February 2006

The Voyager

East Valley Astronomy Club

Volume 20 Issue 2

From the Desk of the President
by Steven Aggas, 2006 EVAC President

Have you considered running for an office? We are in need of a volunteer for Properties Director. If you are interested, send me an email and I'll pencil you into the job. EVAC will be renting a storage room for our property (your garage will not be used!), so all that is needed is to bring the books to the meeting for our lending library, and keep track of who has what.

Additionally, I'd like to mention that we have up to two 15 minute slots available in the General Assembly meeting for members who would like to "show and tell". Just send me an email beforehand so I can get it into the presentation. We don't always fill these but they are available and other members could be really interested in the project you're working on! This is the perfect time to show your newest gadgets.

As our speaker for the February General Assembly meeting we will have Mr. Ted Bowell. Mr. Bowell will talk on the topic 'Searching for Near-Earth Asteroids - Now and in the Future'. He is principal investigator of the Lowell Observatory Near-Earth-Object Search (LONEOS), and has discovered a large number of asteroids, both as part of LONEOS and in his own right before LONEOS began. Among the latter are the Trojan asteroids 2357 Phereclos, 2759 Idomeneus, 2797 Teucer, 2920 Automedon, 3564 Talthybius, 4057 Demophon, and (4489) 1988 AK. He co-discovered the periodic comet 140P/Bowell-Skiff, and the non-periodic comet C/1980 E1.

Join us at the Southeast Regional Library (Gilbert Public Library) on Friday, February 17th at 7:30PM. The GPL is located at the Southeast corner of Greenfield and Guadalupe Roads.

The Backyard Astronomer
Our Sun *by Bill Dellinges*

It is February. It is cold. Let's make a cup of cocoa and discuss something warm. Have you thought about our sun lately? Our sun is a star just like the stars we see at night but much brighter of course due to its nearness. The sun has an apparent magnitude of -27 and absolute magnitude of +4.8 (that is, what its apparent magnitude would be if seen from a distance of 32.6 light years – as a comparison, Rigel's absolute magnitude is -8.1).

While stars vary in size and color, they all have something in common: they are large balls of gas – mostly hydrogen gas. In the case of our sun, the gas ball is 864,000 miles in diameter (or 108 Earth diameters). Mass wise, the sun is 330,000 times the mass of the Earth. Volume wise you could put 1,300,000 Earths inside the sun. In fact, the planets, moons, asteroids, and comets in the Solar system are a joke compared to the sun. Think about this statistic for a moment: the sun represents 99.8% of the mass of the Solar System. The planets are indeed just crumbs left over from the sun's creation.

When you get that much gas in one place, gravity pulls it toward its center where pressures and temperatures rise to 27 million degrees F. inducing the hydrogen atoms to crash violently enough together to fuse into helium. Fusion is the source of the energy

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The Backyard Astronomer

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of the stars. This was not suggested until as late as 1926 by astronomer Sir Arthur Eddington, while a detailed explanation of the physics involved were worked out by German-American physicist Hans Bethe in 1939.

Fusion is what makes hydrogen bombs work. So it's like millions of these bombs are going off at the sun's center every second. The fusion process occurs at the sun's center and out to about 30% of its radius where each second 630 million tons of hydrogen are converted to helium. Because of Herr Einstein's $E = MC^2$, 4,600,000 tons of the hydrogen will be converted to energy, so every second the sun weighs less by that amount. The photons created therein will require about 1 million years on average to fight their way to the sun's surface where by then their temperature has cooled to 11,000 F. This is the surface temperature we are exposed to when basking in the sun at a safe distance of 93 million miles.

Based on age estimates of meteoroids, the sun has been doing this for 4.6 billion years. Stellar evolution models show there is enough hydrogen left in the sun to continue "burning" for another 5 billion years (Student: "Professor, did you say 5 billion years or 5 million years?" Professor: "5 billion years." Student: "Whew! Thank God, I thought you said 5 million!"). So the sun is quite a powerhouse, a virtual giant cosmic nuclear reactor. It puts out enough energy in one second to run the modern world for 10 million trillion years. To pay for that energy, you'd need to write a check equal to the U.S. national gross product for 7 million years.

It's interesting to note that while the sun has made life possible here on Earth and sustains it, there is a thin line between friend and foe. By chance, we orbit in a "habitable zone", not too close to the sun (hot) or too far (cold). This has served us well over the eons and allowed biology to flourish on this grain of sand. But anyone who has suffered a severe sunburn or skin cancer knows the power of the sun's infrared and ultraviolet radiation. Indeed, if it wasn't for the Earth's protective ozone layer in the upper atmosphere, the sun's ultraviolet radiation would kill us off in short order.

There is more bad news ahead for us. In about 2 billion years, we'll see an increase in the sun's luminosity as it approaches its red giant phase of life. The helium "ash" produced from the fusion process accumulates at the sun's center where it contracts, heats up, and causes the outer hydrogen burning shell to fuse more furiously expanding the sun's size by about 100 times (bringing its edge out to somewhere between the orbits of Mercury and Venus). The sun is now a red giant with a surface temperature of 5800 F. Though cooler, it's closer and thus will fry Earth. The apparent diameter of the sun in the sky is now 50 degrees and takes 3 hours to rise.

In another 100 million years the helium core temperature reaches 180 million degrees F. and begins to fuse into carbon. This causes further expansion of the sun to perhaps Earth's orbit – it is now a larger red giant 200 times bigger and 1000 to 2000 times brighter than it was as a "normal" star. Earth, by now, is a burned out cinder. It may be orbiting within the low density extended atmosphere of the sun or might have receded outwards somewhat, due to sun's lessoning gravity from mass loss during the red giant stages. At this point Earth is just a lesson in geology as life was destroyed millions of years earlier from scorching solar radiation (Or perhaps even earlier from over population, pollution, disease, or war).

