A word from your editor by Sapavith ‘Ort’ Vanapruks

Covid-19 Notice
HAS have decided to cancel public HAS events for the time being, beginning with the March 14 public star party at Dillingham. Includes the upcoming in town star parties at Kahala and Geiger, as well as the monthly meeting. These cancellations will continue while we remain on lockdown. We don’t know yet what will happen with the club star party in June. We will try to update as soon as possible.

I have been wanting to learn how to take photo of deep sky object including processing it. On Thursday, 9/10/2020, I decided to try it with Andromeda Galaxy (M31). I used Canon EOS T3i with Asahi Takumar 135mm f2.5 Lens for Pentax. The tracking mount is Skywatcher Star Adventurer Pro.

I was hoping to get around 120 seconds exposure. However, I did not do a good job on polar alignment. I was only be able to do 60 seconds without star trail. I ended up took 44 light (ISO400 Exp 60 Sec 135mm f/2.5), 20 dark, 20 flat, and 20 bias photos. I used Sequator to stack my images and processed in Adobe Lightroom. It will be awhile before I get better at post-processing.

(Continued on page 6)
President’s Message
October 2020

Mars rules the evening sky this October. Blazing brighter than Jupiter with its distinctive red-orange color, it will attract a lot of attention this month. While we reach opposition to Mars on October 13th, our closest approach is on October 6th because Mars has passed perihelion and is moving farther from the Sun between those dates faster than we are catching up to it. This means Mars won’t rise until a bit after sunset when it’s closest, so it won’t be highest in the sky until about midnight. It is, however, farther north than it sometimes is, so it will climb higher in the sky for those of us in the northern hemisphere than at some other close oppositions. In Hawaii it will reach higher than 75 degrees above the horizon at its zenith.

Many of us remember the closest (by a small amount) opposition of Mars in something like 60,000 years in 2003. The 2018 opposition was a little closer than the one this year, but a global dust storm obscured the surface, so this is our best viewing opportunity in 17 years. Mars won’t be closer until 2035, so now is the time to take advantage of this “few in a lifetime” opportunity.

If we are allowed to use Dillingham Air Field for our club star party on October 10, I urge you to take your own equipment out there to do your viewing. I admit I have trouble keeping up with the COVID-19 restrictions and how they apply to us. It’s a shame that we can’t do public star parties during this rare opportunity. A good view of Mars can inspire an interest in astronomy that could last a lifetime. How many oohs and aahs will not be spoken? This is yet another great part of our lives taken away by the corona virus.

Opposition also means that spacecraft can travel to Mars most efficiently, so some missions have recently launched. The United Arab Emirates makes its first attempt to place an orbiter (“Hope”) around Mars. China is sending an ambitious three-part mission (“Tianwen-1”) with an orbiter, lander, and rover. NASA’s mission includes the rover Perseverance, similar to Curiosity, and a helicopter named Ingenuity. Good luck to all.

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

President
Chris Peterson
956-3131
chrisp@higp.hawaii.edu

Vice President
Polly Miao
zmiao@hawaii.edu

Secretary
Tamara Weese
cptweese@yahoo.com

Treasurer
Peter Besenbruch
peter@besenbruch.info

Board Members-at-Large
Andy Stroble

Astronews Editor
Sapavith ‘ORT’ Vanaprucks
astronews@hawastsoc.org

HAS Webmasters
Peter Besenbruch
peter@besenbruch.info

School Star Party Coordinators
Mark Watanabe
Charles Rykken

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.
Observer’s Notebook—October 2020 by Jay Wrathall

