A word from your editor by Sapavith ‘Ort’ Vanapruks

HAS have decided to cancel public HAS events for the time being for both public star party at Dillingham and in town star parties at Kahala and Geiger, as well as the monthly club meeting. These cancellations will continue while we are still in tier level. As we are now in modified tier 5 on Oahu, we will continue to have the club member only star party. We will be limiting the club party to the key master and 29 extra members. All attendees must be fully vaccinated. Please check your email and website for an update.

August weather has been a little better than July. In the evening on Thursday, 8/12/2021, I was able to capture some meteors through my camera. I have couple of photos of Perseids Meteors on page 6. On Friday, 8/13/2021, just before Sunset, I went out to Kalaehoa Beach to try to catch ISS Transit going in from of the Sun. I had my camera set to ISO-800 with 1/1000 sec. ex-

(Continued on page 6)
It’s planet time again! While Mercury and Mars were too low in the west to observe at Dillingham Airfield on August 28th, Venus was showing a waning gibbous phase. In the east, Jupiter and Saturn are now high enough to observe as twilight fades and will be well placed for viewing for the next several months. The seeing was good, and the skies cooperated until about 9:30 when clouds quickly rolled in followed by showers that drove us away.

Saturn’s rings are beautiful to observe and have fascinated astronomers since Galileo first observed some “ears” that appeared to be attached to the planet. We are far enough past opposition now that a bit of Saturn’s shadow falls on the rings enhancing the three-dimensional appearance. Most telescopes will show Titan. More aperture reveals more moons.

The rings provide more than a pleasing view, however. They are composed of countless particles, mostly water ice and ranging from pebble - to house-sized. Each is in an independent orbit subject to the gravitational influence of Saturn, its moons, and all the other ring particles. The Cassini mission, which orbited Saturn from 2004 to 2017, made observations that revealed many details of the ring dynamics.

Recent research based on these observations (published in Nature Astronomy and reported in Sky and Telescope and elsewhere) provides new knowledge about Saturn’s core from its influence on the rings. The core appears to span about 60% of the planet’s diameter and contain 55 earth masses, 17 of which are rock and ice mixed into the remainder (mostly hydrogen and helium). It is “fuzzy”, with no discrete layers but increasing density (and concentration of helium) toward the center, and sloshes around. This motion generates waves in the C ring.

The core also doesn’t appear to convect. This may help to explain Saturn’s unexpected brightness in infrared light (because it hasn’t cooled as fast as it would if the core convected), but it makes it difficult to explain Saturn’s magnetic field. As usual in science, better data lead to deeper understanding but also often require revised hypotheses. We can appreciate Saturn’s rings for the insights they enable as well as for their beauty.
**Planets Close to the Moon**  
**Times are Hawaii Standard Time**
- Sep 7, 10h, Mars 3.8° SSW of Moon; 10° and 11° from the Sun in the evening sky; magnitudes 1.8 and -5.1
- Sep 8, 16h, Mercury 5.9° SSW of Moon; 26° and 27° from the Sun in the evening sky; magnitudes 0.1 and -6.6
- Sep 16, 19h, Saturn 3.7° NNW of Moon; 133° from the Sun in the evening sky; magnitudes 0.5 and -11.5
- Sep 18, 0h, Jupiter 3.8° NNW of Moon; 148° from the Sun in the evening sky; magnitudes -2.8 and -11.9
- Sep 20, 3h, Neptune 3.7° NNW of Moon; 174° and 173° from the Sun in the midnight sky; magnitudes 7.8 and -12.5
- Sep 24, 8h, Uranus 1.26° NNW of Moon; 138° and 137° from the Sun in the morning sky; magnitudes 5.7 and -11.5

**Other Events of Interest**  
**Times are Hawaii Standard Time**
- Sep 5, 14h, Mercury at aphelion, 0.4667 AU from the Sun
- Sep 6, 14h, New Moon; beginning of lunation 1221
- Sep 9 4h, September Epsilon Perseid meteors; ZHR 10; peak; 2 days after New
- Sep 10, 23h, Moon at perigee; distance 57.77 Earth-radii
- Sep 13, 10h, First Quarter Moon
- Sep 20, 13h, Full Moon
- Sep 22, 9h, September or fall or autumn equinox
- Sep 26, 12h, Moon at apogee; distance 63.44 Earth-radii
- Sep 26, 19h, Mercury stationary in longitude; starts retrograde motion
- Sep 28, 15h, Last Quarter Moon

