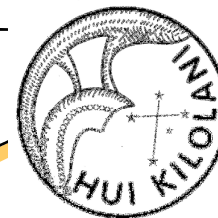


This artist's concept shows NASA's two Voyager spacecraft exploring a turbulent region of space known as the heliosheath, the outer shell of the bubble of charged particles around our sun. Image credit: NASA/JPL-Caltech.

Hawaiian Astronomical Society
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The Astronews



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President's Message

By Chris Peterson

The GRAIL mission to the Moon is scheduled to launch on September 8 from Cape Canaveral. GRAIL stands for Gravity Recovery and Interior Laboratory. It is a Discovery Program mission. Unlike most of the other recent Moon missions launched by the United States, Japan, China, and India, this one won't be focused on sending back images of the Moon's surface. This mission is designed to investigate the Moon's interior by carefully measuring its gravity field.

Two spacecraft will be launched on the same rocket and will use an efficient low-energy approach to the Moon that will take a few months. The two spacecraft will orbit the Moon at a height of 50 km with one following the other about 200 km behind. Differences in the local gravity field will affect the speeds of the satellites. By carefully measuring their separation, scientists will be able to measure variations in the Moon's gravity at different locations.

(Continued on page 2)

Upcoming Star Parties

Public Party Sep 03 Kahala/Ewa
Club Party Sep 24 Dillingham
Public Party Oct 01 Dillingham

Upcoming Events:

- The next meeting is at 7:30 p.m. on **Tuesday, Sep 6**, at the Bishop Museum Planetarium
- Bishop Museum's next planetarium shows with **Barry Peckham** are Friday, **Sep 2 & 16**, at 8:00 p.m. www.bishopmuseum.org/calendar
- The next Board Meeting is Sunday, **Sep 4**, at 3:30 p.m. at the POST building at UH.

Place stamp here. Post Office will not deliver mail without proper postage.

This technique has been used for Earth by the GRACE (Gravity Recovery and Climate Experiment) mission launched in 2002. Earth's gravity field is trickier to measure than that of the Moon because Earth is an active planet. Among other variables, tides, weather, and climate change all move large amounts of water (whether vapor, liquid, or ice) around the planet relatively quickly, so Earth's gravity is a moving target. Nonetheless, GRACE has been able to produce accurate maps of Earth's gravity that show changes over time.

In contrast, the Moon is very stable. Changes over time are minor. It will only require 90 days of gravity mapping to gather the necessary data.

The Moon's gravity field is far from uniform, though. Experiments during the Apollo era showed evidence of 'mascons', concentrations of mass, mostly beneath mare basalt-filled basins. Basalt is denser than the light-colored highland rocks. Learning how the gravity field varies can tell us about the differences in the mass of rocks at depth. These differences can be interpreted to reveal details of the subsurface structure of the Moon.

If all goes as planned, we will improve our knowledge of the Moon's structure from crust to core. We will get a better idea of the thermal and geologic history of the Moon. This mission will dig deeper than others and provide more than just a pretty picture.

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The **Astronomer** 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 16th of each month. We are not responsible for unsolicited artwork.

Meteor Log - September 2011

by Tom Giguere

In the past, the **α -Aurigids (AUR)** shower has produced short, unexpected, outbursts at times, with EZHRs of ~ 30–40 recorded in 1935, 1986 and 1994, although they have not been monitored regularly until very recently, so other events may have been missed. Only three watchers in total covered the 1986 and 1994 outbursts, for instance! Although no predictions for unusual activity have been made for 2011, the nearly-new Moon provides ideal skies for whatever may happen.

The formerly-little-known **September ϵ -Perseid (SPE)** minor shower was apparently responsible for producing an unexpected outburst of swift, bright meteors on 2008 September 9 (from a radiant somewhere between $\alpha = 47.5^\circ$ to 49° , $\delta = +38^\circ$ to $+43^\circ$). The radiant for this small, unpredictable shower remains well on-view all night from about 22h–23h local time onwards.

Report your results if you get lucky with either of this month's small meteor showers!