Old Sol's carbon core will never reach the 1 billion degree F. temperature required to fuse carbon; our sun isn't massive enough. It will literally expand itself to death creating a planetary nebula. Sloughing off its outer envelope it will reveal a collapsed carbon core about the size of Earth with half the sun's mass, a density equal to a ton per square inch, and a temperature of 180,000 F. Dense and white hot, the sun is now a white dwarf. No nuclear reactions are going on - the white dwarf shines from only compression. Like a dying ember in a fire place, it will gradually cool over billions of years into a cold black crystallized carbon stellar corpse, a dangerous bit of detritus for unwary space travelers!

But, it was good ride. A 10 billion year life. A stable furnace allowing life to form on one of its planets. Creator of a fine though brief planetary nebula. Ending its stellar career (no pun intended) as a white dwarf star lasting longer than its main sequence lifetime. Finally winking out into a dark collapsed carbon core. But wait! What is a compressed chunk of carbon?

"Twinkle, twinkle little star, how I wonder what you are. Up above the world so high, like a diamond in the sky."

◐ First Quarter Moon on February 4 at 23:29

● Full Moon on February 12 at 21:44

◑ Last Quarter Moon on February 21 at 00:17

○ New Moon on February 27 at 17:31

Treasuring What's Outside of Our Planet by Visual Means: A Blessing by Laurice Dee, Ph.D.

6 July 1997, I was having lunch at Einstein's Bagels. After picking up my delicious food, I went to the newspaper bin. I was going to select a paper at random so that I could have something to read while eating. A good way to stimulate my mind at the same time as my taste buds. Something from "outer space" caught my eye. A large photo of some odd-looking terrain was on the front page of the Arizona Republic. The entire rusty-colored surface was littered with varying-shaped rocks that almost matched the color of the surface. There were a couple of little hills in the distance. The sky was salmon-colored. I figured that it had to be Mars, since I was aware of it being red. A box-like machine (with wheels, of course) was sitting in front of the scenery with a rectangular solar panel on its top. I pulled that section out of the bin and anxiously read the story. I learned that if we would like to know what outer space looks like, we'd have to send some kind of robotic machine to photograph and bring the images back to our planet electronically. I understood that some spacecraft just arrived at Mars and took its first color photo of the terrain which appeared in the Arizona Republic. The article included a website address for those that wanted to know more about the photo, as well as the spacecraft's mission at Mars. I was so intrigued with the rock-scattered landscape and the story behind it that I nearly forgot my vegetarian bagel sandwich!

I took advantage of my developing Internet research skills to learn more about the mission, and as a result, I followed its progress during the following several months. The images brought back from Mars were quite awesome. I'd look at them and then read the information that explained about them. Not only did I learn about what Mars was like, but I was able to discover a few other missions from doing some research on the Internet. One spacecraft was exploring Jupiter while another awaited launch during the fall of 1997. Two spacecraft were already in space studying our star, the Sun. I must admit that I would not have followed these missions if it had not been for the incredible images that were brought back to Earth by these robotic explorers. Hey, wait a minute, didn't I mention that I am profoundly deaf? Because of my congenital deafness, I rely on my vision heavily to assimilate information on everything. This includes learning about outer space.

My getting to know "what is out there" was one of my most rewarding experiences, since I never knew anything about outer space when I was in school. Nor did I have an exposure to astronomy or space exploration during my growing-up years. All I knew was the nine planets in our solar system that I had to memorize in grade school science class. I'd look at the illustration of our solar system and try to remember the number of planets, as well as their names. Even though I was able to watch Neil Armstrong take his first steps on our Moon that was televised internationally, my knowledge of outer space was still extremely limited.

Thanks to the plethora of images that were taken by spacecraft that explored our Sun, as well as Mars and Jupiter, I was able to maintain interest in the Mars mission and develop my enthusiasm for the other missions that explored our solar system. After learning about one new mission after another via the Internet, I decided to do some public outreach by joining the Solar System Ambassadors program that is currently sponsored by Jet Propulsion Laboratory in Pasadena, California. One of the things I love to do as a Solar System Ambassador is share photos that were taken of our celestial neighborhood, including planets, asteroids, and comets, by various spacecraft. I am sure I'd bore the hell out of the public if I did not have anything visual to show them!

If it weren't for the remote sensing instruments that are affixed to various spacecraft, we would not be able to obtain images, as well as data, of space objects that are being explored. Simple as it is. Not only am I the one to appreciate outer space by not having to "listen" to learn new things, but so many of you, space- and astronomy-enthusiasts, develop your love for the outer space, and the beautiful photos make it even more so! Textual information, as well as illustrations, enhances your understanding of what is outside of our planet. Imagine what it would have been like for us to learn about outer space without looking at photos? It is almost like trying to type information into the computer or obtain it when the computer is off!

During the early centuries, well-known astronomers, including Galileo Galilei, Giovanni Cassini, and Christaan Huygens, were able to develop and use telescopes to find out what was in the night sky. They took extensive notes on what they observed. Such notes were compared and made public. There was a strong disagreement about whether the Earth was the center of everything that was orbiting around it. Because Galileo was able to see that the moons of Jupiter orbit around the huge gas giant, he strongly believed that the Sun was the center, not

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Treasuring What's Outside of Our Planet by Visual Means: A Blessing

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Earth. He was placed under house arrest for the rest of his life because one strong religious group was very much against it and did not want to hear any more of Galileo's arguments. With improvements in telescopes in terms of visibility, as well as magnification, later astronomers were able to prove that the Sun was the center.

Fast forward to our time. Technology has advanced so much that we are so fortunate to have the technical means to know what outer space truly is like. Thanks to the ground-based instruments, we are able to get to know the objects that float in space outside of our planet visually. If it weren't for the sophisticated binoculars and telescopes that many of us possess, we would probably never enjoy close-up views of objects such as the following: richly-textured surface of our Moon; the sunspots that appear on our Sun; the dimly-lit little Mercury; the brightly-lit Venus; the vast redness of Mars; the dark bands of Jupiter; the expansive Saturn ring system; comets with their fuzzy tails; planetary and solar nebulae; star clusters (as well as infinite number of stars!); distant galaxies; and, of course, our Milky Way, one of the numerous galaxies where our solar system is located. Peering through the powerful lens of our scopes, we are able to see the four Galilean satellites that orbit Jupiter, as well as the multiple moons that revolve around Saturn. We also get a good glimpse of the global details of Venus and Mars when they move close to Earth.

