October 2007

The Observer

East Valley Astronomy Club

Volume 21 Issue 10

Inside this Issue:

From the Desk of the President
by Claude Haynes

The Observer comes out just in time to remind you of the All Arizona Star Party on October 12 and 13. We do need some help in setting up during the weekend. Bring some food to share at the potluck on Friday night. The Saturday evening meal is $5.00 and should be great fun. We are selling raffle tickets for $1.00 each to offset some of the expense of the event. We have some prizes from Photon, Starizona and Chartmarkers; plus some donated items. Complete information is on the EVAC website. It promises to be a wonderful weekend.

Election of officers is just around the corner. If you are interested in any position, please email me. Only Martin Thompson is hitting the two year term limit as a member of the board. We do need more active participation in club leadership, so I encourage you to think about this opportunity to assist the club and the community.

As I mentioned last month, Win Pendleton is moving to Colorado and EVAC will be taking a more active role in the SkyWatch talks on the second Friday of the month, and as volunteers at the observatory. In light of my comments about officer elections, we also could use some more volunteers to assist with public outreach. There is great reward in the joyful exclamations as people look through a telescope. It makes us appreciate anew objects that we often take for granted. Objects that I hope to fully enjoy at the All Arizona Star Party – see you there.

Keep looking up!

Claude

The Backyard Astronomer
Riparian Raid *by Bill Dellinges*

It was a night of infamy. This story must be told so others who follow me may not suffer a similar debacle. I had been asked to present an astronomical lecture on Friday, the 13th of July, at the Gilbert Library for EVAC's public star party night. Hmmm, that date was a bad omen right there. My plan was to give my basic astronomy slide show. I arrived early in order to set up before the crowd arrived. Usually someone is there to open the facility for the monthly lectures. Not that night. I was locked out. When 7:55 p.m. came, I got a sinking feeling in my stomach. Then an off duty Riparian docent happened by and asked me what the problem was. When I explained the situation to him, he tried to get the attention of the custodians inside the closed library. Meanwhile a number of people who had come for the lecture were gathering around us. The docent managed to talk his way in and get the front doors opened for us. The cleaners look flummoxed as a wave of humanity poured in like a burst dam. However, the large lecture room doors were still locked.

Sweating bullets, I looked around and realized I could use the lobby for my presentation. There was a blank wall for projection and electrical outlets for power. I then made a command decision. I announced that due to a snafu, we were locked out of the main room but I would do my presentation in the lobby for those who could accept such an unorthodox arrangement. I heard no protests, so I quickly set up, wires and cords flying every which way. Men, women, and children scrambled to

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Upcoming Events:

Local Star Party at Boyce Thompson – October 6

Public Star Party in Gilbert – October 12

All-Arizona Star Party at Farnsworth Ranch – October 12 & 13

Las Sendas Star Party in Mesa – October 16

General Meeting at Southeast Regional Library – October 19

Scottsdale Stadium Starlight Sleepover – October 20

The Backyard Astronomer

Continued from page 1 slide tables and chairs around for a place to sit. They made me proud. All they needed were life preservers and it would have looked like the final minutes of the Titanic.

I began my program a little after 8 p.m. The show was progressing nicely with lots of questions. About two thirds of the way into my talk, I noticed four policemen talking to the custodians in the lobby. Oh-oh, I thought, this can't be good. One of them came over and asked who was in charge. That would be me, I said. He wanted to know who I was, who let me in, and what was going on here. I explained everything. Surely he would recognize our ingenuity in improvising entry into a locked building and setting up shop in a lobby.

Apparently not. I was asked for I.D. and my driver's license disappeared for about ten minutes - no doubt to check my rap sheet. Evidently the custodians had second thoughts about letting us in and called the police. I received a stern lecture about entering a closed facility without a key and/or authorization. It didn't matter to them that I had been scheduled to speak that night or the fact that every second Friday we have lectures there. We were ordered to leave the building immediately. As I packed up, the policeman told the group this was an illegal gathering and they'd have to leave. So that was that. I had been busted. Too bad they didn't have a cameraman with them - I might have been on a future "Cops" episode.

I felt sorry for the audience as they had been game to sit on tables and the floor to learn a little astronomy, only to be thrown out of the place. As they departed the premises, I reminded the folks they could still enjoy the telescopes, observatory, and mingling with EVAC members outside. At the time the incident seemed dreadful to me, but later after sharing the experience with club members outside, I noted everyone thought the "bust" was quite amusing. Lesson learned here? Always reconfirm with someone in charge at a facility where you have a speaking engagement. One good thing came out of it. Before the raid, a young boy asked a very good question. Why do the gas giant planets spin faster than the inner planets? I was not happy with my answer and sent the question to Sky and Telescope's "Hobby Q&A." They tell me it will be answered in the November, 2007 issue. Check it out.

Supernova 1997ff's Cosmic Neighborhood

Ten billion years ago, when the universe was in its infancy, an aging star in a corner of space took its last breath. This final gasp was a big one, a titanic supernova explosion, which unleashed streams of brilliant light.

As the blazing light traveled through space and across billions of years, Earth and its neighboring planets in the solar system were born and evolved. Humankind arose. Astronauts set foot on the moon. NASA's Hubble Space Telescope was launched into space. The light was still journeying toward Earth in 1995 when Hubble stared at a tiny speck of sky in the Northern Hemisphere for its farthest look across the cosmos, called the Hubble Deep Field.

Finally, the light from the dying, faraway star did reach Earth in 1997. Astronomers using the Hubble telescope to hunt for distant supernovas caught it while taking a second look at the Hubble Deep Field. The detection was the first of an unlikely string of coincidences leading to important information about the supernova and the universe's behavior 10 billion years ago. These serendipitous events include finding the exploding star buried in two other Hubble telescope observations of the same area, both taken within months of the second "deep field" study. Supernova Type Ia in Hubble Deep Field North Galaxy 4-403.0. Image credit: NASA and A. Riess (STScI)

Planetary Magnetic Fields, Part Two

by Henry De Jonge IV

Editors note: Due to its length this article is being continued from the September issue of The Observer.

Planetary Moons

It came as a great surprise but some of the planetary moons also have magnetic fields. Below is a chart summarizing these discoveries, [3].

