

Halos & Tangent Arcs by Ort Vanapraks

.When I took the photo (see page 11) on Wed, 8/12/2015, at Moana Farm after sunset, I was not sure what I was looking at. I spoke with Tom Giguere about it and he said they were Sun Dogs. However, the more research I did the less I think they were Sun Dogs, because all Sun Dogs photos and explanations show Sun Dogs to be on the left and right of the Sun, not above the Sun. I spent my free time in the past 2 weeks to find out what they were. Finally, I found a website that talks about Circumzenithal Arc, which then took me to Tangent Arc.

Atmospheric Optics (<http://www.atoptics.co.uk/halosim.htm>) is a website that gave me the most detailed information regarding Sun Dogs and Tangent Arc. This website shows that Sun Dogs and Tangent Arc are part of Ice Halos (light refracted and reflected by tiny ice crystals in atmosphere). In order for Ice Halos to be visible to us, these tiny ice crystals need to be at 22° from the Sun. From this website, I found out that there are many objects created by ice crystals. These objects are 22° halo, Parhelia (Sun Dogs), Parhelic Circle (ring expanded from Sun Dogs), Upper/Lower Tangent Arc,

(Continued on page 10)

Inside this issue:

Club Information	2
President's Message	2
Observer's Notebook	3
Meeting Minutes	4
Event Calendar	5
Space Place	7
Meteor Log	8
Treasurer's Report	9

Upcoming Events:

- The next meeting is on Tuesday, Sep. 1st at the Bishop Museum 7:30 PM.
- Bishop Museum's planetarium shows are every Saturday of the month at 8:00 PM www.bishopmuseum.org/calendar
- The next Board meeting is Sun., Sep. 23 at 3:30 PM in POST building at UH.

President's Message September 2015

The Perseids meteor shower has come and gone. Did you see any? I spent about half an hour on top of my carport on the early morning of August 13th. I saw seven definite meteors and about the same number of "faint possibilities." You know the kind. Out of the corner of my eye, might have been a glint of light off my glasses, etc.

Some of the best ones I saw, if they were Perseids, were on the night of August 8th at Dillingham. It was still fairly early, so the radiant wasn't up yet. I saw one bright green trail that persisted for a few seconds. Others saw an even better one that I missed.

Although the Perseid shower lasts a few days, it still has a rather narrow peak of maximum intensity, and that was predicted to be best placed for the mainland U.S. this year. In the last few years, predictions of shower intensity for various showers based on calculations of the positions of debris shed by the parent comet for that shower in previous passages around the Sun have gotten much better. Some of these calculations look hundreds of years back and estimate the effect of gravitational perturbations to estimate the present position of the debris trails. It's not perfect, but there have been some successes in predicting showers with greater than normal intensity.

Some astronomical opportunities are very predictable. We know the positions of the stars, nebulae, galaxies, and planets. Others are completely unpredictable, such as the appearance of a supernova. Meteor showers are an odd combination of the two. We know quite well when the regular showers will occur each year and what time of night to look, yet we have

(Continued on page 6)

Hawaiian Astronomical Society
P.O. Box 17671
Honolulu, Hawaii 96817

President

Chris Peterson

956-3131

chrisp@higp.hawaii.edu

Vice President

Peter Besenbruch

peter@besenbruch.info

Secretary

Gretchen West

282-1892

gwest002@hawaii.rr.com

Treasurer

April Lew

734-2705

stardustlounge@hotmail.com

Board Members-at-Large

Otis A. Wikman

otisann49@gmail.com

Andy Stroble

The **Astronews Editor**

Charles Rykken

astronewseditor@gmail.com

HAS Webmasters

Peter Besenbruch

peter@besenbruch.info

Harry Zisko

harryz@pobox.com

School Star Party Coordinators

John Gallagher

Mark Watanabe

Calvin Oliveria

The **Astronews** is the monthly newsletter of the Hawaiian Astronomical Society. Some of the contents may be copyrighted. We request that authors and artists be given credit for their work. Contributions are welcome. Send them to the Editor via e-mail. The deadline is the 15th of each month. We are not responsible for unsolicited artwork.