Thanks to our robotic explorers that travel in space, we are able to obtain details of our solar system and beyond through visual means. Although it may be nice to listen to receive information about outer space, the photos definitely speak volumes. Here is something to ponder: How are we able to appreciate space-related details, such as volcanoes on Io, one of the Galilean satellites, if we were listening to a piece of information about the Jovian system? Since it is quite impossible to know the intricacies of the universe through listening alone, images brought back by space-traveling machines are something that all of us cannot possibly do without.

Not only we study the universe through photos, but we are able to appreciate the detailed features of our home planet (from the outside), thanks to the satellites that orbit Earth. Let me share one experience of mine. Very shortly after receiving articles and photos of tropical cyclones, including hurricanes, that were sent to me by my aunt who lives in Tampa, Florida, I started developing interest in the formation, as well as the lifetime, of tropical cyclones in the Atlantic and Pacific oceans, Gulf of Mexico, and the Caribbean Sea. I have learned so much about tropical depressions, tropical storms, and hurricanes by tracking them via the National Hurricane Center (NHC) website during one hurricane season after another. If it weren't for the Geostationary Operational Environmental Satellites (GOES), as well as a few other Earth-orbiting satellites, that beam updated images of tropical cyclones to Earth, I would have no idea of what a massive swirling convective storm system looks like, as well as its development and activity. Following tropical cyclones every hurricane season by looking at images and reading reports from the NHC website continues to be an extremely interesting experience for me. A great way to appreciate our Mother Nature!

For all the things I've mentioned above, I must say that we're definitely blessed to have our sight which enables us to treasure all the details of our celestial neighborhood, as well as the universe, with the use of high-tech, ground-based equipment and remote-sensing instruments on board spacecraft. For the life of me, I cannot imagine anyone appreciating the vastness of outer space by auditory means without looking at images!

Back to the color photo of Mars that I mentioned earlier, it was the Pathfinder lander that took the image of the beautiful terrain. The cute little rover, Sojourner, was sitting in stowed position right in front of the lander. Both the lander and rover arrived at Mars on the 4th of July in 1997 and had an extremely successful mission. Sojourner took images and collected data on various rocks after rolling down from the lander. The lander itself took images of the scenery and took measurements of the Mars environment. The huge success of the mission led to several missions that have already arrived at Mars to perform extensive study of the Red Planet.

By the way, if Galileo, Cassini, and Huygens had lived in our time, they would probably get so much information by using sophisticated instruments that they would hardly get any sleep! Imagine what it would have been like for them to work alongside with current astronomers and scientists!

If you have any questions and would like to comment, please do contact Dr. Dee at jplssambassador@wyndtell.com or launchspace@msn.com or send her a fax at 480.890.7878. The website for the JPL Solar System Ambassadors Program is http://www.jpl.nasa.gov/ambassador

Laurice Dee, Ph.D.

JPL Solar System Ambassador (Arizona Representative)

JPL Solar System Ambassadors Program, Jet Propulsion Laboratory (JPL) - Pasadena, CA

February Guest Speaker : Dr. Edward Bowell

Born in London, educated in Europe, Dr. Edward Bowell has been an astronomer at Lowell Observatory since 1973.

Dr. Bowell is the Principal Investigator for the Lowell Observatory Near-Earth Object Search (LONEOS). Begun in 1993, the LONEOS system utilizes a 0.6-meter f/1.8 Schmidt telescope to discover near-Earth comets and asteroids. Using a 4K x 4K CCD detector to cover a field of view of 2.9 x 2.9 degrees, the telescope is designed to make four scans per region over the entire visible sky each month down to a limiting magnitude of about 19. Dr. Bowell will give a presentation entitled 'Searching for Near-Earth Asteroids - Now and in the Future'.

Tachyons

by Henry De Jonge

This article will look at the idea that some particles may exist that can travel faster than the speed of light. In fact one of these proposed particles "always" travels faster than the speed of light! They are called Tachyons. We will discuss some ideas about faster than light travel, the properties of Tachyons, how they may differ from ordinary particles, and whether or not we may ever be able to detect them.

FASTER THAN LIGHT TRAVEL AND TACHYONS

Can anything go faster than the speed of light? According to relativity theory, objects with mass that are initially at rest or going at sub light speeds, are restricted from ever exceeding the speed of light, as this would require infinite energy. In another mode of thought according to special relativity theory, if anything were going faster than the speed of light it would have an imaginary mass, [4].

Consider that light has no trouble going at the speed of light and some objects have no trouble converting to light as well. Light can also convert to objects with mass, [9]. In another vein of thought, the Smarandache hypothesis in 1998 stated that there is no such thing as a speed limit in the universe, [5].

With these ideas in mind, consider that there are instances that would appear to show faster than light speed. One is the photon that through quantum tunneling, appears to suddenly reappear on the far side of a quantum barrier. Because of the uncertainty principle the photon has a very small but real chance of suddenly appearing on the other side of the barrier, ("quantum tunnel effect"), [4]. This tunnel effect is so fast it would seem to be faster than light.

The Einstein-Podolsky-Rosen phenomenon is a second quantum example of seemingly faster than light travel. In this effect two distant, separated, photons from a common source, can apparently influence one another's behavior at two distantly separated detectors, [4]. This appears to be a faster than light influence of one photon upon another.

In 2000, a scientist produced a laser pulse with a "group" velocity faster than the speed of light. Cases such as this, where the "phase" or "group" velocity of a wave may exceed the speed of light, are the results of classical interference, and do not involve any energy or information traveling faster then the speed of light, [5]. These are examples of superluminal phenomenon. Thus we see examples of faster than light travel that seem to exist.

What about anything that is already going faster than the speed of light or having no mass to begin with? According to the inflation theory of the origin of the universe, during the big bang, at about 10^-35 second, for an extremely brief period, the universe expanded faster than the speed of light, [3]. What of all the matter and energy during this period? Did all revert back to "normal" after this inflationary blink? Could there have been Tachyons generated during this period of inflation that are still in existence? Could they exist because they are always going faster then the speed of light since their creation?