Moon	Orbital Period	Density (gm/cm^3)	Magnetic Field
Io	1.77 days	3.57	May have small & induced magnetic field
Europa	3.55 days	3.02	May have small & induced magnetic field
Ganymede	7.155 days	1.94	Has small magnetic field about 100 times weaker than Earth
Our Moon	29.53 days	3.34	May have small remnant magnetic field

Io has many active volcanoes, which are constantly spewing out material. Most of it falls back on its surface but some of it actually escapes into the surrounding magnetosphere of Jupiter. Recall how the spinning giant planet's huge magnetosphere is dragged through space, (with many particles as well) over and through some moons. It generates up to 400,000 volts across Io as it sweeps through it at high speed. Io and Jupiter actually form a giant electrical circuit, like a battery and a flashbulb, [1]. This fast moving electric field generates a weak magnetic field in and around Io. It is comparable in strength to that of Mercury. Theories predict that this is a bit too high and may imply that Io has an intrinsic magnetic field of its own. The active volcanoes on its surface indicate the subsurface fluid motions. Tidal heating may be responsible for the continued volcanic activity. The magnetic field is nearly aligned with its axis of rotation, [3].

Europa may also have a modest magnetic field, [1]. The interior model, (its very high density) implies a metallic core surrounded by a rocky mantle. The motions and continual smoothness of the icy surface do indicate an internal heat source. Again tidal forces may be the answer to this. Perhaps the small amount of fluid underneath the solid surface also carries ions and therefore produces currents, (like in Uranus and Neptune)? It also orbits well within Jupiter's magnetosphere. The magnetic axis is aligned about 45 degrees to its rotational axis, [3].

Ganymede is larger than the planet Mercury. It also has a substantial magnetic field about twice as strong as Mercury's! It generates its own magnetosphere within Jupiter's magnetosphere as well, [6]. Its surface features indicate an active geological past, [1]. The heat for the needed internal fluid motions may come from gravitational tidal forces from other Jupiter moons, Jupiter itself, and radioactive decay. The magnetic field axis is aligned about 10 degrees within that of the rotational axis, [3].

Our moon has patches of magnetized rocks and may have had an intrinsic magnetic field long ago when it was initially forming. According to the most accepted theory of its formation, it was formed out of the earth from a collision with another body so that it would be expected to have a similar initial composition as the earth. This remnant magnetic field has been detected in ancient lava flows. The maria, (younger, darker, surface areas) have rather homogenous fields and the highlands, (older, lighter, surface) show a greater field strength diversity, [9].

We see that some moons also have planetary magnetic characteristics and in fact some moons are larger than some planets!

Magnetic Field Strength vs Internal Structure

As we have learned the first essential ingredient for generating a planetary magnetic field is having the magnetic material to begin with. A planet must have the material that can generate and sustain a magnetic field.

Planet	Mass	Density	Magnetic Field Strength	Interior Composition
Mercury	0.0553	5.43	0.006	Solid iron core, fluid outer ?
Venus	0.815	5.20	0*	Solid core, fluid outer ?
Earth	1.0	5.52	1.0	Solid iron core, fluid outer ?
Mars	0.107	3.93	0*	Solid core, fluid outer ?
Jupiter	317.83	1.33	19,519	Liquid metallic H-?
Saturn	95.162	0.687	578	Liquid metallic H-?
Uranus	14.536	1.32	47.9	Ions dissolved in water-?
Neptune	17.147	1.64	27	Ions dissolved in water-?
Pluto	0.0021	2.05	0	

** may have small induced magnetic field*

Below are the nine planets with their mass, (as a multiple of the earth) density, (in gm/cm^3, recall that water equals 1) magnetic field strength, (again as a multiple of the earth), and a brief note on their possible interior composition relating to its magnetic field, [3], [1].

We see that there is a good correlation between the density and mass of a planet with it having a magnetic field and with its strength. According to the dynamo theory this should be the norm. We see that for the majority of cases

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Planetary Magnetic Fields

Continued from page 3

the dynamo theory seems to be correct in this instance even when it uses different models of the planets interior for the construction of the magnetic material and currents.

But we have also seen that there are still many questions left to be answered and this relationship does not fit for all the planets. There are some surprises. For example, the density of Saturn is so low that if placed on water it would float! But yet the huge mass of both Saturn and Jupiter allow it to be modeled with a magnetic inducing core. The same is true of both Uranus and Neptune, with their fairly large masses, although their interior mechanisms are different.

We do not have good enough models for the interior structures of Venus and Mars to explain their seemingly lack of a magnetic field, while also lacking such a model for Mercury to explain it having a magnetic field! Perhaps the reason Mars with a fairly high density has no intrinsic magnetic field today is that the iron is spread throughout the planet and not concentrated enough in its interior to have a solid core with a molten exterior. Or is it that the heat has long ago left the planet and its interior is totally or almost totally solid? Why does Venus not have a detectable magnetic field despite being nearly the size of the earth? Mercury presents all sorts of questions as we have seen.

So far though, the correlation seems to hold overall and it has a great deal of verification in most theories. It also works well for the earth, and it is the best we have so far. Bigger magnets usually produce bigger magnetic fields.

Magnetic Field Strength vs Rotation Rate

The second essential ingredient a planet must have for generating a magnetic field according to the dynamo theory is currents. These are the currents moving inside and around the magnetic material. According to the dynamo theory the faster a planets rotation rate, the more currents it can potentially produce. Therefore the more rapid the rotation of the planet, the stronger the generated magnetic field should be.

Planet	Rotation	Magnetic Field Strength
Mercury	58.81 days	0.006
Venus	243.69 days	0*
Earth	23.93 hours	1.0
Mars	24.62 hours	0*
Jupiter	9.925 hours	19,519
Saturn	10.50 hours	578
Uranus	17.24 hours	47.9
Neptune	16.11 hours	27
Pluto	6.405 days	0

** may have small induced magnetic field*

Below we list the nine planets and their rotation as well as the strength of their magnetic field, again in multiples of the earth, (=1), [3].

It seems pretty clear that the planets with fast rotations have intrinsic magnetic fields, all the planets with rotation rates in hours have stronger fields than the earth (except for Mars). Jupiter and Saturn with the fastest rotation rates have the correspondingly strongest magnetic fields.

Convection also plays a role in producing currents, but that factor is very difficult to get empirical data for and show proof of. We usually derive such convective motion from the models and data themselves. It understandably can be a critical factor in current strength when combined with rapid rotation, and the two are no doubt related. It makes intuitive sense that more rapid rotation may generate more convective motion.

The fact is that Venus moves exceedingly slow. Perhaps it cannot generate the currents and motions needed to form an intrinsic planetary field? What are the minimums needed in material and currents for a planet to generate a magnetic field? Mars may have the quick rotation but lack the internal magnetic material or other motions, (convective?) needed for a magnetic field, (although it may have had such a proper combination in its past).