First Quarter	Full Moon	Last Quarter	New Moon
September 4	September 12	September 20	September 27

Shower	Activity	Maximum Date	λ_{\odot}	Radiant α	δ	V_{∞} km/s	r	ZHR
α -Aurigids (AUR)	Aug 28- Sep 10	Sep 01	158.6°	93° +39°		67	2.5	6
ϵ -Perseids (SPE)	Sep 05 - Sep 21	Sep 10	166.7°	48° +40°		66	3.0	5

For more information on observing meteors, please contact Tom Giguere, 808-782-1408, Thomas.giguere@yahoo.com or Mike Morrow, PO Box 6692, Ocean View, HI 96737.

Deep Space Mysteries Calendars from Astronomy Magazine

These calendars are being offered again this year to club members for 50% off of list price. Regularly \$12.95 are going for \$6.50.

Contact Jim MacDonald or send your order along with a check for \$6.50 for each, made out to H.A.S., P.O. Box 17671, Honolulu, HI 96817-0671.

Offer ends September 30. These calendars are very popular and make great gifts.

HAS Financial Report as of August 15, 2011

Initial Balance:	\$4,378.64
Receipts:	
Calendars	26.00
Donations	18.50
Dues Received	124.00
Magazine Payments	34.00
Total Income:	\$202.50
Expenses:	
Astronews	172.61
Magazine Subscriptions	34.00
Trip funds to Donations	30.00
Total Expenses	\$236.61
Final Balance	\$4,344.53

The club gained two new members this month. They are John Draper and Hao Zheng who rejoined the club. Thanks to Susan Girard, Carolyn Kaichi and James Branchaud for their donations. Thanks and clear skies to all renewing their membership this month. Come join us for some great views. Jupiter is coming up earlier each evening.

Upcoming School Star Parties

- Sept 02 (Fri) Mililani Uka Elementary
- Sept 16 (Fri) Niu Valley Middle School
- Nov 04 (Fri) Pearl City Highlands Elementary

- April 12 (Thur) Ala Wai Elementary

If you are interested in participating, sign up during HAS meetings or contact John Gallagher at gallaghej002@hawaii.rr.com, or call 683-0118 and leave a message.

**Hawaiian Astronomical Society
General Membership Meeting
August 2, 2011**

President **Chris Peterson** called the August 2, 2011, meeting of the Hawaiian Astronomical Society to order at 7:37 p.m. The meeting was held at the Planetarium on the grounds of the Bishop Museum. There were thirty-six members and two visitors in attendance.

Associated Lectures: H.A.S. President **Chris Peterson** reports that the next free Hawaii Space Lecture Series talk will take place at 7:30 p.m. on Tuesday, August 23, 2011. This month the Hawaii Space Lecture Series presents **Dr. Lionel Wilson** of Lancaster University, who will speak on "What Vesta Can Tell Us About the Early Solar System." For further information on upcoming lectures, contact NASA PRPDC at 808-956-3132 or on the Web at <http://www.higp.hawaii.edu/prpdc>. Regular lectures usually take place at the NASA Pacific Regional Planetary Data Center, room 544, in the Pacific Ocean Science and Technology Building on the Manoa campus of the University of Hawaii.

News Items: The Messenger mission to Mercury reached a seven-year anniversary continuing to gather data as it orbits the closest planet to our sun. NASA's Lunar Reconnaissance Orbiter has reached the first perihelion of Mercury and achieved a high elliptical orbit. This mission will continue to gather information on the Sun's closest satellite.

NASA Rover Opportunity is approaching the Mars crater "Endeavor." Opportunity is coming closer to the rim and "Spirit Point" which overlooks the Endeavor crater. The rover may observe the exposed rock outcrops on the southern rim of the crater where it is thought deposits are older than previously seen.

Cassini spacecraft has taken interesting photos of Saturn's icy moon Helene. In recent developments, the Hubble space telescope has discovered a fourth Moon orbiting Pluto. Temporarily named P4, this new satellite is about the same size as Pluto's third and fourth moons, Nix and Hydra. These two moons appear to be in a range of 20 to 70 miles in diameter. The New Horizons craft has reached the halfway point on its way to Pluto and its moons.

Dawn spacecraft has returned close-up images of the Asteroid Vesta.

Juno, NASA's most recent planetary mission was launched in early August and will travel to Jupiter. After an expected five-year journey Juno will be placed in a Polar orbit. Observations taken from this orbit may help to determine Jupiter's gravity and composition.

