The Astronews

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All About Zodiacal Light

by Joe Rao

At certain times of year in the right locations, a faint cone of light appears in the predawn sky for lucky viewers in dark locations. This eerie glow is the Zodiacal Light. It is best seen before daybreak, generally two to three hours before sunrise in the eastern sky. But it's also visible in the west at certain times of year.

Over the centuries countless individuals have been fooled into thinking the Zodiacal Light was the first vestige of morning twilight. In fact, the Persian astronomer, mathematician and poet Omar Khayyam, who lived around the turn of the 12th Century, made reference to it as a "false dawn" in his one long poem, The Rubaiyat.

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Inside this issue:

Upcoming Star Parties

Public Party	**Sep 6**	**Kahala Park**
Club Party	**Sep 20**	**Dillingham**
Public Party	**Sep 27**	**Dillingham**
Public Party	**Oct 4**	**Kahala Park**
Club Party	**Oct 18**	**Dillingham**
Public Party	**Oct 25**	**Dillingham**

Upcoming Events:

- The next meeting is 7:30 on September 2nd at the Bishop Museum.
- **Sam Rhodes** next Planetarium show on Mon. Sep. 1st.

President's Message

When most readers see this, Mars will be past opposition. However, as I write this Earth is still approaching Mars. We have all heard that this is the closest that Earth and Mars have come in thousands of years. (On August 26, 2003, at 11:51 p.m. HST, Mars will be 34,646,418 miles away). But closest by how much, and for how long?

The reason that Mars oppositions are always rare opportunities, and this one especially so, relates to the orbits of Earth and Mars. Of the outer planets, only Mars comes so close to Earth and changes its distance from Earth so dramatically. If the orbit of Mars were more nearly circular, each opposition would be about as good as the next or previous one. However, Mars has one of the most elliptical orbits of any planet in the solar system. The best oppositions occur when Mars is nearest perihelion, its closest approach to the Sun. Because it takes almost 26 months (on average) for Earth to catch up to Mars again, it takes seven or eight oppositions (about 15 or 17 years) to complete a cycle of Mars oppositions, from good to relatively poor and back to good again.

In case you missed it, Sky and Telescope had a good article in the June issue that discussed some aspects of the closeness of Mars. The diameter of Mars at this year's closest approach will be about 25.1". The last two "good" oppositions were in August 1971 (24.9") and September 1988 (23.8"). Contrast that with the previous two oppositions: May 1999 (16.2") and June 2001 (20.8").

Because the gravity of every body affects everything else, calculating past positions is tricky. However, one celestial mechanic who tried to take every significant body into account calculated that in 57,617 B.C. the diameter of Mars reached 25.13" compared to the 25.11" expected this time.

I found no answer to my question of how long Mars will be closer than at the previous next-best opposition. My guess is for less than a day. However, Mars will still appear larger than it was at its best during the 2001 opposition for the entire month of September.

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Observer's Notebook—September 2003 by Jay Wrathall

Planets Close to the Moon

Times are Hawaii Standard Time

Sep 7, 12h, M 4.9° SSE of Neptune
(146° from sun in evening sky)
Sep 8, 23h, M 4.2° SSE of Uranus
(163° from sun in evening sky)
Sep 9, 02h, M 1.2° NNW of Mars
(164° from sun in evening sky)
Sep 19, 17h, M 4.7° N of Saturn
(75° from sun in morning sky)
Sep 23, 20h, M 4.1° NNE of Jupiter
(25° from sun in morning sky)
Sep 24, 10h, M 4.2° NNE of Mercury
(18° from sun in evening sky)

Venus is closer than 15° from the sun when near the moon in September.

Other Events of Interest

Times are Hawaii Standard Time

Sep 10, 06:35h, Full Moon
Sep 10, 16h, Mercury at inferior conjunction with sun
(Passes into morning sky)
Sep 12, 0h, Saturn 0.86° S of Asteroid 1 Ceres
(68° from sun in morning sky)
Sep 23, 00:48h, Fall or Autumn Equinox
Sep 25, 17:08h, New Moon
Sep 26, 14h, Mercury at greatest elongation
(17.9° West of the sun in the morning sky)

The Planets in September

Mercury
Mercury is visible in the morning twilight during the first week of the month.

Venus
Venus is still too close to the sun to be observed in September.

Mars
Mars is just past opposition and is still great for viewing, especially early in Sep.