The rotation of a planet also affects its magnetosphere. Dynamo theory maintains that the magnetospheres of rapidly rotating planets with strong magnetic fields are dominated by planetary rotation, while the solar wind controls the plasma flow in smaller magnetospheres of slowly rotation planets, [6]. Thus rapid rotation with a strong magnetic field, (which seems to go hand in hand) creates a powerful force. We have seen that the larger planets with their fast rotations can drag their magnetic fields around with them and cause severe and complex distortions within the magnetosphere.

Thus rotation has a profound bearing on a planet having a magnetic field, its strength, and its influences.

Conclusion

Even as we think we understand the two basic requirements of a planetary magnetic field, we have seen quite a bit of diversity in the planets and some of their moons in many aspects regarding their magnetic fields, origins, and influences. The range in planetary size, density, and rotation, is wide and impossible at present to fit into one complete magnetic theory. The large number of questions about each planets magnetic field shows how the dynamo theory is pushed to its limits in many respects. Variations in the planetary dynamo theory can also lead to many different conclusions from the same set of data, like the tilt of the magnetic axis, [9]. Still it is the best theory we have at present and has helped us to understand many planetary and magnetic features. It is good to see how it also helps generate so many new questions, which will forward our complete understanding.

We see how the moon and Mars have patches of magnetized rock, like remnant magnetic fields from long ago. The magnetic field origins of Mercury seem to be very different from the rest. Venus is still a mysterious planet in its interior as

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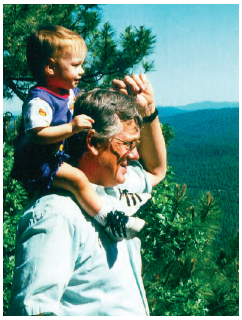
October Guest Speaker: Dr. Paul Knauth



Dr. L. Paul Knauth received his B.A. in 1966 from the University of Chicago and his Ph.D. from the California Institute of Technology in 1973.
Paul Knauth has been a professor at ASU for 28 years and is currently in the new School of Earth and Space Exploration. His recent research interests are the environmental conditions of the early Earth, life elsewhere, and Mars. He is a member of the NASA Astrobiology Institute. His talk will give an alternative view of the origin of layered sedimentary rocks on Mars that invokes meteorite impacts rather than water to account for all features observed from orbit as well as at the Rover landing sites. Paul is an avid, extreme amateur astronomer who regularly observes from the darkest sky sites with his 45-year old, 1,100 lb, 12.5" Newtonian reflector (http://www.public.asu.edu/~iaclpk/telescope.htm). After looking through Peter Argenziano's 25" Obsession, he immediately wrote out a check and ordered one fully loaded. His visual survey of the universe with the new 25" Obsession began in June.

Last Quarter Moon on October 3 at 03:06

New Moon on October 10 at 22:01

First Quarter Moon on October 19 at 01:33

Full Moon on October 25 at 21:52

In accordance with the club's constitution and bylaws, nominations for Officer or Board positions shall be opened at the October general meeting and shall be publicized prior to the November general meeting. Nominations will be closed at the start of the November general meeting. Officers shall be elected by a simple majority of the General Assembly present at the November general meeting. Is this the year you get involved? The future of EVAC depends on you. Contact a current officer for more information.

Robert Burnham Jr. Memorial Fund

You can be a part of history as people from all walks of life coordinate their efforts to pay tribute to one of the most influential people in amateur astronomy. The East Valley Astronomy Club is proud to serve as fiduciary agent for a drive to place a permanent memorial to Robert Burnham Jr on the grounds of Lowell Observatory in Flagstaff, Arizona. It is estimated the memorial will cost approximately $20,000. Any additional funds raised will be contributed to the Northern Arizona University scholarship fund for the benefit of astronomy students.
Robert Burnham compiled his three volume Celestial Handbook while working at Lowell Observatory as part of the Stellar Proper Motion Survey. This grassroots effort began on a Cloudy Nights discussion forum, and with the guidance of Burnham's sister, Viola Courtney, and her daughter Donna Cox, has grown to include numerous members of the astronomy community, including the honorary chairman of our fundraising committee Jack Horkheimer of the Miami Science Museum, better known for his PBS Star Gazer series.
For more information on Robert Burnham Jr please visit the official memorial website www.rbjm.org .
If you wish to make an online donation, please use the PayPal link here:
http://www.eastvalleyastronomy.org/rbjm.htm
If you wish to make a donation by mail, please make check payable to Burnham Memorial Fund and mail it to EVAC, PO Box 2202, Mesa, Az., 85214-2202... or you can donate at a club meeting.

Robert Burnham Sr and Robert Burnham Jr at the telescope

10" Deep Space Hunter

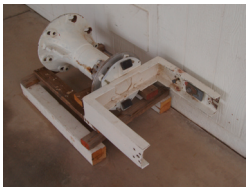
A very nice Dobsonian from Hardin Optical. Included in the sale are a finder scope and Telrad. Three eyepieces are also included: 9mm and 25mm (1¼" diameter) and 32mm (2" diameter). Asking price $400.

Peri Cline
480-981-5203 between 6 pm and 9 pm weekdays
peri_cline@cox.net

For Sale by EVAC

Optical tube assembly – Newtonian with focal ratio F7, includes one helical and one Crayford style focuser. There is some chipping on the mirror and quite a bit of dust. Tube is 18½" in diameter and 64" in length.
$75 or best offer

