March 2009

The Observer

East Valley Astronomy Club

Volume 23 Issue 3

From the Desk of the President
by David Douglass

Wow! What a month. Since the last time I sat here writing for the EVAC Observer, there have been six (6) school star parties, one (1) city event (Chandler), three (3) daytime events consisting of the Arizona Science Center, Cub Scout Day in Gilbert, Curious George at the Riparian, and two (2) other star parties, including our own 2nd Friday event. We tried to host the February Riparian Skywatch, but had building access problems again. We had our own monthly meeting, with fantastic speakers, and auctioned off 3 telescopes. To top it off, we had the GRCO observatory open on Friday and Saturday night, each week. Not a bad month. As always, there was a good group of EVAC volunteers to handle all the necessary activities. I congratulate each and every one of you on a job well done.

Speaking of building access problems, the problem was identified, and fixed. EVAC now has their own key, and access codes, so we are in good shape for both our regular monthly meetings, and the monthly Riparian Skywatch talk.

Our speaker schedule is filling in nicely. Our March speaker is Kim Herrmann, a Postdoctoral Research Scientist at Lowell Observatory. He will be speaking on using planetary nebula to probe the disk mass of face-on spiral galaxies. If you check the EVAC website, you will notice that the calendar is almost full for 2009. Our Vice President, Wayne Thomas, is doing an excellent job lining up speakers for EVAC's monthly meetings.

Hopefully, everyone who wants to, is getting a chance to see comet Lulin. It is only with us for a few more weeks. The weather has not been cooperating here at the end of February, but hopefully, that will change. If you are not sure where to look, you can go to the Internet, and browse to Heavens Above at http://www.heavens-above.com/main.aspx and look about middle page under Astronomy. There you will find Comet C/2007 N3 Lulin. Thanks to Lynn Young for helping me find that listing. Comet Lulin is now an evening view type item. You don't have to wait until after midnight.

Our events coordinator, Randy Peterson is lining up a tour of the Mt. Graham observatory, SW of Safford. Now that should be exciting. There are only 18 seats for the all day tour, which is scheduled for August 1st, and if I recall correctly, 12 of those were booked at the February meeting. The tour is not until August, but you need to reserve your space, and make payment now. If there is enough interest, a second day will be scheduled for August 8th. Contact Randy at events@evaconline.org for more information.

March and April are looking busy. We have six (6) schools scheduled already, two (2) separate Boy Scout evening events and, of course, the Messier Marathon on March 27/28. In the first week of April, there are five (5) outreach events, including the 100 Hours of Astronomy covered elsewhere here in the Observer.

It's a good thing we all like astronomy, and enjoy the outreach events. They really are fun. If you have not brought you telescope out to one of them recently, why not try to make one in the coming weeks? I look forward to seeing you during the various events coming up. Until then, Keep Looking Up!

Editor's note: Bill Dellinges is taking a well deserved vacation. His monthly Backyard Astronomer column will return in April.

Inside this Issue:

Upcoming Events:

Public Star Party – March 13

Monthly General Meeting – March 20

Deep Sky Star Party – March 21

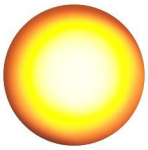
Local Star Party – March 28

Check out all of the upcoming club events in the Calendars on page 8

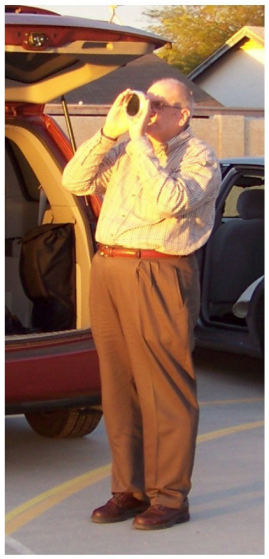
ANDERSON ELEMENTARY OUTREACH EVENT

February 5, 2009

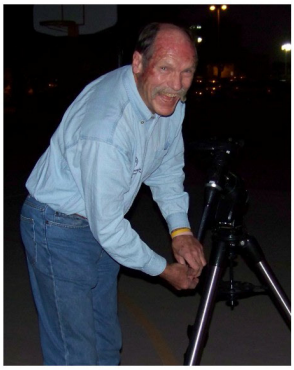
Claude Haynes, Bill Houston, Dave Douglass, Derek Youngston



This picture of the sun taken through Claude's solar filter



Bill Houston, Claude Haynes, Dave Douglass, Randy Peterson



Wayne Thomas

Lana, Lynn & Andrea Young

by Jan Douglass

Neutrinos in Astronomy

by Henry De Jonge IV

Neutrinos play a very important role in many astrophysical processes. In this two part series we will look at neutrinos in a bit of detail. We will examine what they are and their role in the standard model, (SM) their role in stars, (especially the sun), supernovae, and in shaping the Universe. We will see that these elusive, practically massless, and fast moving particles have profound influences on our Universe. They can also be thought of as another observational window or probe, (like visible light or gamma radiation) to better understand many astrophysical phenomena .In Part I we will look at the neutrino in general and discuss solar neutrinos. In Part II we will examine super nova, (SN) neutrinos and the cosmic neutrino background, (CNB).

What is a Neutrino?

Neutrinos are an electrically neutral stable type of elementary particle and classified as a type of lepton with no electrical or strong charge. They do have a very slight mass and react via the gravitational force and also interact via the weak nuclear force. The reason why they have such a small mass is not yet understood. They play a key role in particle decays and thus in radioactive decays. They are one of the most abundant yet barely detectable particles in the universe.