Jupiter
Jupiter rises shortly before dawn and is too close to the sun for easy viewing.

Saturn
Saturn rises about 2:00 am and is visible in the pre-dawn sky.

Uranus
Uranus is near Mars and is well placed for viewing this month..

Neptune
Neptune is near Mars and Uranus and is easily viewed in September.

Pluto
Pluto is in Ophiuchus and can still be viewed in the evening sky.

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After opposition Mars will rise earlier, so it will be higher in the sky at a more convenient hour. Let's hope for clear skies and no dust storms. We won't get a chance like this again.

Chris

Meeting Minutes

by Gretchen West

The August 5, 2003 meeting was called to order by President Chris Peterson at 7:32 p.m. in the Atherton Halau, Bishop Museum, with thirty-one members and six visitors in attendance.

President Chris Peterson began by informing the membership that the next meeting will have a Mars theme. As we have the event at the Bishop Museum on the August 27 and so many members will individually be viewing the "Red Planet" at opposition, we want to be able to discuss and share information.

Bishop Museum / Mars Viewing

August 27th only: Mike Shannahan wants all members to know that the Bishop Museum will be having a Mars observation on August 27 from 8 pm to 12 midnight. Those who are helping out are advised that they can set up on the big lawn starting @7:00 pm. Viewing for August 26th is canceled.

Dillingham Renewal

Treasurer Jim Mac Donald has renewed our authorization with the Department of Transportation for the use of the Dillingham Field site. He reminded members who come to use the viewing area that there should be no over-night stays at the site. It is important that we help new members and visitors to keep to the roads and not venture out on to the taxi way or runway.

Public Star Party

A West Oahu viewing area and gathering has been proposed by Forrest Luke and John Gallagher at the Waikele Community Park. A free public star party at this site would take place on the same evenings as the Kahala Free Public Star Party at Kahala Community Park in East Oahu. Insurance coverage and premium costs are being researched and reported on by Jim MacDonald. Anyone interested in bringing their telescope to this site is asked to contact the board.

School Star Parties

Members are needed for the August 29 star party at Iroquois Point Elementary.

Lectures

On August 28, 2003 at 7:30 pm, the NASA Pacific Regional Planetary Data Center is presenting Dr. Peter Mouginis-Mark, Planetary Scientist who will talk about ***Mars Exploration and the Hunt for Water***.

The talk will take place in the Pacific Ocean Science & Technology building, UH Manoa, 1680 East-West Road, POST 544. Chris Peterson will have a telescope set up for the viewing of Mars.

Members Help Sought

Jim Bedient shared some information about the educational set-up for elementary and secondary schools use of the Faulkes Telescope-North. The 2m telescope, nearing completion at Haleakala, is sponsoring astronomy outreach and use for local school teachers and students for observing projects. Jim soliciting help from members in the club to volunteer to assist local teachers and students in

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Meteor Log—September 2003

by Mike Morrow

The best sporadic rates of the year are on show this month along with a few mysterious minor showers.

Monday the 1st, the Alpha Aurigids. Radiant 05h 36m +42° About 3 to 5 meteors per hour from this minor shower. Why mysterious? On occasion 30 meteors per hour have been observed; as happened in 1935, 1986 and 1994. Alpha Aurigids are swift and occasionally bright.

Tuesday the 9th, the Delta Aurigids. Radiant 04h 00m +47° Again about 4 meteors an hour. The full Moon on the 10th destroys this drizzle.

Saturday the 20th the Piscids. Radiant 00h 20m -01° here we are looking at 3 meteors an hour or less.

If you are interested in observing meteors
contact Tom Giguere on Oahu at 672-6677 or write to:
Mike Morrow, P.O. Box 6692, Ocean View, Hawaii 96737

Minutes *(Continued from page 4)*
their endeavors. If any members are interested please contact Jim Bedient at bedient@hawaii.edu, or call 423-8660.

Speaker of the Evening

Dr. James Beletic, Deputy Director of the W. M. Keck Observatory.

Dr. Beletic gave an expansive talk on the purpose for observation from the Keck Observatories on Mauna Kea. His discourse touched on astronomy as a passive science of observation. Such observations involves visible

particles and auroras, as well as electromagnetic waves in the form of visible and infrared optical and radio waves. Collection of information from light is accomplished using two methods. Collection of information uses pictures, analyzing structure and brightness. In addition light data may also be assesses using spectroanalysis.