Planets in October

<table>
<thead>
<tr>
<th>_planet</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>Will be visible low in the western twilight sky the first few days of October, but will be very difficult to see because it will be so close to the horizon</td>
</tr>
<tr>
<td>Venus</td>
<td>rises around 4:00 AM, and dominates the morning sky – shining at magnitude -4.0</td>
</tr>
</tbody>
</table>
|Mars| reaches opposition on October 13 at magnitude -2.5 and with a disk size of 23”.
This is the brightest Mars will appear until 2035. |
|Jupiter| is 30° in the southern sky an hour after sunset. It will have a few hours of good viewing and at magnitude -2.4 will be the brightest object in the sky except for the moon. |
|Saturn| is 7° east of Jupiter on October 1st. The gap narrows to 5° on Oct 31. Saturn shines at a magnitude of +0.5 and sets a 11:00 pm by the end of the month. |
|Uranus| rises shortly after sunset and remains in the sky the rest of the night – shining at magnitude +5.7. |
|Neptune| is in northwestern Aquarius and is easy to find with binoculars, shining at mag. +7.9. |
|Pluto (Dwarf Planet)| between Jupiter and Saturn in the evening sky – magnitude +14.8 |

Other Events of Interest

<table>
<thead>
<tr>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct 1, 06h, Mercury at greatest elongation</td>
<td>(25.8° east of the sun in evening sky)</td>
</tr>
<tr>
<td>Oct 1, 11:06h, Full Moon</td>
<td></td>
</tr>
<tr>
<td>Oct 13, 13h, Mars at opposition; Mag -2.6</td>
<td>(Passes into morning sky)</td>
</tr>
<tr>
<td>Oct 16h, 09:11, New Moon</td>
<td></td>
</tr>
<tr>
<td>Oct 16, Moon at perigee, 55.98 earth-radii (Moon at perigee only 4.4 hour after new moon)</td>
<td>(Closest of year. Tides very high and very low)</td>
</tr>
<tr>
<td>Oct 20, Orionid, meteors</td>
<td></td>
</tr>
<tr>
<td>Oct 23, 20h, Asteroid Parthenope at opposition</td>
<td></td>
</tr>
<tr>
<td>Oct 31, 04: Full moon</td>
<td></td>
</tr>
<tr>
<td>Oct 31, 06, Uranus at opposition</td>
<td></td>
</tr>
</tbody>
</table>

Planets Close To the Moon

Times are Hawaii Standard Time

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Planets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct 4, 19h</td>
<td>Moon 70° SE of Mars (165° from sun in morning sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 4, 02h</td>
<td>Moon 2.96° SE of Uranus (151° from sun in morning sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 13, 18h</td>
<td>Moon 4.1° ENE of Venus (38° from sun in morning sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 17, 13h</td>
<td>Moon 6.3° NNE of Mercury (17° from sun in Evening sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 22, 08h</td>
<td>Moon 2.03° SE of Jupiter (80° from sun in evening sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 22, 19h</td>
<td>Moon 2.61° SE of Saturn (86° from sun in evening sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 27, 00h</td>
<td>Moon 4.0° SE of Neptune (134° from sun in evening sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 29, 09h</td>
<td>Moon 70° SE of Mars (134° from sun in morning sky)</td>
<td></td>
</tr>
</tbody>
</table>

Planets Close To the Moon

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Planets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct 1, 06h</td>
<td>Moon 70° SE of Mars (165° from sun in morning sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 4, 02h</td>
<td>Moon 2.96° SE of Uranus (151° from sun in morning sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 13, 18h</td>
<td>Moon 4.1° ENE of Venus (38° from sun in morning sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 17, 13h</td>
<td>Moon 6.3° NNE of Mercury (17° from sun in Evening sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 22, 08h</td>
<td>Moon 2.03° SE of Jupiter (80° from sun in evening sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 22, 19h</td>
<td>Moon 2.61° SE of Saturn (86° from sun in evening sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 27, 00h</td>
<td>Moon 4.0° SE of Neptune (134° from sun in evening sky)</td>
<td></td>
</tr>
<tr>
<td>Oct 29, 09h</td>
<td>Moon 70° SE of Mars (134° from sun in morning sky)</td>
<td></td>
</tr>
</tbody>
</table>
An Idiot's Guide to Astrophotography Image Types (Thomas Jesper)

LIGHTS
Light frames are the images containing the captured data for your target. They may be noisy, have color casts, dust spots or other imperfections. They should be exposed for and focused on your deep sky object.