They were first postulated by Wolfgang Pauli in 1930 to account for the missing energy in nuclear beta decay. They were first discovered experimentally, (actually detected were anti neutrinos) in 1955 by Clyde Cowan and Frederick Reines at Los Alamos labs. They detected the neutrinos from a nearby nuclear fission reactor. When Wolfgang Pauli first predicted the neutrino he is said to have remarked how he had done something no good theoretical physicist should do, that is predict something that could not be verified experimentally.

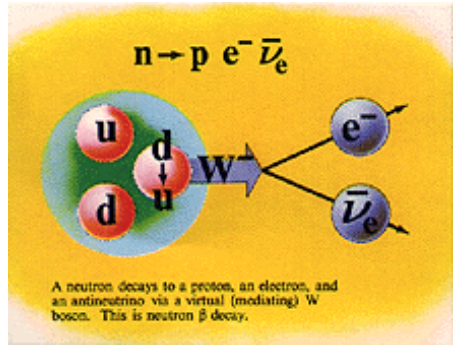
Neutrinos come in 3 basic types or flavors and their antiparticles, (six total). The original neutrino is called the electron neutrino, (from its association with electrons) and the other two types are called muon neutrinos, (discovered in 1962) and tau neutrinos, (discovered in 1975) due to their associations with the production and decay of the muon and the tau particles.

It has been shown experimentally that neutrinos can change flavors, that is become morphed into one of the other types. This implies that they have some mass, (about a million times smaller than the mass of an electron!) and do not travel at exactly the speed of light, albeit just a bit slower.

Neutrinos can easily penetrate astronomical thickness of matter which is why they can be thought of as a probe, providing information from the deepest , innermost, areas of stars and SN which otherwise would remain unknown. They are also used as probes of the weak nuclear force and to study nuclear decay.

Neutrinos we know of basically come from the following sources; stars, (especially the sun), particle accelerators and nuclear reactors, radioactive decay, cosmic rays, supernovae, and the Big Bang, (BB).

Neutrinos arise from manmade nuclear reactions, especially in nuclear reactors which utilize nuclear fission as their energy source. A standard nuclear plant can easily radiate about 1020 neutrinos per second with an energy of about 4 MeV. In the nuclear fission of heavy nuclei electron antineutrinos are generally produced as a neutron decays into a proton as shown in the picture below.



A neutron decays to a proton, an electron, and an antineutrino via a virtual (mediating) W boson. This is neutron β decay.

In natural nuclear decay processes neutrinos are produced and from the Earth alone it is estimated that about 6 million neutrinos per second, per square centimeter, are produced. When a neutron decays in a radioactive nucleus it breaks down into a proton and an electron with the release of an antineutrino. This has been verified by many experiments.

When high energy cosmic rays hit the Earth's atmosphere they produce "showers" of particles due to their interactions. Some of these particles are neutrinos and are called "atmospheric neutrinos". It is now thought that most if not all cosmic rays come from SN and super massive black holes, (SMBH) that can accelerate electrons and protons to extremely high energies. These particles can collide with interstellar material, (ISM) and also form neutrinos that are part of the CNB. Overall the earth receives neutrinos with an energy from less than 1eV to over 1017 eV.

Neutrinos can be detected in 2 main ways, either by taking part in nuclear reactions or by collisions with other particles. The first neutrino detector was created in 1968 and continues running today. It detects neutrinos when a chlorine atom interacts with a neutrino and turns into an argon atom which then undergoes radioactive decay. In a collision detector the neutrinos are noticed when a neutrino and a proton convert into a neutron and a positron, (anti electron) or the neutrino collides directly with an electron. Both of these collisions produce Cerenkov radiation which is produced when the electrons or positrons, (or any particle) travel faster than light in water and thus produce radiation, (this is the blue glow seen in the water surrounding nuclear reactors).

At the end of the article is a table summarizing the types of neutrinos and showing their maximum masses, (as no direct measurement of neutrino mass has yet been accomplished).

In the sun as in all stars, neutrinos come from the weak interactions that occur during nuclear fusion. In particular, nuclear fusion generally produces electron neutrinos. About 85% of the solar neutrinos are produced in this type of deep solar interior reaction, (by the conversion of protons to alpha particles). This is called the fundamental proton-proton reaction, (pp). In this reaction protons are converted to alpha particles, (which include neutrons) positrons, and neutrinos, with the release of about 25 MeV of energy for every 4 protons "burned". About 600 mil-