Dr. Beletic explained the anatomy and construction of telescopes over time, from very early telescopes up to the sophisticated telescopes used today on Mauna Kea and at other sites around the world. Dr. Beletic

described the role of astronomy, the uses to which the gathered data can be put. He also spoke of the need for construction of additional outrigger telescopes at the Keck site on Mauna Kea.

Dr. Beletic's discourse was illustrated through the use of brilliant photographs from the Keck Telescopes and illuminating diagrams.

The meeting adjourned at 9:05 pm. for refreshment.

Respectfully submitted,
Gretchen West, HAS

Careful Planning and Quick Improvisation Succeed in Space Biz

by Tony Phillips

On December 18, 2001, ground controllers at JPL commanded NASA's Deep Space 1 (DS1) spacecraft to go to sleep. “It was a bittersweet moment,” recalls Marc Rayman, the DS1 project manager. Everyone was exhausted, including Deep Space 1, which for three years had taken Rayman and his team on the ride of their lives.

DS1 blasted off atop a Delta rocket in 1998. Most spacecraft are built from tried-and-true technology—otherwise mission controllers won't let them off the ground. But Deep Space 1 was different. Its mission was to test 12 advanced technologies. Among them: an experimental ion engine, a solar array that focused sunlight for extra power, and an autopilot with artificial intelligence. “There was a good chance DS1 wouldn't work at all; there were so many untried systems,” recalls Rayman.

Nevertheless, all 12 technologies worked; the mission was a big success.

Indeed, DS1 worked so well that in 1999 NASA approved an extended mission, which Rayman and colleagues had dreamed up long before DS1 left Earth—a visit to a comet. “We were thrilled,” says Rayman.

And that's when disaster struck. DS1's orientation system failed. The spacecraft couldn't navigate!

What do you do when a spacecraft breaks and it is 200 million miles away? “Improvise,” says Rayman.

Ironically, the device that broke, the 'Star Tracker,' was old technology. The DS1 team decided to use one of the 12 experimental devices—a miniature camera called MICAS—as a substitute. With Comet Borrelly receding fast, they reprogrammed the spacecraft and taught it to use MICAS for navigation, finishing barely in time to catch the comet. “It was a very close shave.”

In September 2001, DS1 swooped past the furiously evaporating nucleus of Comet Borrelly. “We thought the spacecraft might be pulverized,” Rayman recalls, but once again DS1 defied the odds. It captured the best-ever view of a comet's heart and emerged intact.

By that time, DS1 had been operating three times longer than planned, and it had nearly exhausted its supply of thruster-gas used to keep solar arrays pointed toward the Sun. Controllers had no choice but to deactivate the spacecraft, which remains in orbit between Earth and Mars.

Rayman has moved on to a new project-Dawn, an ion-propelled spacecraft that will visit two enormous asteroids, Ceres and Vesta, in 2010 and 2014. “Dawn is based on technologies that DS1 pioneered,” he says.

Even asleep, DS1 continues to amaze. Find out more about DS1 at http://nmp.jpl.nasa.gov/ds1. For kids, go to http://spaceplace.nasa.gov/ds1dots.htm to do an interactive dot-to-dot drawing of Deep Space 1.

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

Zodiacal Light *(Continued from page 1)*

What it is

It was once thought to be solely an atmospheric phenomenon: perhaps reflected sunlight shining on the very high atmosphere of Earth. We now know, however, that while the phenomenon indeed involves reflected sunlight, it is being reflected not off our atmosphere, but rather off a non-uniform distribution of space debris left over from the formation of the planets some 4.5 billion years ago.

These countless millions of particles—ranging in size from meter-sized miniasteroids to micron-sized dust grains—seem densest around the immediate vicinity of the Sun, but extend outward, beyond the orbit of Mars and are spread out along the plane of the ecliptic (the path the Sun follows throughout the year).

Hence the reason for the name "zodiacal" light, is because it is usually seen projected against the zodiacal constellations, which were conjured by astronomers and poets to fit the ecliptic.

When to see it

The best time to see the Zodiacal Light is when the ecliptic appears most nearly vertical to your local horizon.

For those in the Northern Hemisphere, this occurs in the western evening sky after sunset from early February to late March. The best morning view in the eastern sky comes from late September into the early part of November.

Conversely, for those who live in the Southern Hemisphere, the best view in the western evening sky comes after sunset from early August to late September, while the best morning view in the eastern sky comes from late March into the early part of May.

