additional young stars are forming in the nebula at this moment, but are still hidden by the dust and gas.

If we follow Orion's belt to the right, we arrive at reddish Aldebaran, at the top of the "V" forming the head of Taurus. Aldebaran is an orange giant star about 65 light years away, and about 120 times as luminous as the sun. An orange giant is a star that has already fused most of its hydrogen into helium, and is now busy fusing that helium into carbon. Eventually, when most of its helium has been fused into carbon and other heavy elements, it will become a red giant like Betelgeuse.

Most of the stars in the V-shaped head of Taurus, with the exception of Aldebaran, are part of a star cluster – the Hyades, about 150 light years away. The cluster includes about 100 bright stars and many more faint ones, all within a space of about 10 light

years. The naked-eye members that form the "V" are all orange giants, each one about 50 times as luminous as the sun.

If we continue in the same line as before, from Orion's belt through Aldebaran, we reach the Pleiades, almost overhead. The Pleiades are a beautiful cluster of bright young stars, about 400 light years away. Even with the naked eye we can see 5 or 6 members of the Pleiades, and through binoculars or a telescope we can see many more. Several of them are double or even quadruple stars.

If we follow Orion's belt to the left, we arrive at Sirius, near the horizon. Sirius is the brightest star in our sky. It is a white giant star, about 20 times as bright as the sun, and only 8.6 light years away. Sirius is not the closest star to us, but it's a respectable #7, after the sun, the alpha Centauri system, and a few dim stars that, despite their proximity to us, are so small that we need a telescope to see them.

With Betelgeuse at the center, we can now trace the winter circle – the brightest stars in the winter sky. We start with Aldebaran, and curve around through Rigel and Sirius. We then reach Procyon, a little to the east of Orion. When Orion is rising in the evening, Procyon will be near the horizon, below Orion and left of Sirius. A line from Bellatrix (Orion's right shoulder) through Betelgeuse, will point towards Procyon. Procyon is a light-yellow star similar to our sun but a little bigger and about 8 times as luminous. It is about 11 light years away.

Continuing the circle, we come to Pollux and Castor, the Gemini twins, a little north of Orion's head (i.e. to the left of Orion, as Orion is rising). A line going from Rigel through Betelgeuse will point towards Pollux and Castor. Pollux is an orange giant, 35 light years away, while Castor is a white giant about 50 light years away.

Of course, the brightest "star" in Gemini this month is somewhat closer. It is the planet Mars, currently in a position about halfway between Castor/Pollux and Orion. It's hard to miss – glowing a bright reddish-orange, it's even brighter than Sirius. Mars is currently at the closest point of its orbit, and is around 55 million miles away from us. We've been talking about the distances to the stars in light years. The distance of Mars is about 5 light-minutes. That is quite close, but it also means that there is a lag of 5 minutes each way when communicating with a space probe on or near Mars. It's the reason that the Mars rovers needed to be

completely independent, with robotic artificial intelligence – they couldn't wait 10 minutes for a round trip message from earth telling them: "Stop! Don't go over that cliiiiiff!"

Through a telescope, we should be able to see faint markings on Mars (representing different types of dust on the surface) and possibly one or both of Mars's polar ice caps. The "Mars Profiler" on the Sky and Telescope website (www.skypub.com) will show exactly which Mars features can be seen at any specific date and time.

Mars rises at around 7 pm at the beginning of December, 6 pm in mid month, and at the end of the month it is already partway up the sky when the sun sets.

Continuing our circle, we arrive at Capella, a little northwest of Orion. A line from Rigel through Bellatrix will point towards Capella, the "mama goat", which is accompanied by a small triangle of fainter stars, the "baby goats" – Epsilon, Eta, and Zeta Aurigae. Capella, about 45 light years away, is a yellow giant, similar to the sun, but larger. The three "baby goats" are quite different from each other: Epsilon is a white supergiant, about 2000 light years away; Eta is a blue giant, about 200 light years away, and Zeta is an orange giant about 800 light years away.

We complete our somewhat oval-shaped circle by returning to Aldebaran.

December also brings us the Geminid meteor shower. The peak is on the night of December 13, but some Geminid meteors can be seen from December 12 to 15. The moon will set by around 10 pm, leaving a nice dark sky for viewing. As with all meteor showers, the meteors are best seen after around 3 am, when we are on the "forward" side of the earth.