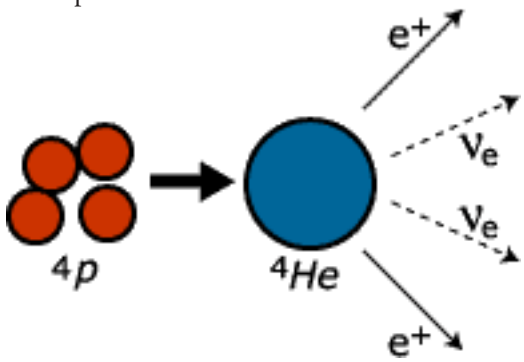
Continued on page 4

Neutrinos in Astronomy

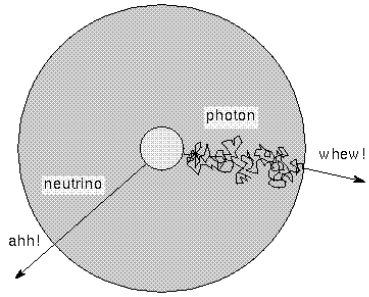
Continued from page 3

lion tons of hydrogen are burned every second to make the sun shine. Interestingly, the pp reaction produces neutrinos with an energy level that was not detectable with the first neutrino detectors. The neutrinos initially sought and detected on earth actually come from a relatively rare solar nuclear reaction in which a Beryllium nuclei captures a proton and forms a radioactive Beryllium isotope which then decays producing an electron neutrino of a certain energy level, (0.8 MeV) that was looked for to verify the standard solar model. There are also other sources of neutrinos produced in the sun by various nuclear reactions. All these neutrino producing reactions make up a neutrino energy spectrum for the sun. The sun produces about one hundred billion solar neutrinos that cross every square centimeter on earth each second.

In the pp reactions, protons are transformed via the weak process as shown in the picture below.



Due to the weak interaction of neutrinos with other forms of matter, about 99.99% of neutrinos produced in the sun escape in a couple of seconds or so, unscathed through the 400,000 mile journey from the center. Photons the traditional messengers of astronomy are destined to be released in hundreds of thousands of years or longer. Note the figure below:



Photons take tortuous paths out of the Sun's interior.
Neutrinos pass right on through in just two seconds.

For about 20 years after the first neutrino detector was set up, (1968-1988) the number of detected solar electron neutrinos was about 2/3 less than what was predicted by theory. These predictions were based on the then SM and the standard solar model. This was called the solar neutrino problem.

In those days according to the SM, neutrinos were thought to have no mass and travel at the speed of light. The experimental setup and the theoretical calculations were gone over with a fine tooth comb. It was thought at times that our understanding of the solar nuclear reactions was incorrect, (and the sun is the best known star we know of!) and at other times that the experiments to detect neutrinos were doomed to failure and/or also incorrect in our understandings of the SM. It was also thought that since the neutrinos from the sun travel astronomical distances and through astronomical amounts of matter before reaching earth, they may have been susceptible to effects that were not noticeable or even possible on earthly scales.

This solar neutrino problem caused the development of at least 5 more neutrino detectors, some sensitive to the energy level of the pp neutrinos. It was not until all three of the neutrino types were finally detected from the sun that in 2001 the solar neutrino problem was declared solved. It turned out that the first measurements only detected one flavor, (the electron flavor) of neutrinos and that the remaining 2/3 of undetected neutrinos were transformed from the electron type into the muon and tau types (more difficult to detect) on their way from the center of the sun to earth. The total number of neutrinos of all types was at last found to be in accordance with the standard solar model.

This discovery also led to a revision of the SM, as neutrinos must have mass in order to change flavor. The SM model was changed to include an effect called the Mikheyev-Smirnov-Wolfenstein, (MSW) effect, which was an idea first thought of in 1985 to help explain the solar neutrino problem via the SM. This stated that the neutrinos when traveling through matter, (especially long, dense, matter columns like in the solar interior) have a finite probability that they can change flavors through weak interactions with their associated charged leptons, (the electron, muon, and tau particles). Perhaps this new neutrino interaction is not the only surprise neutrinos may bring in the future? Regardless, when all the data is examined from all the known sources of neutrinos we can detect on earth, (by 1998) it was found to be consistent with the MSW effect seen in neutrino propagation

Conclusions

It is interesting to note that the same reasons that neutrino astronomy is so interesting make it so difficult. We have seen that these elusive and fascinating particles play important roles in the creation of all stars and have influenced both the theoretical and experimental science of astronomy, as well as our overall understanding of matter and energy.

Neutrinos in the Standard Model of elementary particles

Fermion	Symbol	Mass
	Generation 1 (electron)	
Electron neutrino		< 2.2 eV
Electron antineutrino		< 2.2 eV
	Generation 2 (muon)	
Muon neutrino		< 170 KeV
Muon antineutrino		< 170 KeV
	Generation 3 (tau)	
Tau neutrino		< 15.5 MeV
Tau antineutrino		< 15.5 MeV

March Guest Speaker: Kim Hermann

We are pleased to have as our guest speaker for the March general meeting Dr. Kim Hermann. Dr. Hermann is a postdoctoral research scientist at Lowell Observatory in Flagstaff.

Kim has a B.S. from Behrend College, Penn State University in 2002, and earned her Ph.D. from Pen State in 2008.

As a Lowell postdoc, Kim is working with Deidre Hunter on her LITTLE THINGS project, and is very much enjoying an introduction to reducing radio data. Kim's thesis work was on using planetary nebulae to probe the disk mass of face-on spiral galaxies. She worked with Robin Ciardullo and used MOSAIC and OPTIC on the CTIO 4-m and WIYN telescopes, respectively, as well as the Hydra multi-fiber spectrograph on both telescopes. Kim loves participating in astronomy outreach and greatly looks forward to exploring such opportunities at Lowell.