Mount – HEAVY duty mount build from a tractor axle casing.
$25 or best offer



Contact: president@eastvalleyastronomy.org

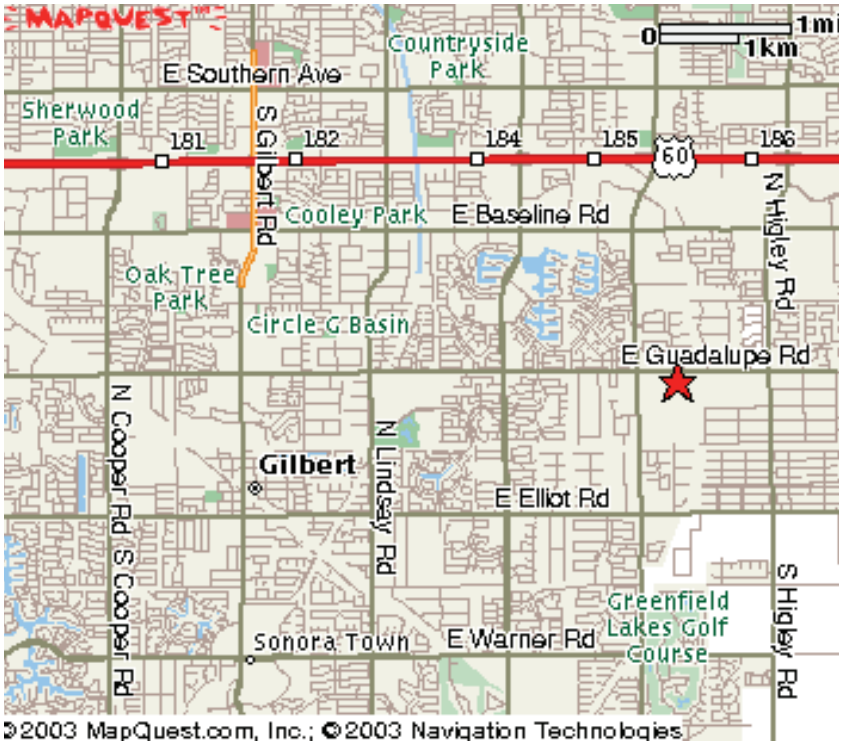
Orion StarMax 102mm Maksutov-Cassegrain
1300mm focal length F12.7
Orion TeleTrack Alt-Az tracking mount
$300 *damionbow2@aol.com*

SBIG ST-402ME

SBIG ST-402ME with Class 1 sensor and CFW402 internal color filter wheel installed and a set of RGBC filters. Same Microlensed, Blue Enhanced, Full Frame KAF-0402ME CCD as the ST-7XME camera. The array is 765 x 510 pixels at 9 microns square. Peak QE is nearly 85%. Also has enhanced cooling and USB-2. Asking price $1200. Also have a set of SBIG BVI filters for photometry, $250.

Marty Pieczonka 480-983-0915 or martyp@sybase.com

www.eastvalleyastronomy.org/grco/obs.asp

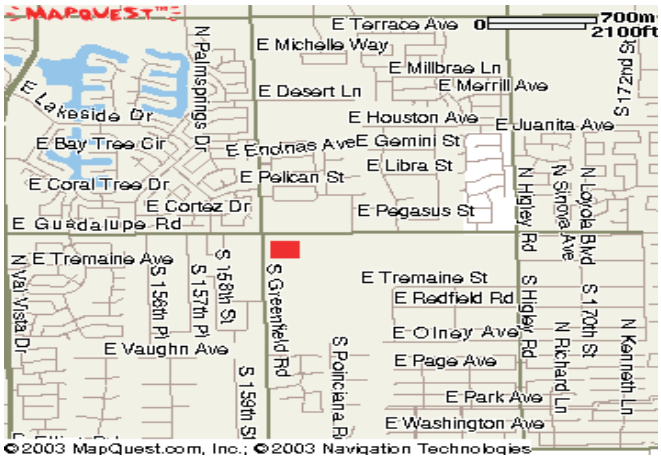


The monthly general meeting is your chance to find out what other club members are up to, learn about upcoming club events and listen to presentations by professional and well-known amateur astronomers.

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!



2007 Meeting Dates

October 19

November 16

December 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 the Village Inn restaurant located on the northeast corner of Gilbert and Baseline Roads in Mesa.

Village Inn
2034 E. Southern Avenue
Mesa, Az. 85204

October 2007

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			

October 6 - Local Star Party at Boyce Thompson Arboretum

October 12 - Public Star Party at Riparian Preserve

October 12 - 13 - All-Arizona Star Party at Farnsworth Ranch

October 16 - Las Sendas Star Party

October 19 - Monthly Meeting at Southeast Regional Library in Gilbert

October 20 - Scottsdale Stadium Starlight Sleep-Over in Scottsdale

A New Twist on an Old Nebula

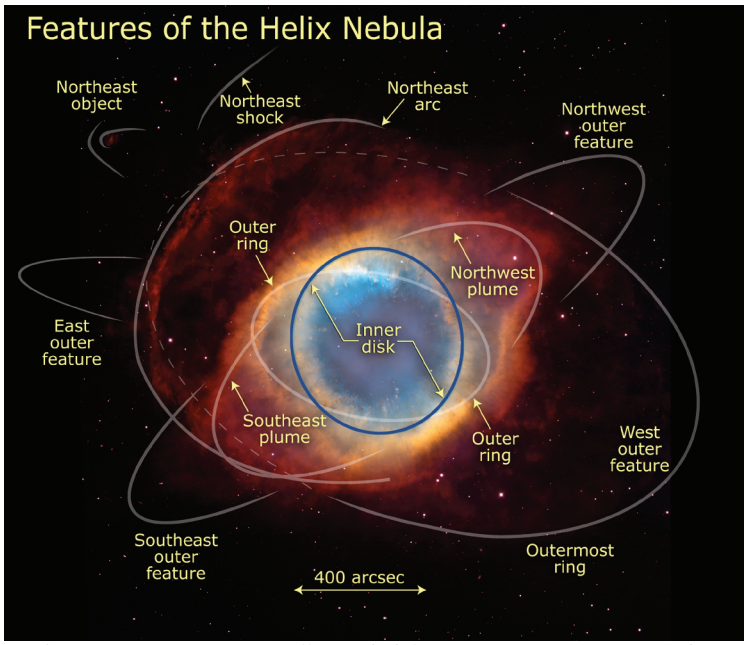
Looks can be deceiving, especially when it comes to celestial objects like galaxies and nebulas. These objects are so far away that astronomers cannot see their three-dimensional structure. The Helix Nebula, for example, resembles a doughnut in colorful images. Earlier images of this complex object — the gaseous envelope ejected by a dying, sun-like star — did not allow astronomers to precisely interpret its structure. One possible interpretation was that the Helix's form resembled a snake-like coil.

Now, a team of astronomers using observations from several observatories, including NASA's Hubble Space Telescope, has established that the Helix's structure is even more perplexing. Their evidence suggests that the Helix consists of two gaseous disks nearly perpendicular to each other.

A team of astronomers, led by C. Robert O'Dell of Vanderbilt University in Nashville, Tenn., made its finding using highly detailed images from the Hubble telescope's Advanced Camera for Surveys, pictures from Cerro Tololo Inter-American Observatory in Chile, and measurements from ground-based optical and radio telescopes which show the speed and direction of the outflows of material from the dying star. The Helix, the closest planetary nebula to Earth, is a favorite target of professional and amateur astronomers. Astronomers hope this finding will provide insights on how expelled shells of gas from dying stars like our Sun form the complex shapes called planetary nebulas.