This month, Saturn is still in Leo. (It moves very slowly – about one zodiac constellation every two years, as it completes its 29-year cycle around the sun.) Saturn rises at midnight at the beginning of December, 11 pm in mid month, and 10 pm towards the end of the month. Venus starts out in Virgo, and is in Libra by the end of the month. It rises at 3:45 a.m. at the beginning of December, and 4:30 towards the end of the month. Jupiter and Mercury are too close to the sun to be seen.

Join us next month when we continue to explore the constellations of the winter circle. And till then – wishing you clear skies, and happy observing!

Presentations by PAS Members at Bookman's Telescope Accessories Workshops

Do you have a topic you'd like to share with the group at a Bookman's Accessories Workshop?

Chet just did a fantastic presentation on Oct 28th, at Bookman's about BEGINNING IMAGING. You should have attended.

He will have a follow up presentation on Dec 2nd, for ADVANCED IMAGING, and we hope to see you there. Chris will be joining him in this demo.

Mike has requested to do 2 topics, so I have given him the next possible dates for Telescope Accessories workshops, and they will be Feb 10th 2008 and May 25th 2008. As soon as he gives me the topics, I will make fliers for those events. We'd love to have your attendance.

We'd also love to have others who wish to share their topics, for future Bookman's workshops. If you wish to share, drop me an email with topic in mind, and

look on line at the Future Events for 2008 (there's a link at the bottom of the current Upcoming Events file on line) and let me know what date you would like to have.

We'd love to have you there with a presentation. I'm allowing 2 hours for presentation time, however, you do not need to do the full 2 hours. But, for those of you who talk longer, you are limited to 2 hours. ***

THIS YEAR'S PAS HOLIDAY SOCIAL

By Terri, Events Coordinator for PAS

You ask... Why does PAS hold a Holiday Social in January? Well, have you ever tried to hold a party during the month of December? If you didn't RSVP with everyone you were inviting a year in advance, they will have had every Saturday and Sunday and possibly Friday night filled with stuff to do, either to get ready for a party at their place, or to go to someone else's Holiday party.

Well, Dan Heim started this Holiday Social gathering. We thank Dan for the idea he sprouted. We don't do Christmas stuff at this party. Instead we are there to Socialize (what a concept!) and eat good food made by our good PAS friends, and play a few games for prizes. We are there to meet the people we see in shadow and darkness at the star parties, in the light of a party. All of the PAS membership is invited. If you wish to bring a friend, the same requests are aimed at your friend. **RSVP IS REQUIRED** for everyone!

1) They **MUST BRING** a dish of food to share & a drink (2 liter of something or a six pack - **NO ALCOHOL**). One drink & one food per person attending (all ages).

Food can be purchased or made by attendee.

2) If they wish to be involved in the White Dwarf Gift Exchange, they **MUST** bring an Astronomy related gift between the price range of \$10 - \$20, for the purpose of this game. Those without a gift will **NOT** be involved in the game. It's a lot of fun!

3) They must, or you can do it for them, RSVP with me by Jan 10th so I have a head count and so I can make the pages needed and name tags.

4) And if they wish to be in the Table Decoration game, they **Must** bring a table decoration. If you remember last year's table decoration game, we had quite a few interesting items, and some funny winners.

The planning for this event will be discussed at the next few Meeting of the Minds (MOMs). If you wish to be in on the planning, be sure to be at these meetings. We are looking for a new activity to include in this year's party. Your ideas are welcome.

The location of this party will be the same as last year. We are honored to be able to use Rod's parent's club house again. The Club House 10401 N Cave Creek Rd

Phoenix, AZ. I have increased our time there by 1 hour, so the start time will be 4pm that day. We will do dinner at 5pm, after everyone has had a chance to show up and add their food to the table. Activities will begin at 6pm, and run until 10pm. THANKS goes to ROD & his parents for helping us secure a location again for this party.

RSVP is required with Terri by Jan 10th. The purpose of the RSVP is so I know who is attending, how many prizes we need, who will help with what part of the party, etc. It also tells me what foods are coming, so that if you haven't RSVP'd me the kind of food you are bringing, you may be asked to bring something different than planned. I'd like to be sure we have enough variety for those who have picky diets (like me).

If you are donating prizes to the Social, or Money for the purchase of extra drinks, food or supplies for the party, please see Terri with that donation.