In 1962 the idea of particles traveling faster than the speed of light was "officially" proposed by Bilaniuk, Deshpande, and Sudarshan, [1]. Gerald Feinberg was the first person to coin the term "Tachyon", from the Greek for swift, [4].

Tachyons would appear to have some very interesting properties. For example, they accelerate if they lose energy, and theoretically at zero energy they would have infinite speed, [2]! Such a Tachyon with zero energy and infinite speed is called transcendent, [6]. To slow the particle to below the speed of light would require infinite energy, [4].

Tachyons also would seem to violate the law of causality, (causality problem) since when two casually connected events A and B are connected with a speed faster than the speed of light, for a stationary reference frame, then event B occurs before event A, [5]. They seem to be able to travel back in time!

Tachyons can also be assigned properties of normal matter such as spin and even an antiparticle. Some theories also allow the Tachyon to have a real mass, [5]! Obviously there are different models, which can assign Tachyons different properties. As we mentioned before, according to spe-

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Classified Advertisements

16" Newtonian Reflector

16" f/5 Dobsonian with a John Hall mirror (Pegasus Optics). Equipped with a Novak mirror cell, spider and diagonal holder; 2" Meade rack and pinion focuser and a University Optics 11x80 finder scope.

$1200 or best offer

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This mount is rock solid and comes with the Takahashi wooden legs. It easily handles the 30 pounds of my Takahashi FS152. I just need something easier for me to handle as I get older.

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Wide angle eyepiece featuring 70° AFOV and ~14mm eye relief in an aluminum body with a wide rubber grip ring. Rubber eyeguard folds back for use with eyeglasses. Barrels are threaded for standard 1¼" filters and have a lock screw safety recess. Multicoated optics, blackened barrels, with top and bottom caps. I have two available. These sell for $49 each new. I will sell one for $30 or both for $55

Peter Argenziano 480-633-7479

news@eastvalleyastronomy.org

Celestron has announced that users can now obtain the new flash upgradeable hand controls with SkyAlign technology for their NexStar GPS and NexStar i Series telescopes. If you would like to purchase a new hand control, the part number is NXW210-NXS0403 and they are available for $150. To order please send a check or money order to:

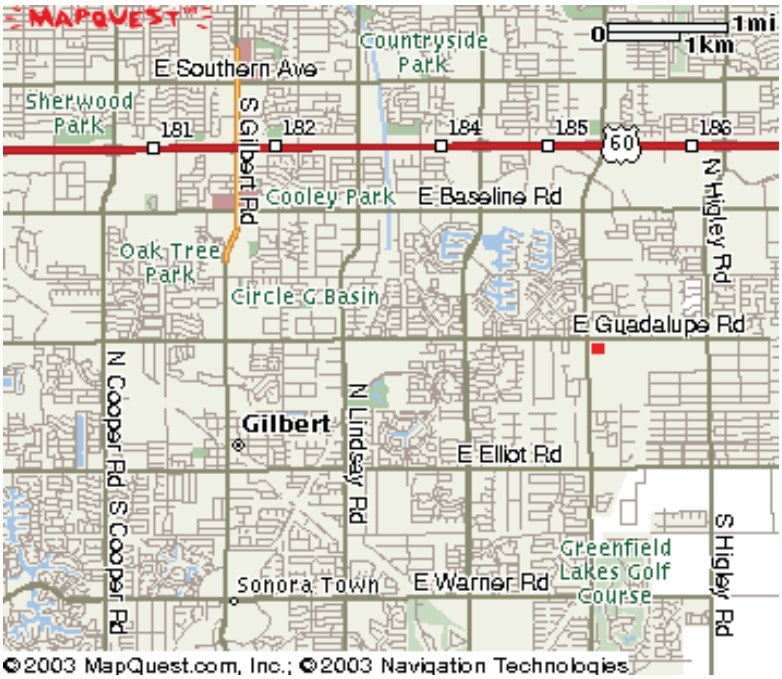
Celestron, Attn: Upgrade, P.O. Box 80770, San Marino, CA 91118

Please make sure to include the part number for the hand control you would like and remember to include your return ship to address on the parts request. Celestron is also offering a trade-in program for your old hand control (in which case you will lose your North and Level abilities). If you would like to exchange your old hand control, you will first need a Return Authorization Number. To obtain an R.A., please send your name, address and daytime phone number to Celestron and they will provide you a Return Authorization number and shipping instructions. You will need to send in your old hand control along with a check or money order for $75. Please note that this upgrade only applies to the computerized hand controls. Basic hand controls that do not have the numbered keypad attached are ineligible for this trade-in offer. CGE and Advanced Series telescope owners can also obtain new flash upgradeable hand controls under the same program. The part number for your upgradeable German equatorial hand controls is NXW210-GEM0410. Please note that neither of these hand controls will work with our NexStar GT series nor original NexStar telescopes. If you have questions or need further details, please feel free to call Celestron Technical Support Services at (310) 803-5955

Advertisements for astronomical equipment or services will be accepted from current EVAC members only. Ads will be published as space permits and may be edited. Ads should consist of a brief text description and must include a current member name and phone number. You may include your email address if you wish. Ads will be published until canceled (as space allows), so please inform the editor when your item has sold.

Ads should be emailed to: news@eastvalleyastronomy.org

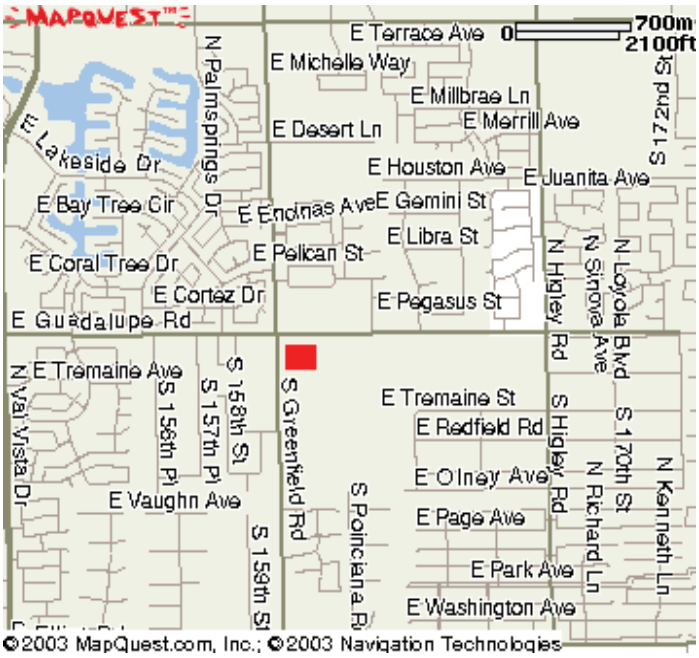
Support your local telescope dealer!