Another surprise is that the dying star has expelled material into two surrounding disks rather than the one thought previously to be present. Each disk has a north-south pole, and material is being ejected along those axes. "We did not anticipate that the Helix has at least two axes of symmetry," O'Dell said. "We thought it had only one. This two-axis model allows us to understand the complex appearance of the nebula."

Using the Helix data, the astronomers created a three-dimensional model showing the two disks. These models are important to show the intricate structure within the nebula. The team also produced a composite image of the Helix that combines observations from Hubble's Advanced Camera for Surveys and the 4-meter telescope's mosaic camera at Cerro Tololo. The Helix is so large that the team needed both telescopes to capture a complete view. Hubble observed the Helix's central region; the Cerro Tololo telescope, with its wider field of view, observed the outer region.



Credit: NASA, ESA, C.R. O'Dell (Vanderbilt University), M. Meixner and P. McCullough (STScI)

East Valley Astronomy Club -- 2007 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

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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

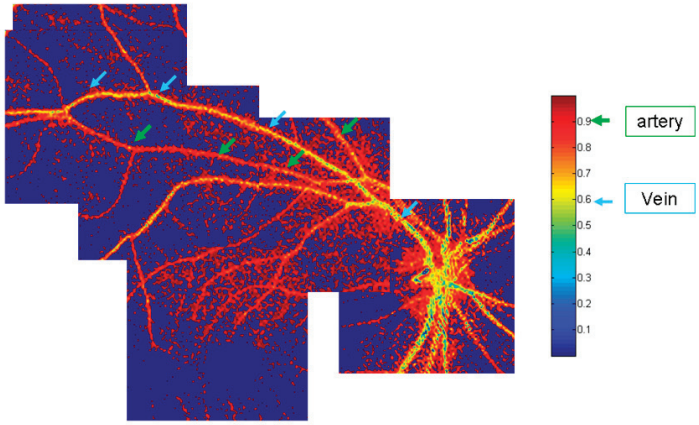
NASA's Space Place

A Missile in Your Eye
by Patrick L. Barry

Satellite technology designed to catch ballistic missile launches may soon help doctors monitor the health of people's eyes. For the last 15 years, Greg Bearman and his colleagues at JPL have been working on a novel design for a spectrometer, a special kind of camera often used on satellites and spacecraft. Rather than snapping a simple picture, spectrometers measure the spectrum of wavelengths in the light coming from a scene. From that information, scientists can learn things about the physical properties of objects in the photo, be they stars or distant planets or vegetation on Earth's surface. In this case, however, the challenge was to capture snapshots of short-lived events—like missile launches! The team of JPL scientists designed the new spectrometer, called a computed tomographic imaging spectrometer (CTIS), in collaboration with the Ballistic Missile Defense Organization as a way to detect missiles by the spectral signatures of their exhaust.

But now the scientists are pointing CTIS at another fast-moving scene: the retina of an eye. Blood flowing through the retina has a different spectral signature when it is rich in oxygen than when it is oxygen deprived. So eye doctors can use a spectrometer to look for low oxygen in the retina—an indicator of disease. However, because the eye is constantly moving, images produced by conventional spectrometers would have motion blurring that is difficult to correct. The spectrometer that Bearman helped to develop is different: It can capture the whole retina and its spectral information in a single snapshot as quick as 3 milliseconds. "We needed something fast," says Bearman, and this spectrometer is "missile-quick."

CTIS is even relatively cheap to build, consisting of standard camera lenses and a custom, etched, transparent sheet called a grating. "With the exception of the grating, we bought everything on Amazon," he says. The grating was custom-designed at JPL. It has a pattern of microscopic steps on its surface that split incoming light into 25 separate images arranged in a 5 by 5 grid. The center image in the grid shows the scene undistorted, but colors in the surrounding images are slightly "smeared" apart, as if the light had passed through a prism. This separation of colors reveals the light's spectrum for each pixel in the image.



This three-color composite image from the computed tomographic imaging spectrometer shows the oxygenation of the blood in the arteries and veins of a human retina. (Arteries appear red, veins appear yellow.)

"We're conducting clinical trials now," says Bearman. If all goes well, anti-missile technology may soon be catching eye problems before they have a chance to get off the ground.

Information about other NASA-developed technologies with spin-off applications can be found at http://www.sti.nasa.gov/tto .

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

2007 All-Arizona Star Party

October 12 - 13

Farnsworth Ranch

http://www.eastvalleyastronomy.org/aasp.htm

If It's Clear...

by Fulton Wright, Jr.
Prescott Astronomy Club

October 2007

Shamelessly stolen information from Sky & Telescope magazine, Astronomy magazine, and anywhere else I can find info. When gauging distances, remember that the Moon is 1/2 a degree or 30 arc minutes in diameter. All times are Mountain Standard Time unless otherwise noted.

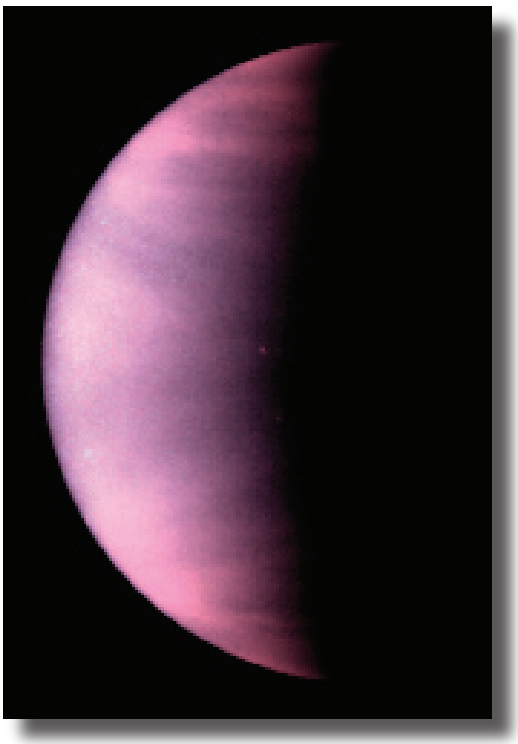
On Sunday, October 7, from 3:30 to 5:30 AM you can see a nice grouping of objects. With your unaided eye look just above the east horizon. Highest and brightest is Venus. To the left is Regulus. Below is the thin crescent Moon. Down and to the left is Saturn.

On Wednesday, October 10, it is new moon, so you can hunt for faint fuzzies all night.