We hope to see the whole PAS membership at the Social this year! Watch for an update about the Social in the Jan issues of PAStimes Newsletter. ***



Last years White dwarf exchange

10/28 Bookman's Review

Did you miss the workshop on 10/28 at Bookman's with Chet as our guest speaker on BEGINNING IMAGING? Well, you missed an awesome class. We arrived at Bookman's and setup the tables. Because this was an Accessories Workshop, I brought all the handouts needed to cover the topic of Accessories. We didn't get any public to show up, but if they had, the handouts would have been there for them. About 3:30 Chet began his presentation. He did an hour and a

half talk on Beginning Imaging that was fantastic. He set up a small finder scope to find the image of Jupiter he had set up across the room. He then showed us his technique on how to bring that image in, put it on the computer, edit it with a special program that can stack the photos, and then end up with a result that is extremely nice. His presentation was awesome and perfect for those who want to know how to get into astrophotography. While doing his presentation Chris

joined in to share his knowledge and insight on the subject. After Chet finished, Chris drew the crowd over to the other table and showed us how to take images with an awesome device that draws in more light, allowing for your digital or ccd images to be brighter and more detailed. He shared that with us for 45 minutes before we had to pack up and depart to dinner. Dinner was at Carlos O'Briens and was fantastic! 11 people attended dinner.



Swap Meet at PAS

At the December PAS meeting, Start Planning for it now!

Dig through your closets, find those old astronomy items you have around your house collecting dust. Bring your astronomical items to buy, sell, trade to the 2007 PAS December Meeting Swap Meet. In the past, we have had plenty of good sales. PAS Members and non-PAS members are welcome to be involved. Sellers: Bring with you a piece of paper with a

brief description of the item at the top. We will set up prior to the speaker, in which you can place your bids on the paper. Then, after the speaker has finished, we will have 15 minutes to complete the sales. You place your name on the page with your bidding price. If you are out bid, you must bid again to win the bid. Buyers: First name and last initial is all that is needed to

win the bid. And of course, don't forget to bring cash. Any items that do not sell at the swap meet may be sent to Don (PAS Members - Free, Non PAS Members - \$ Small Fee) or Barbara for on the website. Good luck with your sales and purchases. We will see you there! ***

Mars Star Parties

We have set the dates for the 4 Mars Parties. Put them on your calendar. They will be held at PV Park at 40th St and Union Hills, roughly 5pm to 10pm, on a Saturday night. I have done up the flyer for them, so please help yourself to the flyer on line, or get one from Terri once they have been duplicated. The dates will be 11/17/07, 12/15/07, 1/12/08, 2/16/08, weather permitting. If you can help out or attend, please RSVP with Terri today, at least for the November Mars Party. See you there! ***

PAS Free Telescope Workshops

Next Event: Dec 2, 2007 3pm to 6pm
Special Guest Speakers: Chet Schuler & Chris Johnson
Topic to begin at 3:30pm, Seating limited, RSVP Required, "Advanced Imaging"

The Phoenix Astronomical Society invites you to drop by at Bookmans with your telescope, sky charts, questions and learn anything you wish to know about astronomy and telescopes at our FREE Telescope Workshop. RSVP is required with Terri 602-561-5398 or Events@pasaz.org Please see our other FREE Public events on line at www.pasaz.org Bookmans is located at 8034 N. 19th Ave. Phoenix, AZ 85021. You can find the dates of these events on line at PASAZ.org EVENTS. We hope to see you there with your telescope as a student, or with your knowledge to assist

those who need the help. If your bringing kids 0-12, RSVP their attendance. The newest thing at the Telescope Workshops is the KIDS CORNER. Kids can enjoy coloring, puzzles, etc, while parents are learning how to use a telescope. Next Telescope Workshops will be:

Sunday 2/10/08 3pm to 6:30pm PAS Bookman's Telescope Accessories Workshop. Special Topic by Mike Marron: Meteorites & Formation of the Solar System, Presentation begins promptly at 3:30pm. Seating is limited, RSVP Required with Terri.

Sunday 5/25/08 3pm to 6:30pm PAS Bookman's Telescope Accessories Workshop. Special Topic by Mike Marron: Stars & Stellar Jets, Presentation begins promptly at 3:30pm. Seating is limited, RSVP Required with Terri. ***

Newsletter Submissions Are Appreciated

(A Plea for More)

By Terri, V.P.