Planets Close To the Moon
Times are Hawaii Standard Time

- Sep 1, 06h, M1.6° ESE of Uranus (138° from sun in morning sky)
- Sep 9, 20h, M 2.7° N of Venus (33° from sun in morning sky)
- Sep 10, 11h, M 4.6° SSW of Mars (27° from sun in morning sky)
- Sep 15, 00h, M 5.1° NNE of Mercury (23° from sun in evening sky)
- Sep 18, 17h, M 2.8° N of Saturn (64° from sun in evening sky)
- Sep 28 15h, M 0.97° SSE of Neptune (167° from sun in morning sky)

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

Other Events of Interest
Times are Hawaii Standard Time

- Aug 31, 18h, Neptune at Opposition
- Sep 4, 00h, Mercury at greatest elongation (21.7° east of the sun in the evening sky)
- Sep 12, 20:41h, New Moon
- Sep 19, Fall AstronomyDay
- Sep 20, 11h, Venus Brightest (Mag, -4.5)
- Sep 22, 22:21h, Autumn Equinox (First day of Fall)
- Sep 27, 16:50h, Full Moon
- Sep 28, 4 Vesta at Opposition
- Sep 30, 05h, Mercury at inferior conj. with sun (Passes into morning sky)

Planets in September

<p>Mercury</p>  <p>Can be seen in the evening dusk during the first half of September, but it is a poor apparition for northern observers.</p>	<p>Venus</p>  <p>shines brightly in the morning sky, reaching maximum brightness on September 20.</p>	<p>Mars</p>  <p>is low in the east just before dawn. Look for in close to Regulus on September 25.</p>
<p>Jupiter</p>  <p>is too close to the sun to be easily observed in September.</p>	<p>Saturn</p>  <p>is in the southwestern sky after sunset.</p>	<p>Uranus</p>  <p>is in the eastern sky before dawn. Will be better placed for viewing later in the year.</p>
<p>Neptune</p>  <p>reached opposition with the sun late in August, so is in the sky all night. Best viewed near midnight.</p>	<p>Pluto (Dwarf Planet)</p>  <p>shines very dimly in Sagittarius. Can be viewed in the early evening but is very difficult to find because it is surrounded by brighter stars.</p>	<p>Vesta (Asteroid)</p>  <p>reaches opposition on September 28 at magnitude +6.2 - the brightest of the asteroids.</p>

President Chris Peterson called the August 4, 2015 meeting of the Hawaiian Astronomical Society to order at 7:31 p.m. The meeting was held in Planetarium, on the grounds of the Bishop Museum, Honolulu, Hawaii. There were twenty-two members and three visitors in attendance.

Notes- President Chris Peterson spoke briefly about Pluto.

Stepping Down- - As we reported last month, John Gallagher, who has shouldered the responsibility of organizing the school star parties for the last seven years, will be stepping down as star party coordinator. Members Calvin Olivera and Mark Watanabe have stepped up and become our new Star Party Coordinators. Calvin will coordinate our outreach activities with schools and youth groups. Mark will continue to use the NASA Night Sky Network application to help organize and accommodate interested groups with our astronomers. Mark will be our NASA Night Sky liaison.

Lacy Veach Day of Discovery – President Chris Peterson reported that the club would take part in the upcoming annual Lacy Veach Day of Discovery at Punahou School. It will take place during October 31, 2015. Gretchen West received sign up during the general membership meeting.

Upcoming Speaker – Calvin Olivera reports that he will be able to line up a speaker to inform us about the NASA astronaut application process and rigorous training program. While this is not usually thought of as pertaining to astronomy, per se, the assembled membership voted to invite Calvin's speaker to address the club during a future meeting.

Perseid Meteor Showers – The upcoming Perseid Meteor showers should be spectacular this year. Barring cloudy weather, the moonless conditions could hopefully allow viewers to see approximately one hundred plus meteors per hour. Mona Farms in Waianae Valley have graciously invited members to hold a viewing session on their property on August 12th. Those interested were to contact Chris Peterson, who will coordinate.

I.A.U. Conference - The upcoming International Astronomer's Union Conference is, as of August 4th, has been in session for a few days. Two of the events scheduled for the astronomers are two public star viewing events at Ala Moana Park, on Magic Island, should weather permit. One of the viewing events took place on August 3rd and the next will take place on August 13th. April Lew reported that there was a fair turn out at the park and the seeing was pretty good for the location. April reported that she, Paul Lawler and Dyron were H.A.S. members who showed up to help I.F.A. with the event.

Chris Peterson reported that this year's I.A.U. conference is to have an exoplanets naming ceremony at the conference center. However, tickets need to be purchased.