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### Planets in September

<table>
<thead>
<tr>
<th>Planet</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>Mercury</strong></td>
<td>Evening planet, rapidly deteriorating throughout the month, virtually setting with the Sun on 30 September.</td>
</tr>
<tr>
<td><strong>Venus</strong></td>
<td>Low evening planet, setting an hour after sunset. A thin Moon is nearby on 9 and 10 September.</td>
</tr>
<tr>
<td><strong>Mars</strong></td>
<td>The Red Planet is too close to the Sun to be seen this month.</td>
</tr>
<tr>
<td><strong>Jupiter</strong></td>
<td>Bright evening planet, well-placed albeit low. A bright gibbous Moon is nearby on 17 and 18 September.</td>
</tr>
<tr>
<td><strong>Saturn</strong></td>
<td>Well-positioned low evening planet. Bright Moon close by on 16 and 17 September.</td>
</tr>
<tr>
<td><strong>Uranus</strong></td>
<td>On the threshold of naked eye visibility in Aries, morning planet Uranus is well placed this month.</td>
</tr>
<tr>
<td><strong>Neptune</strong></td>
<td>Binocular planet Neptune reaches opposition on 14 September and is visible all night.</td>
</tr>
<tr>
<td><strong>Pluto</strong></td>
<td>Rises early afternoon during September, so is very much an evening object although it doesn't set until well after midnight.</td>
</tr>
<tr>
<td><strong>4—Vesta</strong></td>
<td>As an evening object, will be just over 5° to the right of Venus at the beginning of September. Over the following evenings Venus will draw ahead of the asteroid.</td>
</tr>
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</table>
Meeting Minutes

August 3rd, 2021 7:30 PM (Zoom Meeting)     Andy Stroble

Meeting called to order at 7:30 pm by President Chris Peterson with 12 participants.

Minutes from the July meeting were approved without changes, by acclamation.

COVID-19 vaccination is to be a requirement for star party attendance.

Voting on the revised by-laws took place. Unanimously in favor.

President Chris Peterson gave some tips on seeing Venus in the daytime. Helps to have a location and some guides. He also noted that the Hubble Space Telescope has been out of commission for about a month, but is restored to duty due to backup systems. A series of the best work by Hubble from https://www.scientificamerican.com/slideshow/top-10-images-taken-by-the-hubble-space-telescope/ was shared.

There was discussion of the spectrum of the Hubble’s cameras, and how they overlap with the wavelengths the James Webb Telescope will cover. https://esahubble.org/about/general/instruments/ Paul commented that the Hubble is the worst thing to happen to amateur astronomy, due to unduly raising expections of viewing among the public.

Ort shared some photos of Saturn and Jupiter.

It was also noted that some billionaires went to space, sort of.

Tom Giguere gave us a report on the Perseid meteor shower, due to peak Aug. 11/12. The club will seek permission to hold a viewing session at Dillingham/Kawaihapai Airfield on that evening. Contact Tom for information. The websites of the major meteor organizations are https://amsmeteors.org/home.html (American Meteor Society) and https://www.imo.net/ (International Meteor Organization).

Tom also shared information about a conference he recently attended, involving the Team of the Lunar Reconnaissance Orbiter Camera (LROC) which has made petabytes of high-resolution images of our Moon available at https://lroc.sese.asu.edu/. The LROC is in its fourth mission, and will probably have a fifth.

Meeting was adjourned at 9:09pm. There were approximately 20 attendees.

Faithfully submitted, James Andy Stroble, Secretary.
<<Upcoming Star Parties>>

Club Party-Dillingham September 4 — 6:44 PM
Club Party Dillingham September 25 — 6:24 PM
Public Party Geiger/Kahala September 11 — CANCELLED

Upcoming School Star Parties
posure. That is still is not fast enough. I could only see a little black spec on the Sun disk. I also took a video of Jupiter at opposition in the evening Thursday, 8/19/2021. I am still learning how to process planet. I hope to have a photo soon.
If you’re thinking of a galaxy, the image in your head is probably the Andromeda Galaxy! Studies of this massive neighboring galaxy, also called M31, have played an incredibly important role in shaping modern astronomy. As a bonus for stargazers, the Andromeda Galaxy is also a beautiful sight.

Have you heard that all the stars you see at night are part of our Milky Way galaxy? While that is mostly true, one star-like object located near the border between the constellations of Andromeda and Cassiopeia appears fuzzy to unaided eyes. That’s because it’s not a star, but the Andromeda Galaxy, its trillion stars appearing to our eyes as a 3.4 magnitude patch of haze. Why so dim? Distance! It’s outside our galaxy, around 2.5 million light years distant - so far away that the light you see left M31’s stars when our earliest ancestors figured out stone tools. Binoculars show more detail: M31’s bright core stands out, along with a bit of its wispy, saucer-shaped disc. Telescopes bring out greater detail but often can’t view the entire galaxy at once. Depending on the quality of your skies and your magnification, you may be able to make out individual globular clusters, structure, and at least two of its orbiting dwarf galaxies: M110 and M32. Light pollution and thin clouds, smoke, or haze will severely hamper observing fainter detail, as they will for any “faint fuzzy.” Surprisingly, persistent stargazers can still spot M31’s core from areas of moderate light pollution as long as skies are otherwise clear.