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 Rd., on the southeast corner of Greenfield and Guadalupe Roads. Meetings begin at 7:30pm.

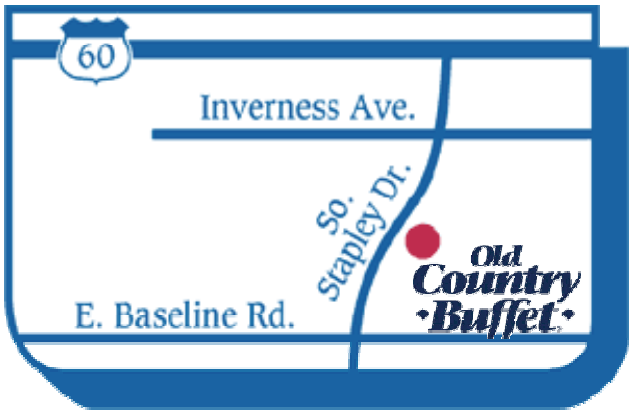
Visitors are always welcome!



2006 Meeting Dates

February 17
March 17
April 21
May 19
June 16
July 21
August 18
September 15
October 14 ***Special Date***
November 17
December 15

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, (near the Walmart Supercenter) just south of US 60.

Old Country Buffet 1855 S. Stapley Drive in Mesa

February 2006

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			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				

Schedule of Events

- *February 1 - Copper Basin Elementary School Star Party*
- *February 2 - Sanborn School Star Party*
- *February 10 - Public Star Party at Riparian Preserve in Gilbert*
- *February 17 - Monthly Meeting at Southeast Regional Library in Gilbert*
- *February 18 - Local Star Party at Boyce Thompson Arboretum State Park*
- *February 25 - Deep Sky Star Party at Vekol Road*

Minutes of January General Meeting

Meeting date: Friday, January 20, 2006

Meeting location: Southeast Regional Library in Gilbert

The meeting was opened by Vice President Silvio Jaconelli, who was standing in for vacationing President Steven Aggas.

The meeting was attended by roughly 90 people. After introductions of Board members and visitors, Wayne Thomas gave the Treasurer's report. Randy Peterson announced upcoming events. Peter Argenziano followed with announcements of JPL highlights and a SAC novice star party slated for February 18 at their Flatiron site.

AJ Crayon announced the All-Arizona Messier Marathon will be held at the Arizona City site on March 25. Marathon popularizer Don Machholz will be making the trip from northern California.

Vice President Silvio Jaconelli announced that the next EVAC meeting will be held on February 17. The speaker will be Ted Bowell from Lowell Observatory. Silvio asked members for input on whether a swap meet might be a suitable alterative to a speaker for an EVAC meeting.

Show and tell came next. Chris Schur showed some of his recent images, which were up to his usual high standard. A couple highlights included images of Hoag's object and the halo surrounding NGC 6826.

After the break, outgoing Vice President Howard Israel introduced the main speaker, William K. Hartmann, an astronomer and space artist from the Planetary Science Institute. Dr. Hartmann developed his premise that Mars has had flowing water quite recently. Comparisons of spacecraft images of Mars and similar images from Earth showed geologically young river beds on both planets. Other images of Mars show glacial patterns with a great similarity to those on Earth's polar regions.

As you may already know, EVAC is a nonprofit Arizona corporation. We are currently completing the process to grant us federal tax exemption under section 501(c)(3) of the Internal Revenue Code. To this end the IRS recommends that we have a conflict of interest policy. The Board of Directors have accepted a proposal to adopt such a policy. According to our bylaws, this proposal will need to be ratified by a simple majority vote of those members in attendance at the February general meeting.

You may view the proposed policy here: http://www.eastvalleyastronomy.org/CoIP.htm

If you would like to read the proposed document in person, copies of the conflict of interest policy will be available at the meeting as well.

East Valley Astronomy Club -- 2006 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: ☐

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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 my family and I 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

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Snowstorm on Pluto

by Dr. Tony Phillips

.There's a nip in the air. Outside it's beginning to snow, the first fall of winter. A few delicate flakes tumble from the sky, innocently enough, but this is no mere flurry.

Soon the air is choked with snow, falling so fast and hard it seems to pull the sky down with it. Indeed, that's what happens. Weeks later when the storm finally ends the entire atmosphere is gone. Every molecule of air on your planet has frozen and fallen to the ground.

That was a snowstorm—on Pluto.

Once every year on Pluto (1 Pluto-year = 248 Earth-years), around the beginning of winter, it gets so cold that the atmosphere freezes. Air on Pluto is made mainly of nitrogen with a smattering of methane and other compounds. When the temperature dips to about 32 K (-240 C), these molecules crystallize and the atmosphere comes down.

"The collapse can happen quite suddenly," says Alan Stern of the Southwest Research Institute. "Snow begins to fall, the surface reflects more sunlight, forcing quicker cooling, accelerating the snowfall. It can all be over in a few weeks or months."

Researchers believe this will happen sometime during the next 10 to 20 years. Pluto is receding from the warmth of the Sun, carried outward by its 25% elliptical orbit. Winter is coming.

So is New Horizons. Stern is lead scientist for the robotic probe, which left Earth in January bound for Pluto. In 2015 New Horizons will become the first spacecraft to visit that distant planet. The question is, will it arrive before the snowstorm?