(Continued on page 6)

Hawaiian Astronomical Society
Event Calendar

SEPTEMBER

SUNDAY

2015

FIRST DAY OF WEEK

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	31	01 7:30 PM Club Meeting	02	03 8:00 PM Globe at Night	04 8:00 PM Globe at Night 	05 8:00 PM Globe at Night 6:30 PM Public Star Party(D)
06 8:00 PM Globe at Night	07 8:00 PM Globe at Night sunset: 18:42	08 8:00 PM Globe at Night	09 8:00 PM Globe at Night	10 8:00 PM Globe at Night	11 8:00 PM Globe at Night	12 8:00 PM Globe at Night 6:30 PM Club Star Party(D) (Private) 
13	14 sunset: 18:35	15	16	17	18	19 6:15 PM Public Star Party(G)&InOMN 6:15 PM Public Star Party(K)
20 	21 sunset: 18:29	22	23	24	25	26
27 	28 sunset: 18:22	29	30	01	02	03

Upcoming Star Parties

Public Party-Dillingham Sep. 4 (C. Rykken)

Public Party Geiger Sep. 19

Public Party Kahala Sep. 19

Upcoming School Star Parties

	No School Star Parties for September
--	--------------------------------------

President's Report (Continued from page 2)

absolutely no idea when a really good meteor will appear or in what part of the sky.

Diligent watchfulness and patience are the keys to success in meteor observing. They are also useful qualities for other astronomical activities and for life in general. Oh, and try not to fall asleep!

Chris Peterson

(Continued from page 4 Meeting Minutes)

The Rosetta Mission – The ten-year Rosetta mission endeavors to catch the comet “67P/Churyumov-Gerasimenko” and answer some of our questions about comets, their composition, and movements. The lander is working to identify organic compounds that the lander took as it bounced along the trajectory. It has generally been believed by astronomers that the materials needed for life are likely to have been deposited on Earth by asteroids and comet strikes. The lander and orbiter continue to have communication issues. As it nears perihelion, it is hoped that the orbiter will be able to detect the lander, as it is more likely to be illuminated by the sun.

Other Missions – The Mars Curiosity is now three years old and continues its movement. The Cassini Mission has taken images of the satellite Dione, an icy moon of Saturn. Images show reddish streaks and we now have more questions to answer. Images of Ceres have shown details of cratering. Further images of Pluto and Charon, are showing more details of two objects. Scientists are having a field day naming mountain ranges, plains and ridges. The spacecraft's spectrograph has identified areas of nitrogen ices, methane ices and carbon monoxide ices.

There was a general discussion of the information regarding Pluto.

Visitors – We had three visitors attending the general membership meeting tonight

The Planetarium – Joanne again led us into the nighttime skies using the machines of the Planetarium. We were entertained with another great talk about the sky above us here in Hawaii. Her ability to manipulate the planetarium's two different mechanisms provides those of us who look up to enjoy another great time under the (almost) stars. Thanks Joanne.

Mahalo – As there was no further business, the meeting was adjourned at 9:37 p.m. Refreshments were served in the rotunda.

Respectfully Submitted,

Gretchen West

H.A.S. Secretary

Solar Wind Creates—and Whips—a Magnetic Tail Around Earth

By Dr. Ethan Siegel



As Earth spins on its axis, our planet's interior spins as well. Deep inside our world, Earth's metal-rich core produces a magnetic field that spans the entire globe, with the magnetic poles offset only slightly from our rotational axis. If you fly up to great distances, well above Earth's surface, you'll find that this magnetic web, called the magnetosphere, is no longer spherical. It not only bends away from the direction of the sun at high altitudes, but it exhibits some very strange features, all thanks to the effects of our parent star.

The sun isn't just the primary source of light and heat for our world; it also emits an intense stream of charged particles, the solar wind, and has its own intense magnetic field that extends much farther into space than our own planet's does. The solar wind travels fast, making the 150 million km (93 million mile) journey to our world in around three days, and is greatly affected by Earth. Under normal circumstances, our world's magnetic field acts like a shield for these particles, bending them out of the way of our planet and protecting plant and animal life from this harmful radiation.