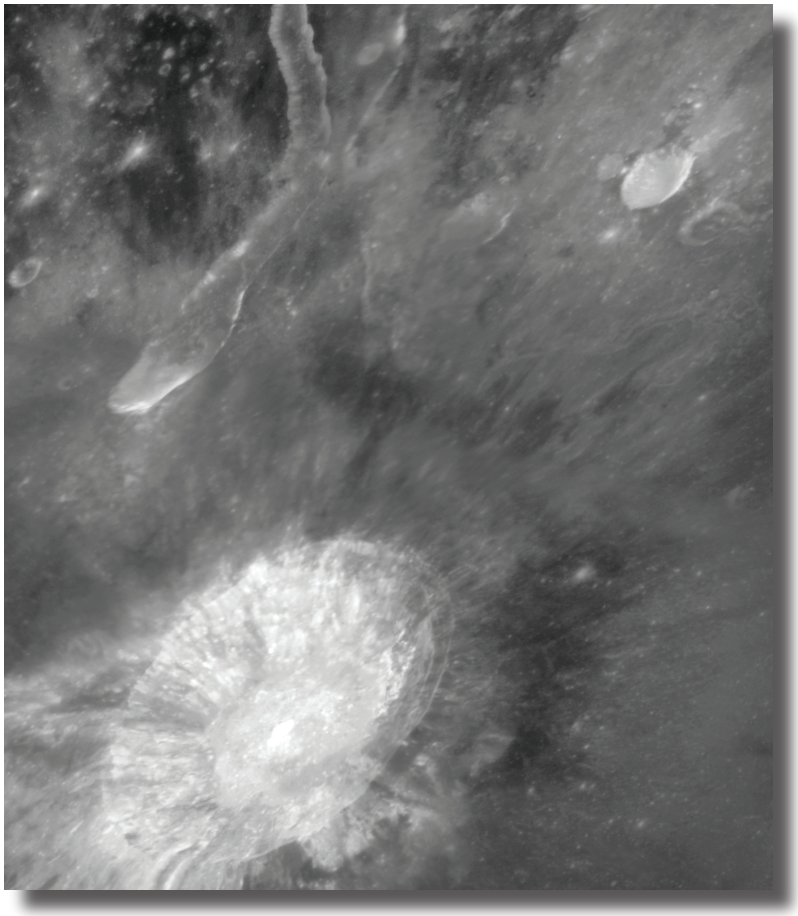
On Tuesday, October 23, almost any time after sunset, you can see an interesting formation on the Moon. With a small (3 inch) telescope look in the southeast for the nearly full Moon. Along the terminator, somewhat north of the Moon's equator, is the very bright crater Aristarcus with the sinuous Schroder Valley nearby. The next crater south is Marius. Just west (toward the terminator) of this crater are the Marius Hills, quite a collection of bumps on the lunar surface. See Astronomy magazine, Oct. 2007, p.49 for more information.

On Thursday, October 25, at 5:21 PM (22 minutes before sunset) the full moon rises spoiling any chance of seeing faint fuzzies for the whole night. If the Moon looks bigger than usual tonight, it actually is, because it is very near perigee, the point in its orbit closest to Earth.

On Friday, October 26, at 10:11 PM, you can see the moon occult a double star. Epsilon Arietis, is two 5th magnitude stars, only 1.4 arc-seconds apart. Because of the alignment of the two stars, they will both disappear at the same time. The stars reappear at 10:47 PM. First one will appear, then 5 seconds later the second one of the pair. The Moon is so nearly full that seeing the stars reappear on the dark limb won't be much easier than seeing them disappear on the bright limb. A big telescope and high power will make the stars easier to see.



Venus cloud tops
Credit: L. Esposito (University of Colorado, Boulder), and NASA



Aristarchus Plateau
Credit: NASA, ESA and J. Garvin (NASA/GSFC)

Planetary Magnetic Fields

Continued from page 4 well as in its clouded atmosphere. The highly speculative nature of the outer planets magnetic fields is still very much a theory, [9]. We have seen the parallels in interior structure and magnetic field generation between Jupiter and Saturn as well as between Uranus and Neptune. Other models in the future may explain their interiors and magnetic fields more completely. The large tilts and center offsets of Uranus and Neptune also present many problems for the dynamo theory, [9]. They will need a lot more data and time to be studied properly. Obviously the earth is the best and longest studied magnetic field and the theories have largely been developed on its data and to explain its properties. Yet even the earth's magnetic field is only beginning to be understood. The recent accumulation of earth data and experimental results is just beginning to test fully the dynamo theory. Let's not forget the magnetic moons of some planets and what they may teach us also.

A strong correlation between magnetic field strength and a planets rotation and density, (mass) have been shown. This supports the fundamental assumptions of the dynamo theory. There are exceptions to this also, but perhaps more and better information will help us to tighten this relationship.

Obviously different types of magnetospheres can exist and they are intimately tied to their planet's magnetic field. The complex nature of the magnetosphere is not yet fully understood. Distorted magnetospheres and mutually interacting magnetospheres, (planets with their moons) are extremely complex.

It is almost as if the magnetic field and its created magnetosphere are alive while constantly interacting and changing! We have a lot more to learn and understand about magnetism and planetary magnetic fields.

REFERENCES

[1] Kaufmann, William J. & Freedman, Roger A. (1999) Universe-Fifth Edition NY, NY W.H. Freeman & Co.