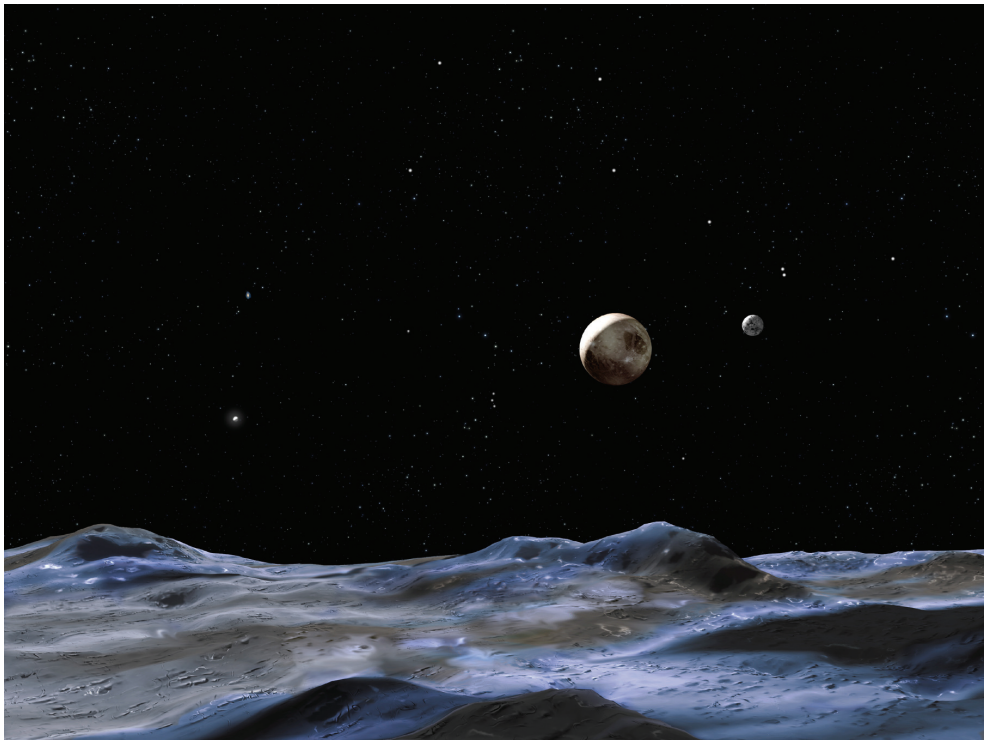
"We hope so," says Stern. The spacecraft is bristling with instruments designed to study Pluto's atmosphere and surface. "But we can't study the atmosphere if it's not there." Furthermore, a layer of snow on the ground ("probably a few centimeters deep," estimates Stern) could hide the underlying surface from New Horizon's remote sensors.

Stern isn't too concerned: "Pluto's atmosphere was discovered in 1988 when astronomers watched the planet pass in front of a distant star—a stellar occultation." The star, instead of vanishing abruptly at Pluto's solid edge, faded slowly. Pluto was "fuzzy;" it had air. "Similar occultations observed since then (most recently in 2002) reveal no sign of [impending] collapse," says Stern. On the contrary, the atmosphere appears to be expanding, puffed up by lingering heat from Pluto's waning summer.

Nevertheless, it's a good thing New Horizons is fast, hurtling toward Pluto at 30,000 mph. Winter. New Horizons. Only one can be first. The race is on….

Find out more about the New Horizons mission at http://pluto.jhuapl.edu . Kids can learn amazing facts about Pluto at spaceplace.nasa.gov/en/kids/pluto.

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



This artist's rendering shows how Pluto and two of its possible three moons might look from the surface of the third moon.
Credit: NASA/ESA and G. Bacon (STSci)

If it's Clear...

by Fulton Wright, Jr.
Prescott Astronomy Club

February 2006

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 Wednesday, February 1, Saturn is about 1/2 degree from the Beehive cluster. It has been sneaking up on the cluster all last month. Look for them low in the east-northeast after sunset. Binoculars will help you see the cluster.

Saturn should be close to the cluster for another couple of days.

On Saturday, February 4, from dark till midnight, you can see two asteroids near each other. 11 Parthenope and 16 Psyche are barely more than 1 arc minute apart. This is for people who like a challenge. They are both magnitude 11 so you will need a big telescope to see them. The Moon will interfere, though less a few days earlier when they are still close. I couldn't find a finder chart on the internet so you will probably need a planetarium program to know where to look (a couple of degrees north of Aldebaran).

There are a lot of 11th magnitude stars in the area so you will probably need to make photos or drawings on successive nights and see which "stars" move. Good luck.

On Monday, February 6, about 1:17 AM, you can see the Moon occult a fairly bright star. With binoculars or a small (3

inch) telescope look low in the west for the gibbous Moon about to set. Merope, 23 Tauri, a 4th magnitude star in the Pleiades, will be covered by the dark limb of the Moon.

On Sunday, February 12, at 5:54 PM, the full Moon rises, so forget the faint fuzzes for tonight.

On Tuesday, February 14, at 8:32 AM, you WON'T be able to see two planets near each other because the sun will be up.

It's too bad, for if you could see them, Mercury and Uranus would be only a little more than 1 arc minute apart.

On Friday, February 17, about 6:30 AM, you can see Venus at its brightest. Look 20 degrees above the southeast horizon for the magnitude -4.6 planet. It should be hard to miss for a week or two around this date.

On Friday & Saturday, February 17 & 18, about 9:00 PM, you can find Saturn's moons grouped near the planet. You can use a planetarium program like Guide, or the internet (for

example:

http://skyandtelescope.com/observing/objects/planets/article_1136_2.asp)

to find the exact positions. There is also a map for the 18th on page 58 of the February 2006 issue of Astronomy magazine. The bigger telescope you have, the more of them you can see.

On Thursday, February 23, about 7:00 PM, you can see Mercury. With binoculars or a small (3 inch) telescope, look 10 degrees above the west horizon for the magnitude 0 planet. It should be visible for a few days around this date. You won't get a better evening view of it in 2006.

On Monday, February 27, the Moon is new so you have all night to search for faint fuzzes.