But for every action, there's an equal and opposite reaction: as our magnetosphere bends the solar wind's ions, these particles also distort our magnetosphere, creating a long magnetotail that not only flattens and narrows, but whips back-and-forth in the onrushing solar wind. The particles are so diffuse that collisions between them practically never occur, but the electromagnetic interactions create waves in Earth's magnetosphere, which grow in magnitude and then transfer energy to other particles. The charged particles travel within the magnetic field toward both poles, and when they hit the ionosphere region of Earth's upper atmosphere, they collide with ions of oxygen and nitrogen causing aurora. Missions such as the European Space Agency and NASA Cluster mission have just led to the first accurate model and understanding of equatorial magnetosonic waves, one such example of the interactions that cause Earth's magnetotail to whip around in the wind like so.

The shape of Earth's magnetic field not only affects aurorae, but can also impact satellite electronics. Understanding its shape and how the magnetosphere interacts with the solar wind can also lead to more accurate predictions of energetic electrons in near-Earth space that can disrupt our technological infrastructure. As our knowledge increases, we may someday be able

(Continued on page 10)

A small group (Ort, Mary, myself) convened at the Farm on the Waianae coast for the 2015 Perseids. Because the summer Perseids are so well known, the Farm itself had 10-12 people out for the event. This made for a nice turnout. The hurricane had just passed to the north, so the weather was dismal. We had both high and low level clouds. A few holes in the clouds and a short clearing episode, which didn't last more than ½ hour allowed a group count of 6 meteors. Not a great year. The American Meteor Society (AMS) encourages folks to post their meteor pictures. Ms. Green captured three meteors in her picture (see picture). Two of the meteors are easy to see, the third is to the left of the largest one and is quite short and faint. Notice the curvature of the star trails to the upper right and lower left of the image; north and south poles, respectively. She doesn't specify the camera lens in the credits, but it must have been a wide angle to show this so nicely.

After a busy period from late July to mid-August, things quiet down during late August, but the Alpha Aurigids make September 1 an interesting night by producing 2-5 meteors per hour. Even more interesting is that this minor meteor shower has produced a couple of notable displays of 20-30 meteors per hour in the past!

(Continued on page 9)

First Quarter	Full Moon	Last Quarter	New Moon
September 21	September 28	September 5	September 13

Shower	Activity	Maximum		Radiant		V _∞ km/s	r	ZHR
		Date	λ☉	α	δ			
α-Aurigids (AUR)	8/28→ 9/5	(Sep 01)	158.6°	91°	+39°	66	2.5	6
Sept. ε-Perseids (SPE)	9/5→ 9/21	(Sep 09)	166.7°	48°	+40°	64	3.0	5

Where is your favorite location to observe meteors: Dillingham, back yard, Sandy beach, Moloka'i, let us know! For more info contact: Tom Giguere, 808-782-1408, Thomas.giguere@yahoo.com; Mike Morrow, PO Box 6692, Ocean View, HI 96737

Treasurer's Report

by April Lew

HAS Financial Report July 16, 2015 to Aug 15, 2015			
Beginning Balance			2073.68
Income:			
	Dues Received	124.00	
	Donation	20.00	
	T-shirt sales	180.00	
Total Income			324.00
Expenses:			
	July Astronews printing & mailing	175.71	
	Insurance	320.00	
Total Expenses			495.71
Ending Balance			1901.97

We welcome 6 new members this month. They are **Russell and Yain Porter donation, Christopher Woods and Karen Quach, Jake and Guy Yeager** .

Many thanks to those renewing their membership (Edward and Toni Haddock, Morris and Jane Jones (2 years), donation.). As a reminder, please check your membership anniversary date listed on the Astronews address label. Clear skies to all!



Looking back to August, Kristi made a composite image, of several 30 second exposures that she took during the Perseid Meteor Shower 2015.. Credit: Kristi Green, AMS website

(Space Place Continued from page 7)

to reach one of the holy grails of connecting heliophysics to Earth: forecasting and accurately predicting space weather and its effects. Thanks to the Cluster Inner Magnetosphere Campaign, Van Allen Probes, Mars Odyssey Thermal Emission Imaging System, Magnetospheric Multiscale, and Heliophysics System Observatory missions, we're closer to this than ever before.