Modern astronomy was greatly shaped by studies of the Andromeda Galaxy. A hundred years ago, the idea that there were other galaxies beside our own was not widely accepted, and so M31 was called the “Andromeda Nebula.” Increasingly detailed observations of M31 caused astronomers to question its place in our universe – was M31 its own “island universe,” and not part of our Milky Way? Harlow Shapley and Heber Curtis engaged in the “Great Debate” of 1920 over its nature. Curtis argued forcefully from his observations of dimmer than expected nova, dust lanes, and other oddities that the “nebula” was in fact an entirely different galaxy from our own. A few years later, Edwin Hubble, building on Henrietta Leavitt’s work on Cepheid variable stars as a “standard candle” for distance measurement, concluded that M31 was indeed another galaxy after he observed Cepheids in photos of Andromeda, and estimated M31’s distance as far outside our galaxy’s boundaries. And so, the Andromeda Nebula became known as the Andromeda Galaxy.

These discoveries inspire astronomers to this day, who continue to observe M31 and many other galaxies for hints about the nature of our universe. One of the Hubble Space Telescope’s longest-running observing campaigns was a study of M31: the Panchromatic Hubble Andromeda Treasury (PHAT): bit.ly/m31phat. Dig into NASA’s latest discoveries about the Andromeda Galaxy, and the cosmos at large, at nasa.gov.

NASA's Night Sky Notes
Catch Andromeda Rising
By David Prosper

(Continued on page 10)
The Perseid meteor shower put on a nice show last month. Two groups observed the
shower from different locations.

Dillingham Oahu Report, Aug 12/13 (Thu/Fri): Our party of six met at the HAS star
party site on the backside of Dillingham airport around 8pm. Overall we had a productive
viewing session, despite a couple of light showers and passing clouds. Apparently, it was a
worknight for the Hawaii national guard, thus we were entertained by multiple helicopters
performing touch-n-gos in the field to the south near the mountains and multiple forays
along the runway at four feet off. Precision flying is fun to watch.

The entire group watched until 3am and saw 90 total meteors of which 65 were Perseids
and 25 were sporadics (random meteors). The diehards remained until 4:45am as the radi-
ant approached the zenith the hourly rate increased. The efforts of Ort and Lytha (Dave
captured a few winks) brought the total to 138 with the breakdown at 101 Perseids, 37 spo-
radics. The group also did some imaging: Ort and I set up auto interval cameras to catch
meteors, shooting about ~1800 frames in total. Lytha captured the milky way, while Sean
did some deep sky work.

Observers: Ort Vanaprucks, Lytha Conquest, Dave Ziemann, Shawn Fields, Michael Kinzer
(new member)

(Continued on page 11)

Perseids passed thru a Perseus Double Cluster. Photo by Tom Giguere

<table>
<thead>
<tr>
<th>Phases of the Moon</th>
<th>First Quarter</th>
<th>Full Moon</th>
<th>Last Quarter</th>
<th>New Moon</th>
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<tbody>
<tr>
<td>September 13</td>
<td>September 20</td>
<td>September 28</td>
<td>September 06</td>
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<table>
<thead>
<tr>
<th>Shower</th>
<th>Activity</th>
<th>Maximum</th>
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<th>$V_\infty$</th>
<th>$r$</th>
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<tr>
<td>α-Aurigids (206 AUR)</td>
<td>Aug 28-Sep 05</td>
<td>Sep 01</td>
<td>158.6°</td>
<td>166.7°</td>
<td>184.3°</td>
<td>91°</td>
</tr>
<tr>
<td>Sept. ε-Perseids (208 SPE)</td>
<td>Sep 05-Sep 21</td>
<td>Sep 09</td>
<td>66</td>
<td>48°</td>
<td>152°</td>
<td>+39°</td>
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<tr>
<td>Dayt. Sextantids (221 DSX)</td>
<td>Sep 09-Oct 09</td>
<td>Sep 27</td>
<td>158.6°</td>
<td>166.7°</td>
<td>184.3°</td>
<td>91°</td>
</tr>
</tbody>
</table>