◐ First Quarter Moon on March 4 at 00:46

● Full Moon on March 10 at 19:39

◑ Last Quarter Moon on March 18 at 10:47

○ New Moon on March 26 at 09:07

New EVAC Members in 2009

Richard Johnson, Tempe, AZ

Michael Brown, Scottsdale, AZ

Charles & Donna Jennings, Mesa, AZ

Parijat Singh, Chandler, AZ

Donald Walker, Mesa, AZ

Lynn and Lana Young, Gilbert, AZ

Alanna Zubler, Gilbert, AZ

Bruce Monte, Casa Grande, AZ

Edward Thomas, Phoenix, AZ

Matthew Gosar, Tempe, AZ

Orion 8” F10 SCT & SkyView Pro Equatorial Mount

Standards include: XLT coatings, 24mm Plossl and manual for mount.
Extras include: Pro GoTo Upgrade Kit, v 3.20, firmware upgraded, cable and documentation manual for GoTo upgrade kit, polar axis finder and 12v battery. List price $1999.00

This equipment is 18 months old. Used sparingly because 14.5” Dob gets preference. Reason for sale is to finance an upgrade.

Sale price $1600.00

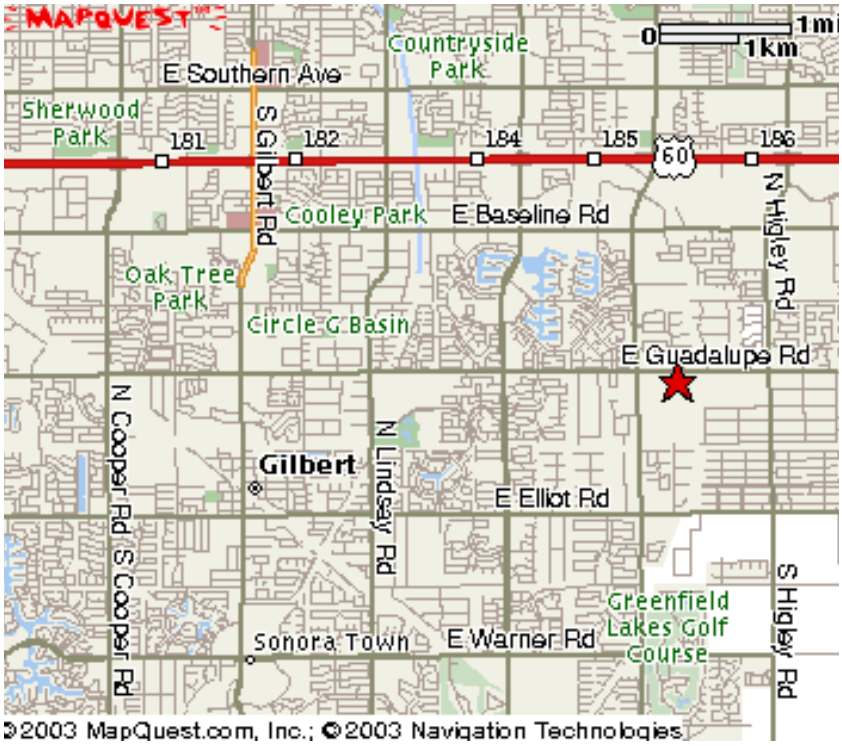
If you are interested in seeing this telescope contact AJ Crayon at 602-938-3277 or e-mail at acrayon@cox.net

Also, if you are thinking of a telescope for Christmas this is an ideal time to start looking and this is an ideal telescope to give.

Sky Quality Meter

The Unihedron Sky Quality Meter measures the brightness of the night sky in magnitudes per square arcsecond. Unprecedented sensitivity in a handheld meter!
The SQM retails for $120 plus shipping. Will sell this one, in excellent condition, for $85.

Contact: Peter Argenziano
Email: news@evaconline.org

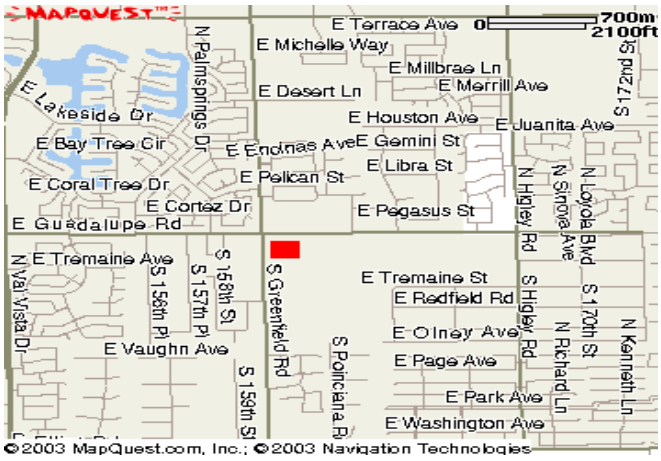


The monthly general meeting is your chance to find out what other club members are up to, learn about upcoming club events and listen to presentations by professional and well-known amateur astronomers.

Our meetings are held on the third Friday of each month at the Southeast Regional Library in Gilbert. The library is located at 775 N. Greenfield Road; on the southeast corner of Greenfield and Guadalupe Roads.

Meetings begin at 7:30 pm.

Visitors are always welcome!