[2] Windows to the Universe (2000-2001) http://www.windows.ucar.edu

[3] Electromagnetic Radiation (1997) http://www.astronomynotes.com

[4] Dynamo Theory (2000) http://www.ency-astro.com

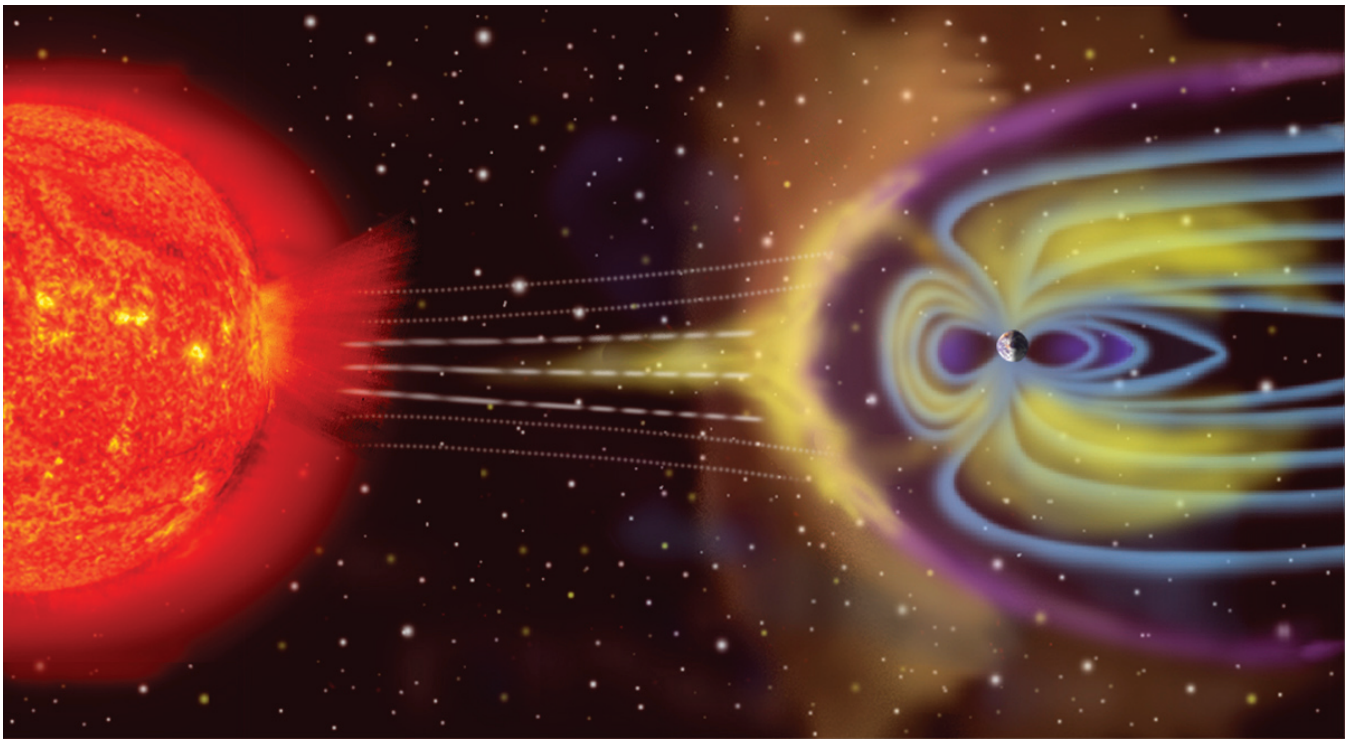
[5] Magnetospheres and the Universe http://www.-spof.gsfc.nasa.gov/Education/Iuniverse.htm

[6] Planetary Magnetospheres (2000) http://www.ency-astro.com

[7] Magnetospheres Other Than Ours http://www.-spof.gsfc.nasa.gov/Education/wotherms.htm

[8] The Similarities of the Planets http://www.livingcosmos.com/celestial.htr

[9] Fortes, Andrew D. (1997) Magnetic Fields of the Planets http://www.ucl.ac.uk/geolsci/edu/students/planet/student/work/magrev/magtoc.htm



The magnetosphere shields the surface of the Earth from the charged particles of the solar wind. It is compressed on the day (Sun) side due to the force of the arriving particles, and extended on the night side. (Image not to scale.) Image courtesy of NASA

Deep Sky Object of the Month

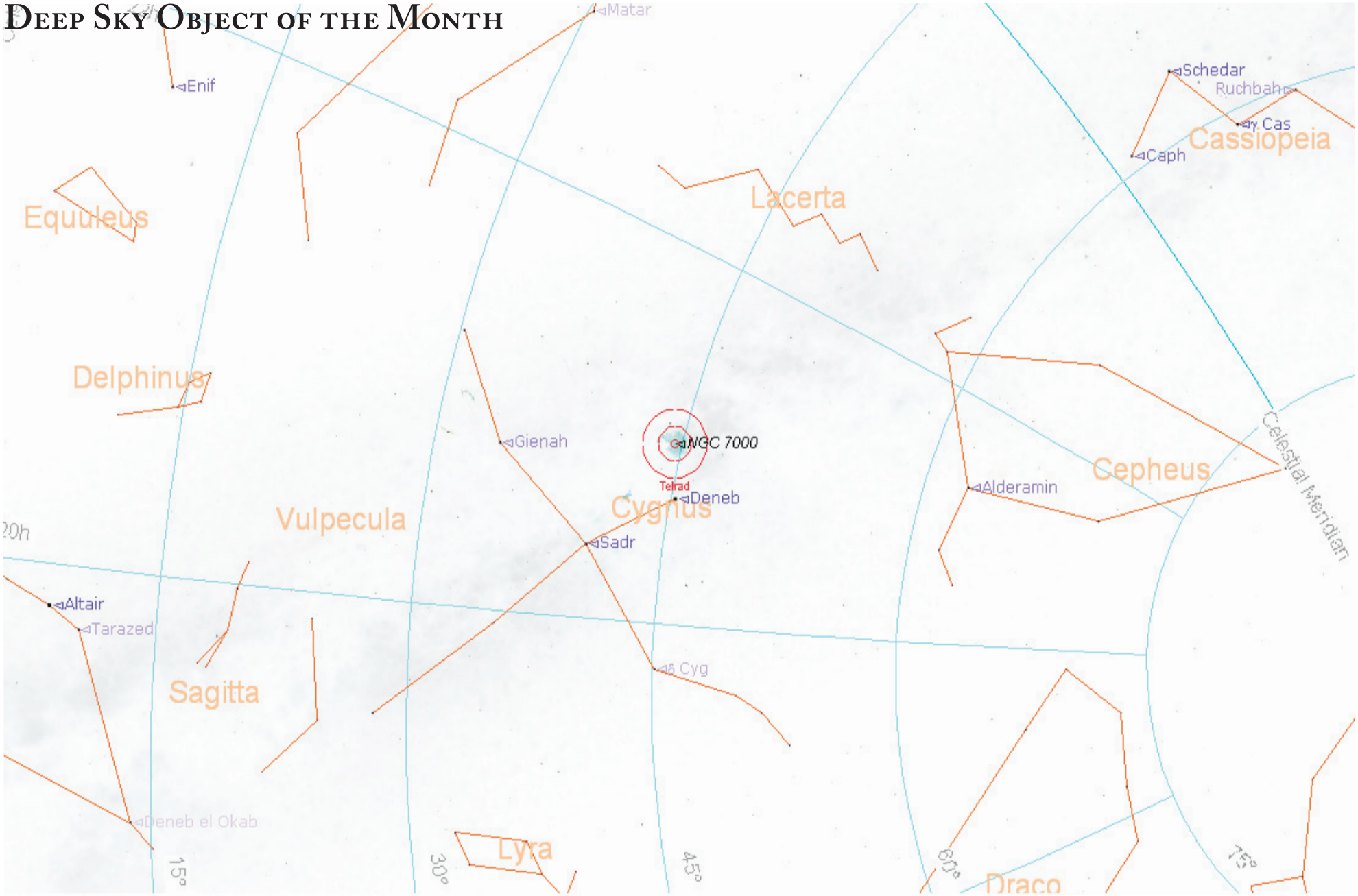


Chart generated with Starry Night Pro

NGC 7000 (North American Nebula) Diffuse Nebula in Cygnus

RA 20h 59m 18s DEC +44° 31' 00" Size: 120'