This past month we see that you don’t always have to observe at the official shower peak! 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 Peter Besenbruch

Cash Flow - 7/11/2021 to 8/19/2021

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<table>
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<tr>
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<tr>
<td><strong>Beginning Balance</strong></td>
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<tr>
<td><strong>Money into selected accounts</strong></td>
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<td><strong>Total Money In</strong></td>
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<td><strong>Money out of selected accounts</strong></td>
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<td><strong>Total Money Out</strong></td>
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<td><strong>Difference</strong></td>
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<tr>
<td><strong>Ending Balance</strong></td>
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July 11-August 9 Treasurer’s Report

There has been no financial activity during this period. The next period will be a different story. Thanks to those who renewed, and a big welcome to our new members. Several people have also donated to HAS. For that, once again thanks. Another big expense in the coming month is the liability insurance bill payable to Mercer. We should be able to afford it, as our current balance sits at $4068.

We continue to hold club star parties at Dillingham twice a month. The last one as of this writing (August 28) started off well before ending rather quickly with some hard rain. We will continue to hold them until the C&C decides to lock down more. Again, to attend, you must be a vaccinated member with your own observing program. Please don’t try to share eyepieces. That should keep the risk to a fairly low level. You can find the schedule here: http://www.hawastsoc.org/2021events.htm. A reminder that the star parties at Kahala and Geiger are canceled until further notice.

Rolling to the Launch Pad
A United Launch Alliance Atlas V rocket with Boeing’s CST-100 Starliner spacecraft aboard is seen as it is rolled out of the Vertical Integration Facility to the launch pad at Space Launch Complex 41 ahead of the Orbital Flight Test-2 (OFT-2) mission.

Image Credit: NASA/Aubrey Gemignani
Spot the Andromeda Galaxy! M31’s more common name comes from its parent constellation, which becomes prominent as autumn arrives in the Northern Hemisphere. Surprising amounts of detail can be observed with unaided eyes from dark sky sites. Hints of it can even be made out from light polluted areas. Image created with assistance from Stellarium.

While M31’s disc appears larger than you might expect (about 3 Moon widths wide), its “galactic halo” is much, much larger – as you can see here. In fact, it is suspected that its halo is so huge that it may already mingle with our Milky Way’s own halo, which makes sense since our galaxies are expected to merge sometime in the next few billion years! The dots are quasars, objects located behind the halo, which are the very energetic cores of distant galaxies powered by black holes at their center. The Hubble team studied the composition of M31’s halo by measuring how the quasars’ light was absorbed by the halo’s material. Credits: NASA, ESA, and E. Wheatley (STScI) Source: https://bit.ly/m31halo
Central Oahu Report, Aug 12/13 (Thu/Fri): Rob and Tom Lancaster found a quiet location off of the road but had to brave clouds and rain. Their total for the night was 28. They can’t be blamed entirely for the low count as an unusual visitor stopped nearby their observing site. A lone individual waited for the traffic to clear, and what they thought were any witnesses, and threw an incendiary device of some kind into the dry grass on the side of Hwy 99 and took off. It went up fast! And as the sky was lighting up with flames, so they called 911… It took about 10 to 15 minutes for the fire dept. to show up. Oh, and there were cops with bright blue lights that came along too. It was like Grand Central Station when all they wanted was a nice clear and dark sky. After they finished filling out a police report and all the emergency lights were gone, they noticed the stars were also gone. They packed up and headed for home. Certainly, a night to remember.

Hawaii Report, Mauna Kea, Aug 11/12 (Wed/Thu): Clare Mamura and three friends observed from the Mauna Kea cabins (6,000 ft) at 9pm and saw ~12 Perseids. The next morning they traveled to the Mauna Kea summit and saw 20 meteors over an hour and a half. Bonus view of the sunrise at ~14,000 ft.

Perseid Shower Peak: Apparently all three groups missed the actual peak of the Perseids this year. According to the American Meteor Society, on the morning of August 14, 2021, the Perseid meteor shower displayed an unexpected outburst of meteors between 06:00 and 09:00 Universal Time (1:00-4:00am CDT; 8-11pm HST on the 13th). So far we have received visual confirmation of an impressive display of Perseids from observers in Wyoming and Ontario, Canada. AllSky camera systems located in Iowa have recorded between 900-1100 meteors each during the course of the entire night.
Curiosity Celebrates Another Year on Mars

The rover took a recent selfie at its location on Vera Rubin Ridge.

This mosaic was assembled from dozens of images taken by Curiosity’s Mars Hands Lens Imager on Jan. 23, 2018, during Sol 1943.

Image Credit: NASA/JPL-Caltech/MSSS