Dominic Cantin photographed the Zodiacal Light near Quebec City, Canada, in August 2000 in this 2-minute exposure. The bright spot is the planet Venus.

Those who live in the tropics or at the equator are luckiest of all, since it has been said that the Zodiacal Light is bright and very conspicuous from these regions. This is probably because the ecliptic is always favorably oriented there, allowing views of the Zodiacal Light both in the western evening sky and eastern morning sky all year long.

What it looks like

To the discerning eye, its diffuse shape resembles almost a tilted cone, wedge or slanted pyramid. At the base of the cone, the light may extend some 20 to 30 degrees along the horizon (a

(Continued on page 9)

Azathoth

by H.P. Lovecraft

When age fell upon the world, and wonder went out of the minds of men; when grey cities reared to smoky skies tall towers grim and ugly, in whose shadow none might dream of the sun or of Spring's flowering meads; when learning stripped the Earth of her mantle of beauty and poets sang no more of twisted phantoms seen with bleared and inward looking eyes; when these things had come to pass, and childish hopes had gone forever, there was a man who traveled out of life on a quest into spaces whither the world's dreams had fled.

Of the name and abode of this man little is written, for they were of the waking world only; yet it is said that both were obscure. It is enough to say that he dwelt in a city of high walls where sterile twilight reigned, that he toiled all day among shadow and turmoil, coming home at evening to a room whose one window opened not to open fields and groves but on to a dim court where other windows stared in dull despair. From that casement one might see only walls and windows, except sometimes when one leaned so far out and peered at the small stars that passed. And because mere walls and windows must soon drive a man to madness who dreams and reads much, the dweller in that room used night after night to lean out and peer aloft to glimpse some fragment of things beyond the waking world and the tall cities. After years he began to call the slow-sailing stars by name, and to follow them in fancy when they glided regretfully out of sight; till at length his vision opened to many secret vistas whose existence no common eye suspects. And one night a mighty gulf was bridged, and the dream-haunted skies swelled down to the lonely watcher's window to merge with the close air of his room and to make him a part of their fabulous wonder.

There came to that room wild streams of violet midnight glittering with dust of gold; vortices of dust and fire, swirling out of the ultimate spaces and heavy with perfumes from beyond the worlds. Opiate oceans poured there, litten by suns that the eye may never behold and having in their whirlpools strange dolphins and sea-nymphs of unrememberable depths. Noiseless infinity eddied around the dreamer and wafted him away without touching the body that leaned stiffly from the lonely window; and for days not counted in men's calendars the tides of far spheres that bore him gently to join the course of other cycles that tenderly left him sleeping on a green sunrise shore, a green shore fragrant with lotus blossoms and starred by red camalates… *(circa 1922)*

This fragment, found among Lovecraft's papers, is presumably his attempt to set down in rudimentary form, preparatory to expansion into a longer story, one of his dreams. It was never expanded.

Zodiacal Light *(Continued from page 7)*
fist on your outstretched arm covers about 10 degrees of sky).

At its best, the display can approach or even equal the Milky Way in brightness, yet it is typically so faint that even a small amount of atmospheric haze can obscure it. On exceptionally clear nights, the tapering cone might be seen to stretch more than halfway to the zenith, an imaginary point in the sky directly overhead from wherever you are.

Finer points to look for

Should you be blessed with optimum sky conditions -- absolutely no artificial lighting, smoke or haze -- you should also try to see the Zodiacal Band, which runs along the entire ecliptic and usually averages about 5 to 10 degrees in apparent width.

Also difficult to see, though actually perhaps a trifle brighter than the Zodiacal Band, is the "counterglow" or ***Gegenschein***. This is a very faint oval patch of light about 10 to 20 degrees long and 6 to 8 degrees wide (overall, comparable in size to the Great Square of Pegasus) and situated exactly on the ecliptic at that point diametrically opposite to the Sun in the sky. If the Sun has just dipped below the western horizon, for example, the counterglow would be just above the eastern horizon.

The counterglow is also caused by material wafting through space, but this stuff is beyond the orbit of Earth. It may appear ever-so-slightly brighter than the Zodiacal Band because the miniasteroids and meteoroids that reflect the light are on the exact opposite side of the Sun, so individually they're illuminated in much the same manner as the Moon at full phase. The maximum possible return of light to the Earth results, producing a concentrated glow at that particular portion of the band.