Project ASTRO: Astronomers and Educators as Partners for Learning

Earlier this summer the club was contacted by Chuck Dugan of the National Optical Astronomy Observatory (NOAO) Office of Public Affairs and Educational Outreach about participating in the Tucson chapter of Project ASTRO. Tucson-ASTRO is a flagship site of the program.

Project ASTRO is a national program that improves the teaching of astronomy and physical science by linking professional and amateur astronomers with local educators. Each astronomer is matched with an educator in a one-on-one partnership and commits to visiting the educator's students at least four times during the school year. Over 500 active educator-astronomer partnerships currently bring the excitement of scientific discovery through astronomy to over 20,000 students annually.

The main focus of Project ASTRO educator-astronomer partnerships is hands-on, inquiry-based activities that put students in the position of acting like scientists - as they come to understand more about the universe (and science in general).

Since 1994, the Astronomical Society of the Pacific's (ASP) highly successful national Project ASTRO program has been providing opportunities for professional and amateur astronomers to contribute to science education in their local communities. With startup funding mainly from the Informal Science Education Division of the National Science Foundation, Project ASTRO began as an experiment in the San Francisco Bay Area. Since then, the program has expanded to include a number of regional sites across the country, thus forming a "National Network" that exchanges information regularly. The Project ASTRO National Staff & Office are located at the ASP in San Francisco.

The program has been sponsored by NOAO in Tucson for the past 11 years, but they haven't been able to expand into metropolitan Phoenix with any consistency or sustainability. We're hopeful that by having a couple of volunteers for this school year that other educators and other schools will want to participate (not to mention other club members). Wayne Thomas and Peter Argenziano will be working with teachers at Centennial School in Ahwatukee and Mesquite School in Gilbert. The program receives tremendous support from the Tucson Amateur Astronomy Association (TAAA).

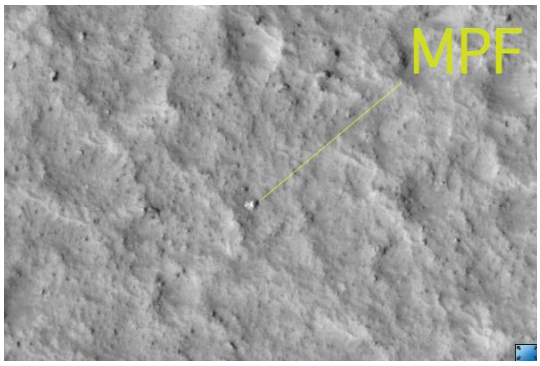
A two-day workshop was conducted on the campus of the University of Arizona on September 14 - 15 to bring together the teachers and astronomers who will partner for this school year. The session began with introductions and an overview of the program.

While the main focus of the workshop was hands-on activities with the newly formed teacher-astronomer partners, it also included other elements.

A video entitled *A Private Universe* demonstrated some very popular misconceptions about our solar system; misconceptions shared by primary schoolers and Harvard graduates alike.

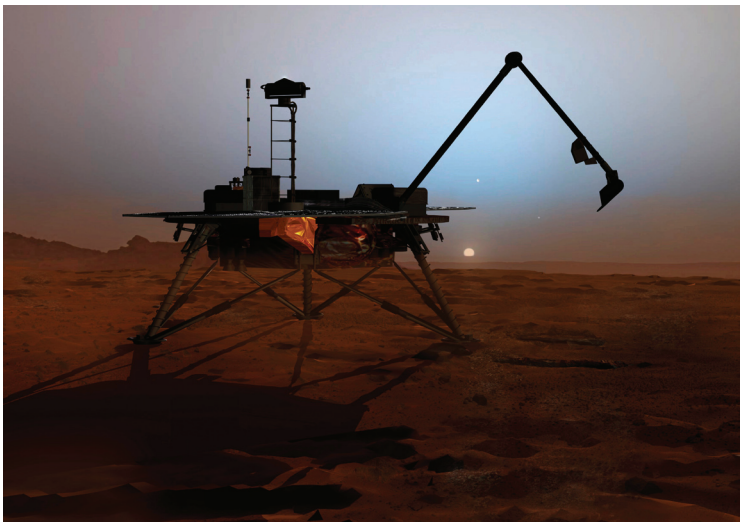
Gina Brissenden delivered a talk entitled *Using Education Research to Create Effective Curriculum*. Gina is the national education specialist for the American Astronomical Society. She studies issues related to teaching introductory astronomy at the university level, including alternative conceptions in astronomy, gender equity in the science class, and progressive assessment.

Audrie Fennema, team member of the HiRISE Operations Center (HiROC), gave the group an update on the High Resolution Imaging Science Experiment. Onboard NASA's Mars Reconnaissance Orbiter, the HiRISE camera offers unprecedented image quality, giving us a view of the Red Planet in a way never before seen. It's the most powerful camera ever to leave Earth's orbit. During its mission, HiRISE will collect thousands of images of the Martian surface, yet will only cover one percent of the planet. The camera's advanced optics allow us to see objects that measure only a few meters across. In addition to investigating deposits and landforms resulting from geologic and climatic processes and assisting in the evaluation of candidate landing sites, HiRISE has imaged all previous mission crafts that can be located.



HiRISE images Mars Pathfinder site

The group was taken on a tour of the Phoenix Mars Mission Science Operations Center. Phoenix is designed to study the history of water and habitability potential in the Martian arctic's ice-rich soil. Phoenix was just launched in August and will journey nine months to Mars.



Artist conception of the Phoenix lander

Next up was a trip up to Kitt Peak National Observatory where the group toured the Mayall 4-meter telescope before observing a glorious sunset. After dinner we all participated in the Nightly Observing Program before heading back to Tucson.

The next day was filled with more hands-on activities and concluded with a partner planning session.

Here's to a successful year and the beginning of an EVAC - Project ASTRO partnership.

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Keep Looking Up!

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