Grail, A new NASA mission to the Moon and will takeoff in

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November, 2011. The twin spacecrafts will measure the Moon's gravity. This information will allow scientists to better determine subsurface structures.

Dillingham Airfield – H.A.S. has been contacted by the D.O.T. Dillingham manager regarding the use of the field. The H.A.S. Board will keep the membership apprised of the on-going discussions. **Chris Peterson** urges all members to adhere strictly to the rules for the use of the area.

Star Light Reserve Committee – Governor **Abercrombie** vetoed Bill 1439. However, the Governor reflected that further work needs to be done by the Star Light Reserve Committee.

Christmas Already? – Treasurer **Jim MacDonald** informed the members that Astronomy magazine is offering their 2012 calendar at a 50% discount of \$6.50. If you are interested in purchasing calendars, contact Jim MacDonald. He will take orders with pre-payment only.

School Star Parties – We have no star parties scheduled for August. However, we have two scheduled for September. Star Party Coordinator **John Gallagher** asked for sign-ups for :

Sept. 2– Mililani Uka

Sept. 23 – Niu Valley Middle School

If you are interested in participating in these or other star parties, be sure to contact **John Gallagher**.

Our regular suburban star parties at Geiger Community Park and Kahala Community Parks continue to be popular. **John Gallagher** reports that about 30 people visited the July Geiger star party, while the Kahala star party was temporarily rained out. **Chris Peterson** arrived later and set up and showed viewers the night sky until about 10 p.m.

Visitors – H.A.S. welcomed two visitors to this month's meeting. **John Draper** and **J.D. Henson**, each found our Website and are interested in learning the night sky and taking up viewing. We welcome them.

Thank You – **Gretchen West**, who spoke for the Big Island travelers, presented **Joanne Bogan** and **John Sandor** a thank-you present for their work in coordinating the Big Island trip to Hilo and Gemini North.

Astronaut Lacy Veach Day of Discovery - The club will participate in the next *Astronaut Lacy Veach Day of Discovery* event at Punahou on Saturday, October 29, 2011. This day of science and discovery for students, parents and teachers celebrates the life of the late U.S. Astronaut Lacy Veach. **Gretchen West** is coordinating the club's exhibit and asked for willing members to help man the table at this year's event. If anyone is interested Upcoming Events – The club will celebrate this year's *International Observe the Moon Night* on October 8, 2011. This takes place the evening of our Saturday suburban star parties at Geiger and Kahala Parks. We urge everyone to mark it on their calendars and join us as we use binoculars and telescopes to observe our satellite.

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Hawaiian Astronomical Society Event Calendar						
< September 2011 >						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	31	1	7:00 PM Mililani Uka Star Party	2 6:30 PM Public Star Party(K) 6:30 PM Public Star Party(G) Sunset: 6:48 PM
4 	Labor Day	5 7:30 PM Club Meeting	6	7	8	9 Sunset: 6:41 PM
11	12 	13	14	15	16	17 Sunset: 6:34 PM
18	19	20 	21	3:00 PM NSN Teleconference	22 7:00 PM Niu Valley MS Star Party	23 6:15 PM Club Star Party (D) Sunset: 6:28 PM
25	26	27 	28	29	30	1

Summer Skywatching in New England (Continued from Page 8)

proved unworthy, and I felt cut off from the local amateurs. What I didn't miss was the \$8 in tolls it costs to traverse the watery southern end of the "Ocean State". In case you wondered why Hawaii isn't called the Ocean State... now you know!

Early in August I was careful to seek out the young moon with its crazy tilt, compared with Hawaiian crescents. The "horns" are nearly one over the other in summertime New England... even more so in autumn. I set a moonwatch gathering for August 4 and convinced 15 or more townfolk to drop by my dad's place for a look in the scope. Transparency was nearly as good as it can get, though low Saturn disappointed me with its softness. Late arrivals missed Saturn but got good looks at half a dozen other top ten targets. A last remaining looker received the Swan Nebula as her reward. The Sagittarius Teapot sits on the roofs of summer cottages during warm New England nights.