Upcoming Meetings

March 20

April 17

May 15

June 19

July 17

August 21

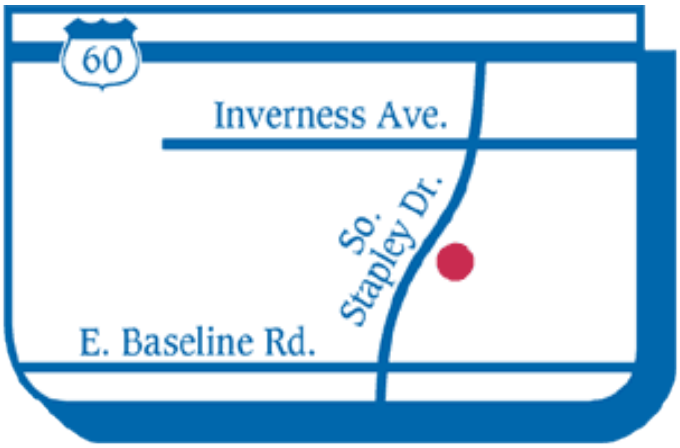
Southeast Regional Library
775 N. Greenfield Road
Gilbert, Az. 85234

All are welcome to attend the pre-meeting dinner at 5:30 pm. We meet at Old Country Buffet, located at 1855 S. Stapley Drive in Mesa. The restaurant is in the plaza on the northeast corner of Stapley and Baseline Roads, just south of US60.

Old Country Buffet
1855 S. Stapley Drive
Mesa, Az. 85204

Likewise, all are invited to meet for coffee and more astro talk after the meeting at Denny's on Cooper (Stapley), between Baseline and Guadalupe Roads.

Denny's
1368 N. Cooper
Gilbert, Az. 85233



March 2009

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	**3**	4	**5**	6	7
8	9	10	11	12	**13**	**14**
15	16	17	18	19	**20**	**21**
22	23	**24**	25	26	27	**28**
29	30	31				

March 3 - Tempe Prep Academy Star Party

March 5 - Kyrene del Pueblo Star Party

March 13 - Public Star Party at Riparian Preserve in Gilbert

March 14 - IYA at Az Science Center

March 20 - Sun Earth Day at SE Regional Library in Gilbert

March 20 - General Meeting at SE Regional Library in Gilbert

March 21 - Deep Sky Star Party at Vekol

March 21 - Boy Scouts Jamboree Star Party

March 24 - Wilson Elementary School Star Party

March 28 - Local Star Party at Boyce Thompson Arboretum

March 28 - All-Arizona Messier Marathon at Farnsworth Ranch

April 2009

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	**3**	**4**
5	6	7	8	9	**10**	**11**
12	13	14	15	16	**17**	**18**
19	20	21	22	23	24	**25**
26	27	28	29	30		

April 3 - Greenfield Elementary School Star Party

April 4 - 100 Hours of Astronomy Celebration

April 10 - Public Star Party at Riparian Preserve in Gilbert

April 11 - IYA at Az Science Center

April 17 - General Meeting at Southeast Regional Library in Gilbert

April 18 - Local Star Party at Boyce Thompson Arboretum

April 25 - Changing Hands Bookstore Astro Event

April 25 - Deep Sky Star Party at Vekol

East Valley Astronomy Club -- 2009 Membership Form

Please complete this form and return it to the club Treasurer at the next meeting or mail it to EVAC, PO Box 2202, Mesa, Az, 85214-2202. Please include a check or money order made payable to EVAC for the appropriate amount.

IMPORTANT: All memberships expire on December 31 of each year.

Select one of the following:

☐ New Member ☐ Renewal ☐ Change of Address

New Member Dues (dues are prorated, select according to the month you are joining the club):

☐ **$30.00 Individual** January through March

☐ **$35.00 Family** January through March

☐ **$15.00 Individual** July through September

☐ **$17.50 Family** July through September

☐ **$22.50 Individual** April through June

☐ **$26.25 Family** April through June

☐ **$37.50 Individual** October through December

☐ **$43.75 Family** October through December

Includes dues for the following year

Renewal (current members only):

☐ **$30.00 Individual** ☐ **$35.00 Family**

Magazine Subscriptions (include renewal notices):

☐ **$34.00** Astronomy ☐ **$33.00** Sky & Telescope

Name Badges:

☐ **$10.00** Each (including postage) Quantity: _____

Name to imprint: _____

Total amount enclosed: ☐

Please make check or money order payable to EVAC

☐ Payment was remitted separately using PayPal ☐ Payment was remitted separately using my financial institution's online bill payment feature

Name: ☐ Phone: ☐

Address: ☐ Email: ☐

☐ Publish email address on website

City, State, Zip: ☐ URL: ☐

How would you like to receive your monthly newsletter? (choose one option):

☐ Electronic delivery (PDF) *Included with membership* ☐ US Mail **Please add $10 to the total payment**

Areas of Interest (check all that apply):

☐ General Observing ☐ Cosmology

☐ Lunar Observing ☐ Telescope Making

☐ Planetary Observing ☐ Astrophotography

☐ Deep Sky Observing ☐ Other

Please describe your astronomy equipment:

Would you be interested in attending a beginner's workshop? ☐ Yes ☐ No

How did you discover East Valley Astronomy Club? ☐

PO Box 2202
Mesa, AZ 85214-2202
www.eastvalleyastronomy.org

All members are required to have a liability release form (waiver) on file. Please complete one and forward to the Treasurer with your membership application or renewal.

Liability Release Form

In consideration of attending any publicized Star Party hosted by the East Valley Astronomy Club (hereinafter referred to as "EVAC") I hereby affirm that I and my family agree to hold EVAC harmless from any claims, liabilities, losses, demands, causes of action, suits and expenses (including attorney fees), which may directly or indirectly be connected to EVAC and/or my presence on the premises of any EVAC Star Party and related areas.