It was brought to my attention recently that some of the PAS club members do not really know that the newsletter is for everyone. If you are a PAS member, or even if you aren't, and you have something you would like to write about and include in the newsletter, send it to Don. For instance, I was chatting with Leah the other day, and I told her that she writes very well, good description, good details, good advice, and easy to read writing style. I told her she should write a column for the newsletter. It doesn't have to be a monthly item. It can be a once in a while item. (Leah has since agreed to do a monthly column called Arizona Sky which started in October) I didn't get a reply at that time from Leah as to if she liked the idea or not, but it brought to

my attention that it is possible that some PAS members do not realize the importance of their submissions to the newsletter.

Whether it is in the form of photos, or reviews, or just an idea to share. The newsletter is our means of communication. And isn't life about VARIETY? Who wants to hear from Terri all the time? Think about it, I was editor for 14 years, I've had 2 years of Prez and now I'm Vice for 2 years, and through all of that, I've written more articles and items for the newsletter than anyone else. I'm not complaining, I'm just saying, wouldn't it be nice to have someone else write something cool. I'll still continue with my reviews, and other items I put in the newsletter, but Don would really appreciate some other submissions.

Many thanks goes to those who did reviews last year, Sonny, Chet, Steve P, Rod, Sam. We need some variety in the newsletter. Send in your submissions today to Don, our wonderful, awesome newsletter editor. He's done a fantastic job of keeping the club up-to-date with news, hence the name NEWS letter. So, why not give everyone's eyes a break from Terri's writing, and send in something cool. If you want your own column, come up with a name for it, and do it monthly. If you just want to submit something once in a while, let Don know which issue you want it in. If it is unmarked for an issue, he will put it in the next possible one. We need your input. Thank you so much, in advance. ***

Going My Way?

by Diane K. Fisher

Not many endeavors require that you plan the mode of transportation before you even know what it is you are transporting. But weighing the physics and economics of getting any sort of cargo to space is a major part of designing a space mission.

It's one of the first issues that NASA's New Millennium Program (NMP) considers when planning a new mission. NMP has the forward-looking job to identify promising new technologies for space exploration. It then helps to mature the technology so it will be available to space missions of the future. If the technology cannot be tested adequately on Earth, the last part of this process is to actually send the technology into space. With carefully documented test results, future mission planners can confidently incorporate the new technology into their designs.

But where to begin? On call from the start, Linda Herrell is the New Millennium Program Architect. Given a list of proposed technologies, she has the job of figuring out the feasibility of wrapping a mission around them.

"We might be considering six or more technologies, anything from solar panels to imagers to masts for solar sails to more intelligent software. Of those, we may choose four. My job is to answer the question—can the selected technology be transported to and operated in space within the constraints of a low-cost technology validation project?"

Along with the list of possible mission payloads (the technologies), Linda also has a list of spacecraft to put them on, as well as a list of launch vehicle parameters. All she has to do is try them out in every possible combination (of which there are thousands) and see what might work.

"Fortunately, we have a software tool to help with this analysis," says Linda. When it comes down to it, her job is primarily to figure out how to get the technologies into space.

Sometimes, it's like figuring out how to get across town when you don't have your own car. You have to get creative."

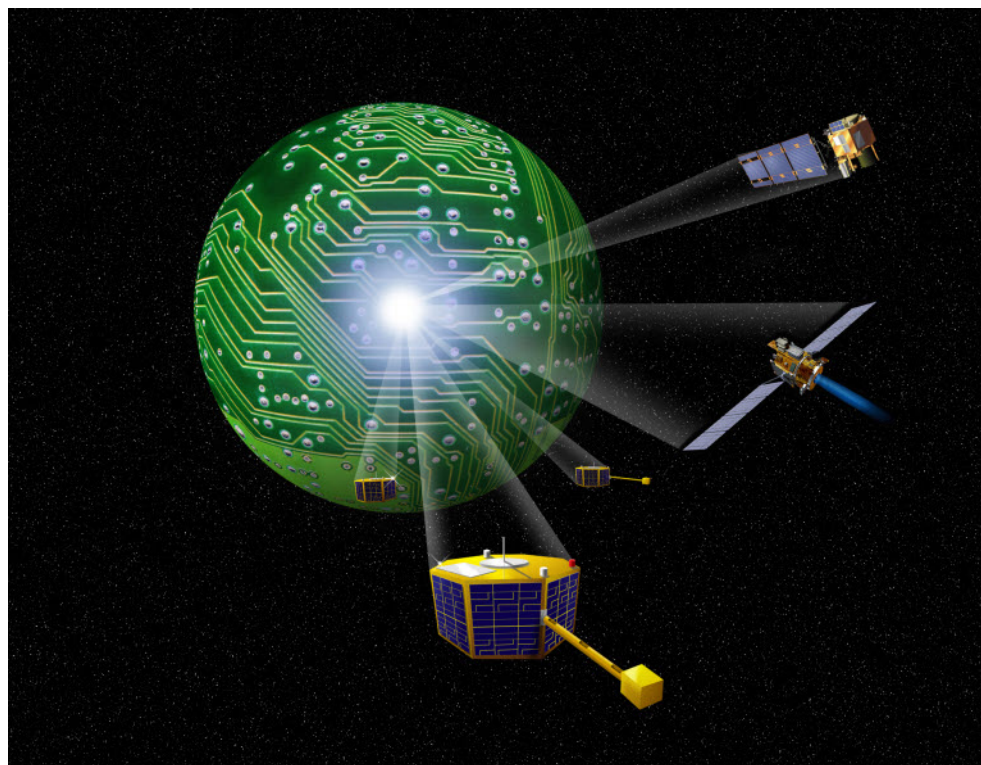
She keeps a database of all possible options, including riding piggyback on another spacecraft, hitching a ride on a launch vehicle as a secondary payload, or sharing a