DARKS
Dark frames contain the noise signal generated by your camera at the same settings of your lights. The noise is subtracted from your lights when stacked. Dark frames should be taken with the exact settings you used to capture your lights and at the same conditions (temperature and humidity) but with the lens cap attached. You should collect 20-40 dark frames.

FLATS
Flat frames correct for any optical imperfections such as vignetting and dust spots. Similar to dark frames, they are subtracted from your lights when stacked. Place an even white light source (such as a computer monitor) in front of your camera and set an Aperture Priority auto exposure. The focus and ISO must be the same as your lights. You should collect around 30-50 flat frames.

DARK FLATS
Dark flats are, you guessed it, a combination of darks and flats. They help to reduce the noise in your flat files. They should be the same exposure time and ISO as your flat files but with the lens cap on. You should collect around 30-50 dark flats. Dark flats contain the same data as bias frames so should not be used at the same time.

BIAS
Bias frames are similar to dark frames but instead contain the baseline noise signal generated by your camera when the sensor receive no data. To capture bias frames, set your camera to the fastest shutter speed (1/4000 or 1/8000 usually) with the lens cap on. The ISO must be the same as your lights, but bias frames are temperature independent. Do not capture bias if you use dark flats. You should collect 50-100 bias frames.

TL;DR
LIGHTS: Expose for target. Captures as much data as you need/want.
DARKS: Lens cap on. Same ISO, shutter speed; temperature as lights. Recommended 20-40 captures.
FLATS: Even light source. AV Autoexposure. Same ISO and focus as lights. Recommended 30-50 captures.
DARK FLATS: Lens cap on. Same exposure setting as flats. Recommended 30-50 captures.
BIAS: Lens cap on. Fastest shutter. Same ISO as lights. Recommended 50-100 captures. No dark flats captures.
Hawaiian Astronomical Society
Event Calendar

October 2020

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 Full Moon 11:05 AM</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10 Club Party Dillingham TBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3rd Qtr 2:30 PM</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17 Public Party Dillingham CANCELLED</td>
</tr>
<tr>
<td></td>
<td>Columbus Day</td>
<td></td>
<td></td>
<td></td>
<td>New Moon 9:31 AM</td>
<td>Public Party Dillingham CANCELLED</td>
</tr>
<tr>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24 Public Party Kahala/Geiger CANCELLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1st Qtr 2:22 AM</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31 Halloween</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<<Upcoming Star Parties>>

Public Party Geiger/Kahala October 24—CANCELLED
Public Party Dillingham October 17—CANCELLED
Club Party-Dillingham October 10—TBD

Upcoming School Star Parties

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>

Volume 70, Issue 10  Page 5
Thomas Jesper, Physics Teacher at Northumberland County Council, shared information on how to take different image types of astrophotography on Facebook. Those information are on page 4.


**Chinese Mid-Autumn Festival Stories (Top 3 Legends)**
The Mid-Autumn Festival is the traditional moon worshiping festival in China. Most of the festival's customs are related to the moon, as are the popular stories explaining the festival's origin below.

1. Chang'e Flying to the Moon
The most famous Mid-Autumn Festival story is Chang'e flying to the moon. The story goes like this…

Long, long ago, there were ten suns in the sky. The suns burnt all the plants and people were dying on Earth, until one day excellent archer Hou Yi used his bow and arrows to shoot down nine of the suns. Earth was saved, and people flocked to learn archery from Hou Yi.

The Western Queen Mother gave Hou Yi a bottle of elixir that could make one person immortal. Although Hou Yi did want to become immortal, he wanted to stay with his wife Chang'e more. Therefore, he just kept it at home.

Pang Meng, one of his students, tried to seize the elixir when Hou Yi wasn't at home. Faced with greedy Pang Meng, Chang'e decided to drink the elixir. It made her fly to the moon where she would stay forever.

To remember her and pray to her, Hou Yi and others started to worship the moon with many offerings. Chang'e's image usually appears on Mid-Autumn Festival pictures. Children in China are told that Chang'e is still living on the moon. And on the night of the Mid-Autumn Festival, when the moon is bright, children try their best to find the shape of Chang'e on the moon.