I further agree to indemnify any party indicated above should such party suffer any claims, liabilities, losses, demands, causes of action, suits and expenses (including attorney fees), caused directly or indirectly by my negligent or intentional acts, or failure to act, or if such acts or failures to act are directly or indirectly caused by any person in my family or associates while participating in an EVAC Star Party.

My signature upon this form also indicates agreement and acceptance on behalf of all minor children (under 18 years of age) under my care in attendance.

EVAC only recognizes those who are members or invitees and who also have a signed Liability Release Form on file as participants at an EVAC Star Party.

Please print name here

Date

Please sign name here

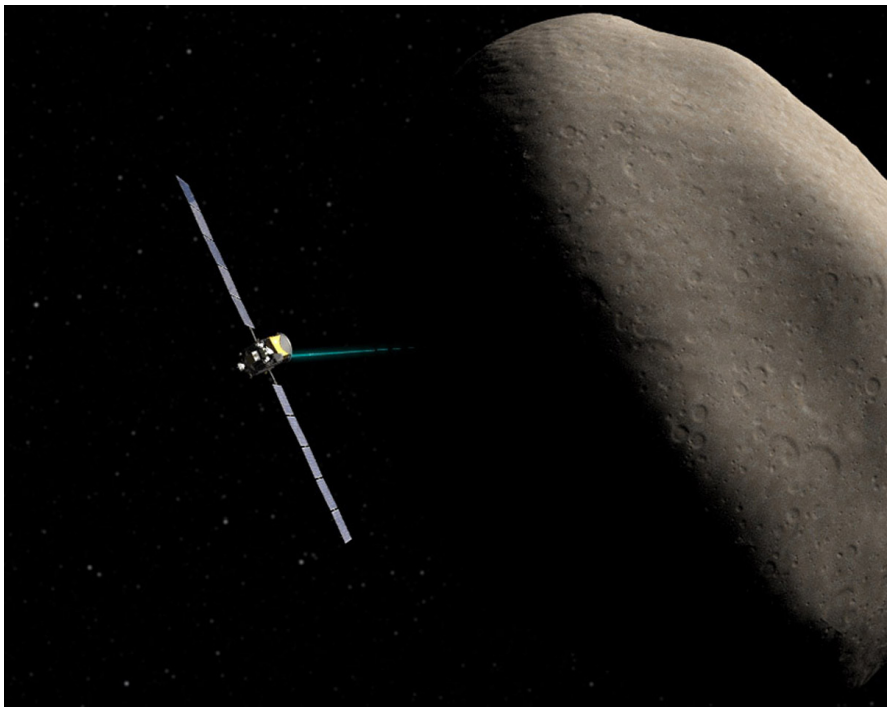
PO Box 2202
Mesa, AZ 85214-2202
www.eastvalleyastronomy.org

Where Did All these Gadgets Come From?

Ion propulsion. Artificial intelligence. Hyper-spectral imagers. It sounds like science fiction, but all these technologies are now flying around the solar system on real-life NASA missions.

How did they get there? Answer: the New Millennium Program (NMP). NMP is a special NASA program that flight tests wild and far-out technologies. And if they pass the test, they can be used on real space missions.

The list of probes that have benefited from technologies incubated by NMP reads like the Who's Who of cutting-edge space exploration: Spirit and Opportunity (the phenomenally successful rovers exploring Mars), the Spitzer Space Telescope, the New Horizons mission to Pluto, the Dawn asteroid-exploration mission, the comet-smashing probe Deep Impact, and others. Some missions were merely enhanced by NMP technologies; others would have been impossible without them.



Dawn will be the first spacecraft to establish orbits around two separate target bodies during its mission—thanks to ion propulsion validated by Deep Space 1.

"In order to assess the impact of NMP technologies, NASA has developed a scorecard to keep track of all the places our technologies are being used," says New Millennium Program manager Christopher Stevens of the Jet Propulsion Laboratory.

For example, ion propulsion technology flight-tested on the NMP mission Deep Space 1, launched in October 1998, is now flying aboard the Dawn mission. Dawn will be the first probe to orbit an asteroid (Vesta) and then travel to and orbit a dwarf planet (Ceres). The highly efficient ion engine is vital to the success of the 3 billion mile, 8 year journey. The mission could not have been flown using conventional chemical propulsion; launching the enormous amount of fuel required would have broken the project's budget. "Ion propulsion was the only practical way," says Stevens.

In total, 10 technologies tested by Deep Space 1 have been adopted by more than 20 robotic probes. One, the Small Deep Space Transponder, has become the standard system for Earth communications for all deep-space missions.

And Deep Space 1 is just one of NMP's missions. About a half-dozen others have flown or will fly, and their advanced technologies are only beginning to be adopted. That's because it takes years to design probes that use these technologies, but Stevens says experience shows that "if you validate experimental technologies in space, and reduce the risk of using them, missions will pick them up."

Stevens knew many of these technologies when they were just a glimmer in an engineer's eye. Now they're "all grown up" and flying around the solar system. It's enough to make a program manager proud!

The results of all NMP's technology validations are online and the list is impressive: nmp.nasa.gov/TECHNOLOGY/scorecard/scorecard_results.cfm. For kids, the rhyming storybook, "Professor Starr's Dream Trip: Or, How a Little Technology Goes a Long Way" at spaceplace.nasa.gov/en/kids/nmp/starr gives a scientist's perspective on the technology that makes possible the Dawn mission.