Summer Skywatching in New England

by Barry Peckham

All chronic skywatchers benefit from planning their trips according to moon phase. I don't actually notice this habit in the amateur astronomers who visit Hawaii, but the relevance of moon phase remains. Thanks to the economy, I was able to invest 3 ½ weeks of low-cost time in a hometown visit to little Rhode Island this summer. And what moon phase suited my arrival best, considering the length of stay? Why, Full Moon, of course!

Hawaii travelers to the Eastern US have their day shortened by 6 hours, so sleep was no distraction as I sat on the beach that first evening, watching a dull orange orb climb above Martha's Vineyard, some 25 miles out to sea. On this mid-July evening the moon's monthly path placed it on the western edge of Capricornus, a southerly sign of the Zodiac. It appeared just after 8:30 in bright twilight, though the sun had set 18 minutes earlier. Haze on the horizon muted the moon glow far more than it does in mid-Pacific, and the low-slung ecliptic of 41.5 degrees North latitude kept this moon in the haze for an hour or more. From this southerly full moon comes a sparkling pathway across open water that will follow the observer all night.

After a few days in Rhode Island, I was ready to set up my scope and show Saturn to a few locals. On July 19th the assembled group was thankfully small, because I misjudged the end of twilight. 9:15 came before I could find Saturn, already dropping into the trees. The sky was typically hazy and haze typically brings a steady atmosphere, so the Ringed Wonder looked dim but sharp. As always, people were impressed. The 12.5 inch ran through a few more targets: Mizar/Alcor, globular M13, Albireo, The Wild Duck Cluster. A 16 year-old niece of my former classmate paid unusual attention to the astro-trivia. She is among the very few in her age group who can pay attention to the universe. I showed her how to aim the scope using a telrad and let her roam through the Cygnus Milky Way. She liked it, but before long it was well past 10 pm on a weeknight, so I lost her and the rest of the audience. Note: New England mosquitoes are at least twice the size of those in Hawaii. Even the locals stay out of their way.

Each Friday, on the other side of this eensie-weensie state, the Providence-based astronomy club hosts a starwatch and telescope viewing session at a permanent observatory in a coastal conservation area. For my last few visits East, I made promises to help with the crowds, and of course to show off my travel scope. All four of my Fridays in Rhode Island this summer got ruled out, notwithstanding the unusually dry weather conditions. I watched the sky, watched the overabundance of TV weather forecasts (all day long) and checked Internet satellite weather, which proved to be far more accurate than the TV folks in tracking cold fronts, with their attendant clouds. Each Friday's.

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Solar System Size Surprise

by Dr. Tony Phillips

News flash: You may be closer to interstellar space than you previously thought.

A team of researchers led by Tom Krimigis of the Johns Hopkins University Applied Physics Laboratory announced the finding in the June, 2011, issue of *Nature*. The complicated title of their article, "Zero outward flow velocity for plasma in a heliosheath transition layer," belies a simple conclusion: The solar system appears to be a billion or more kilometers smaller than earlier estimates.

The recalculation is prompted by data from NASA's Voyager 1 probe, now 18 billion kilometers from Earth. Voyagers 1 and 2 were designed and built and are managed by NASA's Jet Propulsion Laboratory. Aging but active, the spacecraft have been traveling toward the stars since 1977 on a heroic mission to leave the solar system and find out what lies beyond.

To accomplish their task, the Voyagers must penetrate the outer walls of the heliosphere, a great bubble of plasma and magnetism blown in space by the solar wind. The heliosphere is so big, it contains all the planets, comets, and asteroids that orbit the sun. Indeed many astronomers hold that the heliosphere defines the boundaries of the solar system. Inside it is "home." Outside lies the Milky Way. For 30+ years, the spacecraft have been hurtling toward the transition zone. Voyager 1 is closing in.

Much of Voyager 1's long journey has been uneventful. Last year, however, things began to change. In June, 2010, Voyager 1 beamed back a startling number: zero. That's the outward velocity of the solar wind where the probe is now.

"This is the first sign that the frontier is upon us," says Krimigis. Previously, researchers thought the crossing was still years and billions of kilometers away, but a new analysis gave them second thoughts. Krimigis and colleagues combined Voyager data with previously unpublished measurements from the Cassini spacecraft. Cassini, on a mission to study Saturn, is nowhere near the edge of the solar system, but one of its instruments can detect atoms streaming into our solar system from the outside. Comparing data from the two locations, the team concluded that the edge of the heliosphere lies somewhere between 16 to 23 billion kilometers from the sun, with a best estimate of approximately 18 billion kilometers.