launch vehicle with other NASA, Department of Defense, or even commercial payloads.

Her assessment is but one of a gazillion factors to be considered in planning a mission, but it is indeed one of the very first "details" that forms the foundation for the rest of the mission.

Find out some of the technologies that NMP has already validated or is considering at nmp.nasa.gov/TECHNOLOGY/innovative-tech.html. Kids will enjoy watching Linda's cartoon alter-ego talk about her job at spaceplace.nasa.gov/en/kids/live.

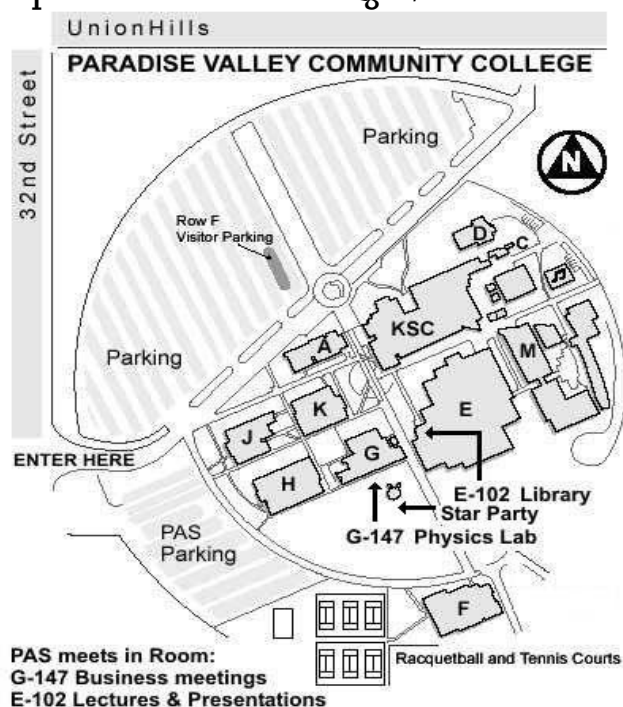
This article was written and provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



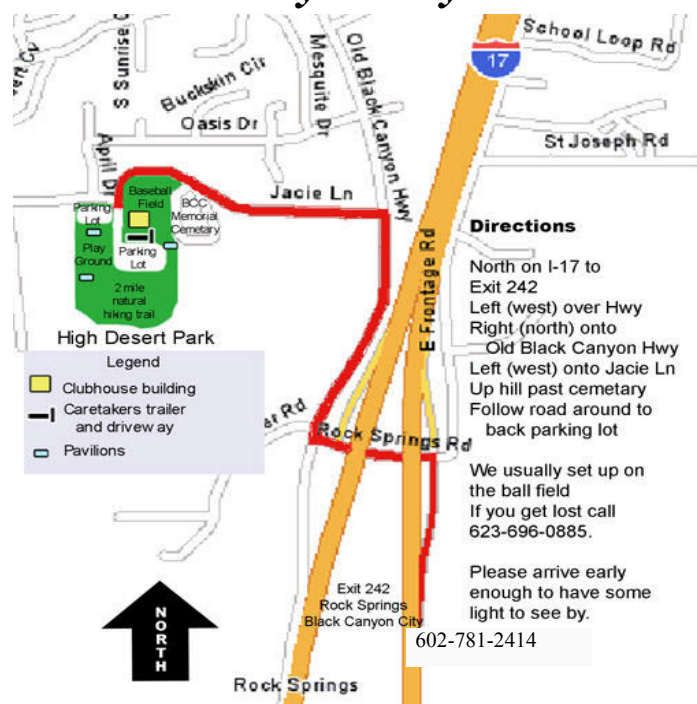
NASA's New Millennium Program selects breakthrough technologies that will be of the greatest use to future space and Earth science missions and that are perceived to be risky to the first user.