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

If It's Clear...

by Fulton Wright, Jr.
Prescott Astronomy Club

March 2009

Shamelessly stolen information from Sky & Telescope magazine, Astronomy magazine, and anywhere else I can find info. When gauging distances, remember that the Moon is ½ a degree or 30 arc minutes in diameter. All times are Mountain Standard Time.

This is a good month to observe Venus. It starts off as a bright, thin crescent, fairly high in the west at dusk and becomes a lower, even thinner crescent as the month proceeds. It is big enough that steadily held binoculars are all you need to see the shape. In fact, some people with very sharp vision should be able to detect the crescent with their unaided eye. Venus passes through inferior conjunction with the Sun on March 27 and moves into the morning sky. Because of the geometry of the Sun, Earth, and Venus, you might be able to catch the planet in both the morning and evening sky about March 23. See Sky & Telescope magazine, March 2009, p. 58 for more details.

Comet Lulin should still be visible this month. The following web site has the details.
http://www.skyandtelescope.com/observing/highlights/35992534.html
Or check out Astronomy magazine, March 2009, p. 42.

On Sunday, March 1, at about 6:20 AM, you may be able to see Mercury and Mars near each other. With binoculars look barely above the east-southeast horizon (down and to the left of Jupiter) for magnitude 0 and 1 points of light within 1 degree of each other. This will not be an easy observation. They are still close the following morning.

On Tuesday, March 3, the Moon is at 1st quarter and sets at 1:52 AM (Wednesday).

On Tuesday, March 3, almost any time in the evening, you can see the asteroid 1 Ceres at its best. It is particularly easy to find tonight because it is 1/3 of a degree north of the magnitude 4.5 star 54 Leonis. Although Ceres is only magnitude 7, there won't be this good an opportunity to view it for quite a while. It was nearest the earth (and brightest) on February 25, but is nearly the same brightness now and easier to find. It won't be this close to the earth again till the year 4164. See Sky & Telescope magazine, March 2009, p. 60 or Astronomy magazine, March 2009, p. 43 for more details and a finder chart. Note that 54 Leonis is an interesting double star, magnitudes 4.5 & 6.3 separated by 6.3 arc-seconds. By coincidence Saturn is 1/2 a degree north of another star in Leo, magnitude 4 Sigma Leonis.

On Saturday, March 7, at 8:04 PM, you can see the Moon occult a 4th magnitude star. Delta Cancri disappears behind the dark limb of the Moon and reappears from behind the bright limb at 8:40 PM.

On Sunday, March 8, at 2:00 AM, you can laugh at the rest of United States as they set their clock forward so they have to wait an hour longer to start observing each night than we Arizonians do.

On Tuesday, March 10, at 6:31 PM (2 minutes before sunset) the full Moon rises spoiling any deep sky observing for the whole night.

On Thursday, March 12, from 2:24 AM to 6:15 AM, the shadow of Titan falls on Saturn. (These times are predictions given by the Voyager 4 planetarium program on my Macintosh computer. The times given by Astronomy magazine, March 2009, p. 42 are 2:34 AM and 5:51 AM.) (Twilight and Saturn's low altitude interfere with seeing it toward the end of this period.) From 2:44 AM to 5:20 AM Titan itself is in front of the planet. As I said last month, this is a fairly rare event. It only happens when the sun is nearly in the plane of Titan's orbit. The event this month is the second of 10 chances to see it that we will get in 2009. After that we have to wait 15 years for it to happen again. Since I have never tried to see this, I'm not sure how big a telescope you will need, but it will be a good deal harder than seeing the shadows of Jupiter's moons on Jupiter. The shadow will be crossing near Saturn's north pole. I'd be interesting in hearing from any of you who try this observation. You can reach me at fulton@prescottastronomyclub.org

On Thursday, March 12, and on into Friday morning, a number of interesting events happen with Saturn's moons. All these events are between very difficult and impossible to observe so it's best to think of what a great show it would be if you were just arriving at Saturn in a space craft. As darkness falls in Arizona, there are 4 (!) moons and their shadows on the planet. At 8:11 PM Dione appears on the celestial west of the planet, followed by Enceladus at 8:33 PM, Tethys at 9:07 PM, and Rhea at 10:29 PM. The first 3 form a tight group for the rest of the night, with Tethys and Enceladus passing within 0.3 arc-seconds (!) of each other at 2:05 AM. Ah, if only Saturn weren't so far away.

On Wednesday, March 18, at 1:40 AM the third quarter moon rises, allowing most of Tuesday night for deep sky observing.

On Thursday, March 26, it is new moon, and you can observe faint fuzzies all night.

On Saturday, March 28, from 1:21 AM till about 4:30 AM, you might be able to see the shadow of Titan on Saturn. This is the third of 10 chances to see this event that we will get in 2009. This time (and future times) Titan does not cross the face of Saturn but passes north of it.