Coming in March… our guest speaker will be noted amateur astronomer and EVAC member Bill Dellinges. Bill presentation will cover the telescope industry from 1950 to 1970. Using slides of S&T ads from this watershed period, we'll see how the amateur telescope market blossomed from a barren state of affairs to a cornucopia of equipment.

Star Party Disclaimer

The East Valley Astronomy Club (EVAC) is not responsible for the property or liability of any star party participant, nor will the club be held liable for their actions or possessions. EVAC is not responsible for any vehicular damage, theft, or mechanical difficulties that may occur while attending a star party. EVAC strongly recommends adherence to the doctrine of 'safety in numbers' when it comes to remote observing sites. In the interest of safety it is recommended that you don't go to remote sites alone and that someone knows where you have gone each time you go out observing.

(Continued from page 5)

cial relativity theory Tachyons traveling faster then the speed of light would have an imaginary mass. Ordinarily this would seem to be absurd and therefore meaningless. In Hawking's recent book, he discusses the concept of imaginary time and mentions that using imaginary time and imaginary numbers, (used in quantum and M theory) actually predicts effects we have observed! Thus just because we use the imaginary number system in our physical models does not mean they are meaningless or just a curiosity. Sometimes the distinction between what is real and imaginary may just be in our minds, [7].

The "Tachyon paradox" supposedly demonstrates that Tachyons do not have an electric charge. This argument states that since the transcendence of a Tachyon is frame dependent, then in one frame it would appear to have a nonzero energy while in another it would appear to be transcendent. Therefore in the transcendent frame it would have zero energy and emit no Cerenkov radiation while in the other it would still be emitting Cerenkov radiation while on its way to transcendence. Since both cannot be true the Tachyon cannot therefore have an electric charge, [6].

We see that the idea of faster than light travel with some very interesting examples has been around for awhile and that Tachyons can have many of the properties of ordinary particles as well as some unique properties of their own.

DO THEY EXIST?

So far, direct physical evidence for the existence of Tachyons has not been repeatedly observed. In the 1980's the elusive and surprising neutrino was though to be a Tachyon, [1]. Measuring the speed of neutrinos accurately enough to see if they do travel faster than the speed of light has been inconclusive. Searches have also been made for them as a result of interactions with ordinary particles by studying high-energy nuclear reactions and no evidence has yet been found, [2].

Looking at cosmic rays has been another method of attempted detection. The energies and speed involved in some cosmic rays are truly phenomenal. Some particle theories that predict "neutron spikes" or proton decay in cosmic rays would infer the existence of Tachyons or imply that Tachyons are neutrinos, but these studies are also inconclusive, [1]. In 1973 two researchers identified a "superluminal" (faster than light) particle in a cosmic ray shower, but the result has never been reproduced, [5].

Some unique Tachyon properties may aid us in the possibility of detecting them. Theoretically, if they were electrically charged, (remember the "Tachyon Paradox") and since they move faster than the speed of light in a vacuum, they would be expected to produce Cerenkov radiation, [2]. So far no evidence of such radiation has been found, and Cerenkov radiation has never been detected in a vacuum, [2], [9]. On the other hand the loss of energy through Cerenkov radiation will lower the energy of the Tachyon which will make it go faster and faster until it moves into transcendence, [6]. Could it still be detected? We have also seen that the 'Tachyon paradox" precludes the Tachyon from even having an electric charge, therefore it would never emit any Cerenkov radiation. So can they really carry an electric charge? It seems that there are still many questions and paradoxes involving Tachyons! I admit that I am also a bit confused!

According to some modern string theories, like the inclusive M-theory, the existence of Tachyons may even be required. Some of these theories involve the use of Tachyons to radiate away the excess energy of a high-energy particle so that it can fall into a black hole and not be deflected away. These particles may "spit" out Tachyons as they merge with the black hole, [4].

On other theoretical considerations, when Maxwell's equations are tied to inverted atomic media, (lasers again) they can lead to Tachyon like solutions, [8]. One would also think that they might produce some detectable gravitational effects when in abundance.

Thus we have both physical phenomena and theoretical models that imply the existence of Tachyons and offer possible detection methods for such particles.