To see the Gegenschein with certainty is no small achievement. Not only does it require absolutely black skies, but unusual perception and visual acuity. Moreover, if it occurs anywhere in or near the Milky Way, it will be hopelessly lost in its light.

Because of its extreme faintness, your best chance of glimpsing it is to use averted vision. Try this: look directly toward that spot in the sky where the Gegenschein should be, then turn your eyes slowly to one side. Slowly returning your eyes to the spot, you just "might" be able to discern this fairly large—albeit exceedingly faint—hazy patch.

Those who live in the tropics or at the equator are luckiest of all since the Zodiacal light is bright and very conspicuous from these regions

Good Luck! (You'll need it.)

This article first appeared in the NightSky Friday section of Space.com, and is reprinted with the permission of the author..

Treasurer's Report

by Jim MacDonald

HAS Financial Report as of August 15, 2003

Initial Balance: $5,346.36

Receipts:

Dues Received	100.00
S&T Payment	65.90
Polo Shirt Deposit	34.36
Total Income:	$200.26

Expenses:

Astronews	78.36
Magazine Subscription Payment	61.95
Polo Shirts	28.65
Refreshments	9.50
Postage	40.95
Excise Tax	2.40
Total Expenses:	$221.81

Final Balance.....$5,324.81

During the month we had five new members join the club. They are ***Martin Kinna***, ***Jerry Kern***, ***Christopher Martin***, ***Michael Feeney*** and ***Melody Chang*** who has just rejoined the club. Welcome to the new members and many thanks to the members renewing their membership this month. Thanks and clear skies to all!

Letter to the Editor (Planetary Imaging with a Webcam)

Dear Sir/Madam

I started a website 2 months ago that documents successful webcam settings when taking pictures of the planet Mars:

http://www.webcam-astrophotography.com

Some of the questions it answers are:

- How many frames should be stacked from an astrophotography AVI?
- How many minutes long can my webcam capture AVI be before rotational blurring occurs?
- How do dust donuts affect image quality?
- What percentage gamma should I use for my webcam?

Webcam Imaging *(Continued from page 10)*

At the moment there are more than 50 sets of images of Mars taken during June, July and August 2003.

Your club's members could use this website to learn what works and what does not when taking pictures of Mars. This way, they need not waste time experimenting, but can spend it more productively taking pictures and AVIs using settings that work.

Your members that that do not do webcam astrophotography might still get value from this website, just by admiring the beauty of Mars. My pictures really started to get impressive and beautiful when I started using a 3x Barlow lens on 15 July 2003.

I am using an unmodified Logitech Quickcam Pro 4000. Most other standard webcams with CCD chips will work as well.

All the techniques I use will be useful when taking webcam images of Jupiter and Saturn as well. Please let your members know of this website.

Thank you,
Alwyn Botha

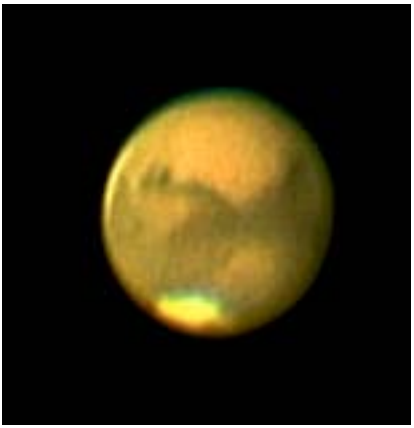
Editors Notes:

- *This topic was the subject of two of the most preeminent webcam imagers, Eric Ng from Hong Kong (http://www.ort.cuhk.edu.hk/ericng/webcam) & Tan Wei-Leong from Singapore (http://www.sg-planets.org/) during their very entertaining tech talk at Stellafane. You can see a webcast of their talk,* ***Pushing the Limits of Resolution in Lunar & Planetary Imaging with a Webcam*** *at the following URL:*

http://www.stellafane.com/post_conv/2003_conv/2003_conv_2.html#techtalks

- *There is also an excellent article on planetary webcam imaging on page 117 of the June, 2003 issue of Sky & Telescope.*

- *Stephanie Choquette's friend Marc Ricard has been using the webcam technique with his C-8 and shares his excellent results with us in this image.*



- *The combined hardware and software cost for webcam imaging is well under $100.*

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"John Dobson explains it all" to Frank Tomaras at this year's Stellafane