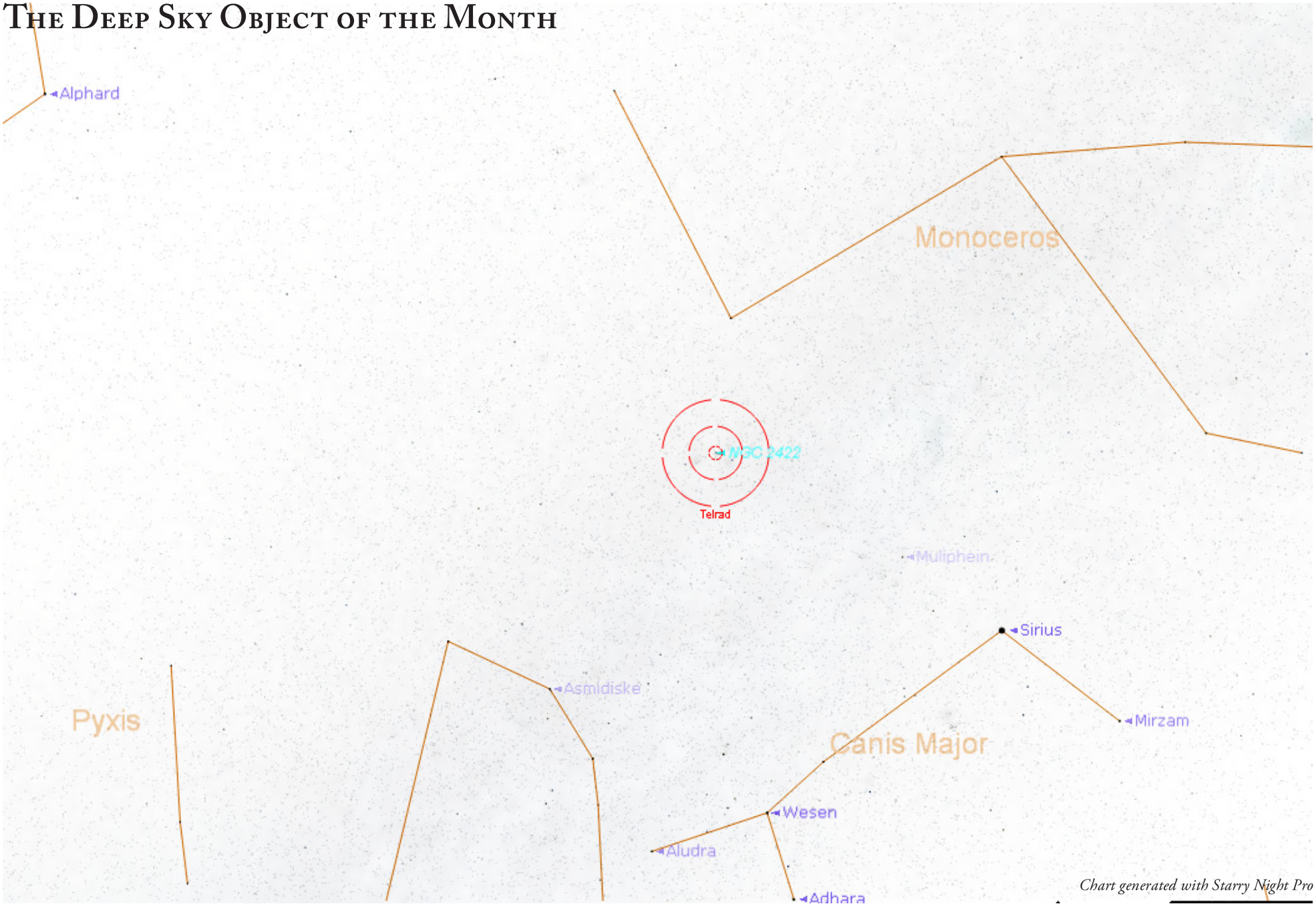
Feb. 21, 2009

CUB SCOUT FAIR

Claude Haynes, Brooks Scofield, Bruce LaFrance and David Douglass reprsented the East Valley Astronomy Club at a Cub Scout Fair in Gilbert where several hundred Cub Scouts came to earn belt loops and academic pins

by Jan Douglass

The Deep Sky Object of the Month



NGC 2422 (M 47) Open Cluster in Puppis

RA 07h 36m 35.0s DEC -14° 29' 00" Magnitude: 4.3 Apparent Size: 25.0'

Randy Peterson

Frank Pino

Lynn Young

Lana Young

Bill Houston

Derek Youngson

Dave Hatch

Dave Douglass

Mike Collins and Ortrun

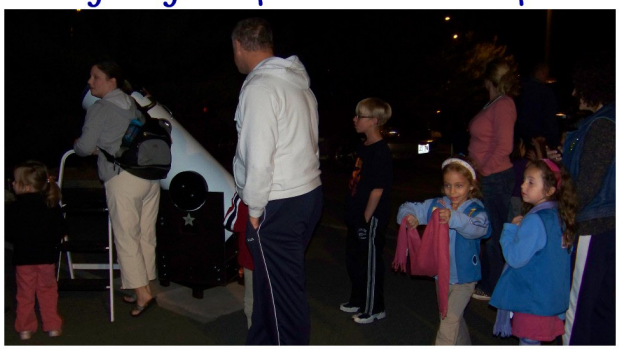
Chandler Parks personnel getting ready for the Star Party

CHANDLER ENVIRONMENTAL CENTER STAR PARTY

Also attending:
Claude Haynes

Feb. 6, 2009

by Jan Douglass



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Keep Looking Up!

East Valley Astronomy Club
PO Box 2202
Mesa, Az. 85214-2202