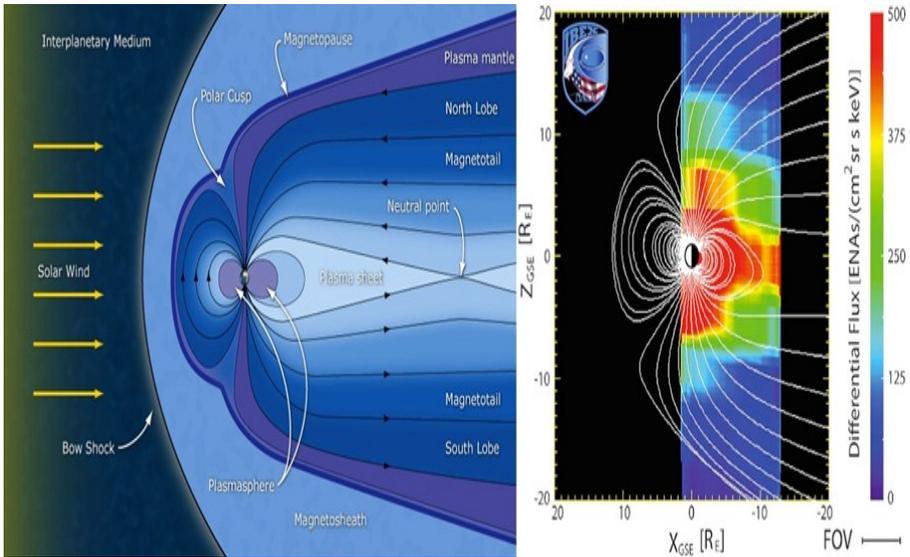


Image credit: ESA / C. T. Russell (L), of Earth's magnetic tail and its cause: the solar wind; Southwest Research Institute / IBEX Science Team (R), of the first image of the plasma sheet and plasmasphere created around Earth by the solar wind.

(Continued from page 1)

and Circumzenithal Arc (Upside down rainbow you see when you face the Sun).

Check out this website to find out more about Ice Halos. Next time you see some objects about 22° from the Sun, you will know what you are looking at. You will not need two weeks the way I did to find this answer.

Please see my photo and illustration to the right on page 11.



Upper Tangent Arc

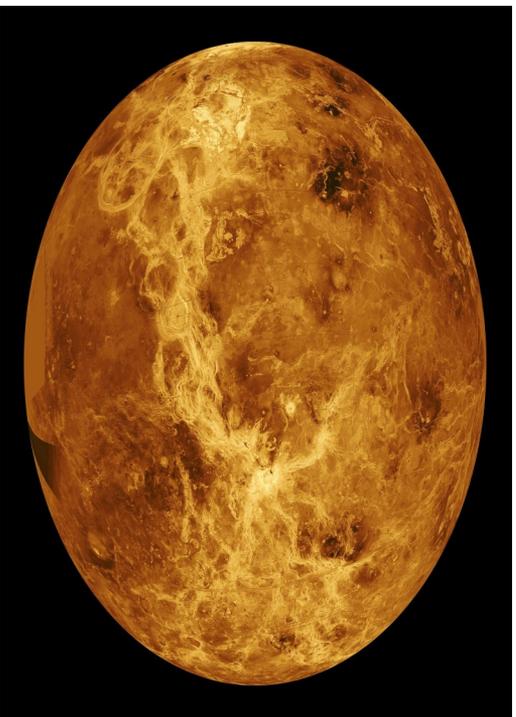
Canon EOS Rebel T2i Sigma AF 17-70mm f2.8-4.5 DC
f/4 1/50 Sec. iso-100 (Automatic Setting)
Wednesday, 8/12/2015 19:36
Mouna Farm, Waianae.



A 22° halo and a Parhelic circle photographed by Lawrence Laveder with a Zuiko 16 mm open to 3.5 and a shutter speed of 1/500 sec on a film Kodachrome 64 in Ca p d'Antibes in September 1990 .

Source: <http://la.climatologie.free.fr/pheno-optique/optical2.htm> and <http://www.photoastronomique.net>

**H.A.S.
P.O. Box 17671
Honolulu, HI 96817**



This global view of the surface of [Venus](#) is centered at 180 degrees east longitude. [Magellan](#) synthetic aperture radar mosaics from the first cycle of Magellan mapping are mapped onto a computer-simulated globe to create this image. Data gaps are filled with [Pioneer Venus Orbiter](#) data. This image or video was catalogued by Jet Propulsion Laboratory of the United States [National Aeronautics and Space Administration](#) (NASA) under **Photo ID: PIA00104**.