CONCLUSION

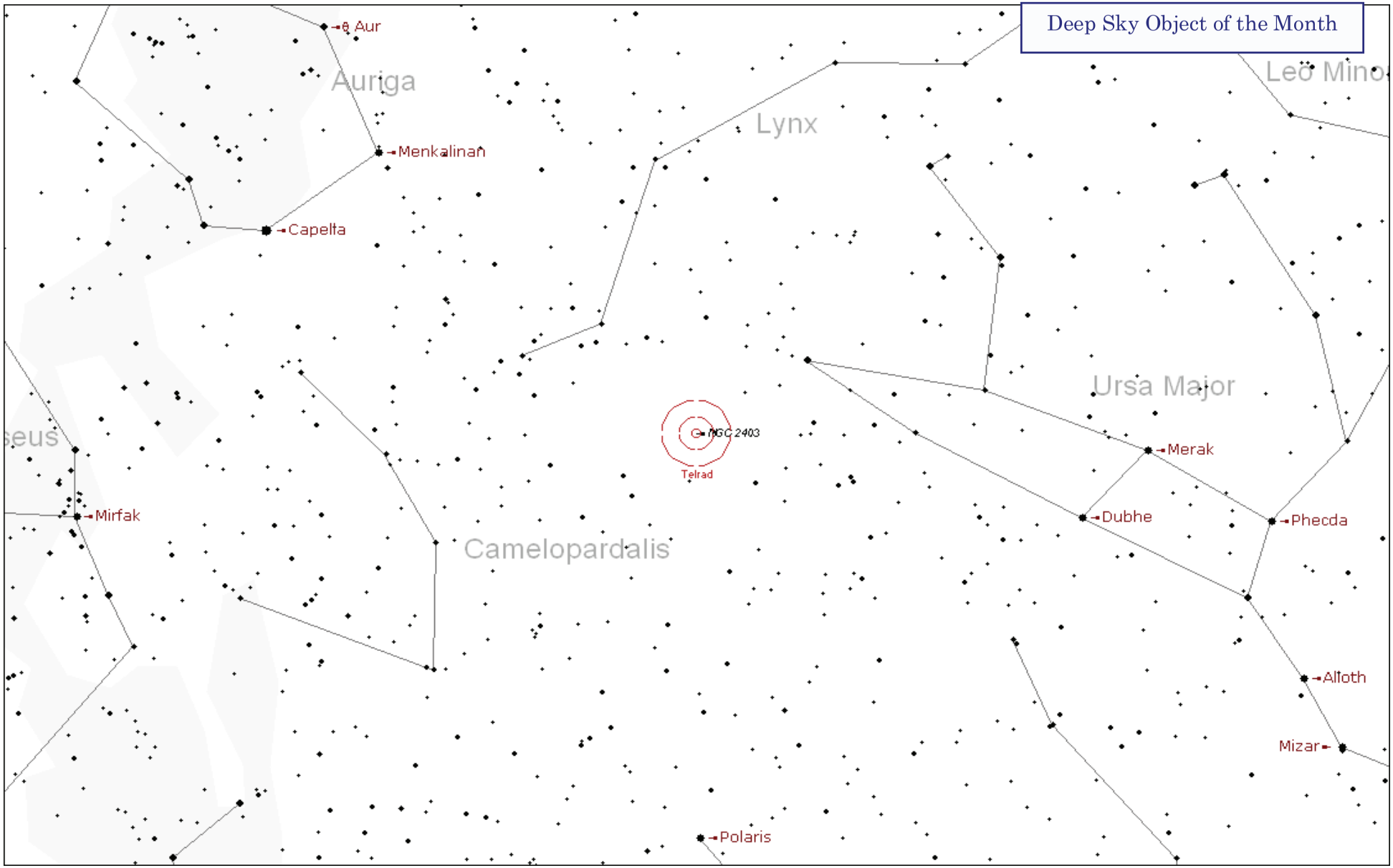
Obviously there is still not any fully accepted or repeatable proof of the existence of Tachyons. They are still a hypothetical particle. Their existence though does seem to be implied by several different means and there also seem to be some methods of verifying their existence that may pan out in the future. After all, gravity waves still have yet to be detected despite our continued attempts.

We are trying to measure particles that are not ordinary with ordinary particle constructed devices. Does this bring with it an inherent limitation? Sometimes our technology takes awhile to catch up with theory and indicate the existence or nonexistence of their predictions. When dealing with such ideas that are out of the realm of even current far flung theories and abnormal physical evidence, perhaps a bit of philosophy and paradox, (confusion) is normal!

There are still many questions about Tachyons that we have not touched upon such as their role in the missing dark matter or vacuum energy. Can they decay or transform into ordinary particles? Are there other critical speeds other than the speed of light in a vacuum, [10]? Should we expect Tachyons to radiate in the same

(Continued on page 15)

Deep Sky Object of the Month



NGC 2403 Nearly Face-On Spiral Galaxy in Camelopardalis

Magnitude: 8.9 Size: 23'.4 x 12'.3 One supernova as of 1983

RA 07h 36m 50.6s Dec +65° 36' 10" Mean Surface Brightness: 23.7 Mag/Arc-Sec^2

Tachyons

(Continued from page 13)

manner as an ordinary particle, [11]? What if Tachyons never cross the light speed barrier and never interact with ordinary matter, or cause causality violations. Would they still exist? Could they ever be detected? Eventually we will have more answers about Tachyons.

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[10] L. Gonzales-Mestres, arXiv:hep-ph/9610474 v1 25 Oct 1996. "Physical and

Cosmological Implications of a Possible Class of Particles able to Travel Faster then

Light"

[11] Ernst L. Wall "The Physics of Negative Mass Tachyons"

http://www.1.shore.net/~ewall/

Henry De Jonge is a semiconductor equipment sales manager and a member of EVAC residing in Gilbert. He has always loved the stars and in between traveling and studying for his MS in astronomy, (degree expected in June 06) enjoys hiking and family activities.

Meeting Minutes for First Quarter 2006 Board Meeting

Meeting commenced at 7:30PM.

Tax-exempt status update was postponed since the project chairperson was not in attendance.

A preliminary budget was discussed, going through each line-item, to determine proper amounts needed for that department to function as intended. Wayne will formalize the discussed numbers and send budget to the EVAC governing body.

The canopy purchase postponed from 2005 was discussed. Info on 10'x10' collapsible canopies will be researched and info sent to the EVAC governing body. It is expected that four canopies will be purchased for a modular approach to EVAC's needs at any upcoming events.

The item up for discussion/vote regarding increasing/changing the absenteeism quantities was defeated. The wording of the C&B's will remain the same. It is felt that the participation must include attending the necessary meetings as the ebb and tide of the discussion covers many options than the proposed wording.

The item up for discussion/vote regarding EVAC sponsoring a second major star party was defeated. Gwen Grace will be thanked for putting together such a nice presentation but the resources in both people power and funds are not available.

During the Open Discussion part of the meeting the following topics were brought up:

1. Riparian dome construction timetable.
2. Gilbert/Riparian network for increasing EVAC membership/awareness.
3. Business cards for EVAC Officers.
4. Email with current months main speaker information sent out within a week of the meeting as a reminder.
5. Current months' main speaker information as a link on the EVAC calendar to the page of intended speakers.
6. Contact scout troops as a way to increase the younger age group of the typical bimodal age distribution found in astronomy.
7. Making a ½ page handout for when EVAC provides telescopes for school star parties, as a way of getting the word out about EVAC and increasing the meeting attendance by young adults and families.
8. Asking for a volunteer within EVAC to act as a meeting greeter for unfamiliar faces in an effort to break the ice with new attendees.

Meeting adjourned at 10:25PM.

The Voyager is published monthly by the East Valley Astronomy Club and made available electronically (PDF) the first week of the month. Printed copies are available at the monthly meeting.

Please send your contributions, tips, suggestions and comments to the Editor (Peter Argenziano) at: news@eastvalleyastronomy.org

Contributions may be edited.

www.eastvalleyastronomy.org

Keep Looking Up!

East Valley Astronomy Club

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