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Planets Close To the Moon
Times are Hawaii Standard Time

- Sep 10, 09h, M 1.5° NNW of Neptune (161° from sun in evening sky)
- Sep 13, 04h, M 3.6° NNW of Uranus (166° from sun in morning sky)
- Sep 16, 07h, M 4.6° N of Jupiter (133° from sun in morning sky)
- Sep 22, 28h, M 4.6° SSW of Mars (58° from sun in morning sky)

The moon is closer than 15° from the sun when near Mercury, Venus and Saturn in August.

Other Events of Interest
Times are Hawaii Standard Time

- Sep 2, 20h, Mercury at greatest elongation (18.1° west of the sun in morning sky)
- Sep 8, 09h, Mercury 0.67° N of Regulus (16° from sun in morning sky)
(Years closest appulse of a planet and a 1st magnitude star)
- Sep 11, 23:26h, Moon Full
- Sep 16, 01h, 1 Ceres at opposition
- Sep 22, 23:06h, Fall or autumn equinox
- Sep 25, 14h, Uranus at opposition
- Sep 27, 01:08h, Moon New
- Sep 28, 10h, Mercury at superior conj. with sun (Passes into evening sky)

<p>♿ Mercury</p> <p>Rises about 90 minutes before the sun in a fine morning apparition early in the month.</p>	<p>♀ Venus</p> <p>Is still too close to the sun to be easily viewed in September.</p>	<p>♂ Mars</p> <p>Rises about 2:00 am and passes through Gemini, ending the month near M44.</p>
<p>♃ Jupiter</p> <p>Rises about two hours after sunset and is well placed for viewing later in the evening.</p>	<p>♄ Saturn</p> <p>Fades into the glow of sunset during September.</p>	<p>♅ Uranus</p> <p>Reaches opposition on September 25 and is in the sky all night. Best observed near midnight.</p>
<p>♆ Neptune</p> <p>Reached opposition last month and so is well placed for viewing in the evening sky.</p>	<p>♇ Dwarf Planet Pluto</p> <p>Is in the southwest sky during the evening hours.</p>	<p>♁ Minor planet 1 Ceres</p> <p>Reaches opposition on Sep 16 at magnitude 7.6.</p>

(Space Place continued from page 5)

Because Voyager 1 is already nearly 18 billion kilometers out, it could cross into interstellar space at any time—maybe even as you are reading this article.

“How close are we?” wonders Ed Stone, Caltech professor and principal investigator of the Voyager project since the beginning. “We don’t know, but Voyager 1 speeds outward a billion miles every three years, so we may not have long to wait.”

Stay tuned for the crossing. For more about the missions of Voyager 1 and 2, see <http://voyager.jpl.nasa.gov/>. Another Voyager project scientist, Merav Opher, is the guest on the newest Space Place Live cartoon interview show for kids at <http://spaceplace.nasa.gov/space-place-live>.

(Meeting Minutes continued from page 4)

Presentation—H.A.S. President **Chris Peterson** presented **Travis Le** with a winner’s plaque for his recent second-place win of the **Astronomical League** of the Pacific’s Young Astronomer award for 2011. Travis was also presented with a certificate and a lifetime’s admission to the McDonald Observatory in the Davis Mountains of West Texas outside Austin, Texas.

Speaker – H.A.S. member and State Science Fair finalist, **Travis Le**, spoke to the club and presented his winning project regarding determining CME (Coronal Mass Ejections), Solar Flares and Hotspots. Travis’ project endeavored to predict occurrences of solar events. Travis tracked and correlated data in seven data sets. He associated times with positions on the sun. He identified and counted and graphed the number of spots. Travis’ conclusions of his project, regarding 5 hot spots, validates data of another researcher of X class solar flares. Travis indicated that he hopes his work and that of others may help to predict events and avert possible catastrophes.

Planetarium Show – **Joanne Bogan** graciously gave us a tour of the skies over Hawaii in a planetarium show of the “Sky Tonight!”

As there was no further business, the meeting was adjourned at 9:04 p.m. Light refreshments were served.

Respectfully Submitted,
Gretchen West
H.A.S. Secretary