Map to PAS Meeting Location



Black Canyon City Site



Dec. 1 Saturday	6 pm to ?	Mike's Historic Cow Track Ranch in Carefree	PAS Star Party*** Members Only*** RSVP with Mike by 12 noon the Friday before. This event will be from 6 pm to whenever, so bring sleeping bags and any supplies you'll need if you plan to spend the night. It's always a fun, educational trip-to-the-past event at Mike's home.
Dec. 2 Sunday	3 pm to 6 pm	Bookman's Back room 8034 North 19th Avenue Phoenix, AZ 85021-5101	PAS Astronomy Accessories SIG And PAS Bookman's Free Indoor Telescope Workshop
Dec. 6 Thursday	7 pm to 9:30 pm	Paradise Valley Comm. College 18401 N. 32nd St Phoenix, AZ 85032 Union Hills and 32nd St.	PAS General Meeting Bobby McGehee, Retired career engineering physicist and author "New Universe Theory" DINNER PRIOR TO PAS MEETINGS - RSVP the day of the meeting to join PAS at the Deer Valley Airport Restaurant for dinner from 5pm to 6:30pm. RSVP is requested
Dec. 8 Saturday	6 pm To ? ?	Mike's Historic Cow Track Ranch in Carefree Phoenix, AZ 85021-5101	PAS Star Party *** Members Only*** RSVP with Mike by 12 noon the Friday before. This event will be from 6 pm to whenever, so bring sleeping bags and any supplies you'll need if you plan to spend the night. It's always a fun, educational trip-to-the-past event at Mike's home.
Dec 15 Saturday	6 pm to 10 pm	Paradise Valley Park 40th and Union Hills Rd. Phoenix, AZ 85032	MARS PARTY (2nd of 4) Come see Mars as it make a close approach to Earth and shows us awesome details on its surface. RSVP required with Terri to attend or help out. Volunteers are asked to arrive around 5pm for Solar set up and viewing, and for traffic / vehicle control. BYO Snacks, Chairs, Drinks. Bring a Friend! If you arrive after dark, please arrive with only your parking lights as not to destroy our night vision. Thank you. The next three Mars Parties will be Dec

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 Editor who will forward them to the Treasurer.

Don Boyd PASTimes Editor
701 W. Del Rio St.
Chandler AZ 85225

To:

Upcoming PAS Meetings

December 6th Bobby McGehee Retired Physicist "New Universe Theory"
February 7th Loretta McKibben AZ SED "Mars"

PAS is incorporated in the state of Arizona as a non-profit, scientific and educational 501(c)(3) organization. Our newsletter PASTimes is published monthly from September to May and distributed by USPS and the Internet. All Issues are available for download on our website www.pasaz.org. Ads for astronomy equipment are provided as a courtesy to sellers and buyers, and do not constitute any endorsement by PAS. All Photos by Don Boyd unless otherwise credited. All articles and photos are copyright their authors or PASTimes.

What's Up For December?

By Rod Sutter, PAS President

Date	<u>Planets</u> Name		Set Mercury
	Rise		
12-15-07	07:18		17:11 Venus
	12-15-07	04:03	14:57
Mars	12-15-07	17:59	08:24
Jupiter	12-15-07	07:46	17:44
Saturn	12-15-07	23:02	11:56
Uranus	12-15-07	12:11	23:42
Neptune	12-15-07	10:53	21:36
Pluto	12-15-07	07:19	17:20
All Times Arizona Time			

Meteor Showers

11-3-2007	Taurids
11-17-2007	Leonids

December 15 2007

Sunrise: 7:20

Sunset: 17:25



Q3:December 1



New: December 9



Q1: December 17



Full: December 24

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