2. Wu Gang Chopping the Cherry Bay
The second story is also set on the moon. The story goes like this…

Wu Gang the woodman wanted immortality, but he didn't try hard enough to learn the necessary magic.

The Emperor of Heaven got angry with him because of his attitude. In order to punish him, the Emperor of Heaven planted a huge cherry bay tree, 1,665 meters (about a mile) high, on the moon and told Wu Gang that if he could cut it down, he could become immortal.

Wu Gang thought this was his chance to try hard at something he was good at to gain immortality. However, the Emperor of Heaven had made it so that the cherry bay healed every time Wu Gang chopped it!

Today, people still believe an obvious shadow on the moon is made by the huge cherry bay.

3. The Jade Rabbit
A rabbit-shape lantern.

The jade rabbit is the main character in the third famous Chinese Mid-Autumn story. Chinese children are told that the jade rabbit is on the moon with Chang'e. Here's the story…

Once upon a time, there were three animals living in a forest: a fox, a rabbit, and a monkey.

Three immortals, pretending to be beggars, went through the forest asking for food. The fox and the monkey quickly offered them food.

The rabbit, who was less resourceful but very pious, felt guilty. She said, “I'm so sorry I couldn't offer any food to help you, but I can give myself”, and jumped into the fire.

The three immortals were moved by the rabbit's sacrifice, and decided make the rabbit an immortal, sending her to live in the Moon Palace.

Chinese Names, Pronunciations, and Meanings

**Hou Yi:** 后羿 Hòu Yì /hoh ee/ [surname Hou] + [name of legendary archer, Yi]

**Chang'e:** 嫦娥 Cháng'ē /chung-er/ [the Moon Lady] + beautiful

**Pang Meng:** 逢蒙 Páng Méng /pung mnng/ [surname Pang] + [to cover/receive/cheat]

**Wu Gang:** 吴刚 Wú Gāng /woo gung/ [surname Wu] + strong
October is a banner month for Mars observers! October 6 marks the day Mars and Earth are at closest approach, a once-every-26-months event. A week later, on October 13, Mars is at opposition and up all night. Mars is very bright this month, and astronomers are eager to image and directly observe details on its disc; however, don’t forget to look at the space around the planet, too! By doing so, you can observe the remarkable retrograde motion of Mars and find a few nearby objects that you may otherwise overlook.

Since ancient times, Mars stood out to observers for its dramatic behavior. Usually a noticeable but not overly bright object, its wandering path along the stars showed it to be a planet instead of a fixed star. Every couple of years, this red planet would considerably flare up in brightness, for brief times becoming the brightest planet in the sky before dimming back down. At these times, Mars would also appear to slow down its eastward motion, stop, then reverse and head westward against the stars for a few weeks, before again stopping and resuming its normal eastward movement. This change in the planet’s movement is called “apparent retrograde motion.” While all of the planets will appear to undergo retrograde motion when observed from Earth, Mars’s retrograde appearances may be most dramatic. Mars retrograde motion in 2020 begins on September 10, and ends on November 16. You can observe its motion with your eyes, and it makes for a fun observing project! You can sketch the background stars and plot Mars as you observe it night after night, or set up a photographic series to track this motion. Does the planet move at the same rate night after night, or is it variable? As you observe its motion, note how Mars’s brightness changes over time. When does Mars appear at its most brilliant?

NASA has tons of great Mars-related resources! Want to know more about apparent retrograde motion? NASA has an explainer at: bit.ly/marsretromotion. Find great observing tips in JPL’s “What’s Up?” videos: bit.ly/jplwhatsup. Check out detailed views with NASA’s HiRISE satellite, returning stunning closeups of the Martian surface since 2006: hirise.jpl.nasa.gov. NASA’s Curiosity Rover will be joined in a few months by the Perseverance Rover, launched in late July to take advantage of the close approach of Mars and Earth, a launch window that opens every two years: nasa.gov/perseverance. Calculate the ideal launch window yourself with this handy guide: bit.ly/marslaunchwindow. The Night Sky Network’s Exploring Our Solar System handout invites you to chart the positions of the planets in the Solar System, and NSN coordinator Jerelyn Ramirez recently contributed an update featuring Mars opposition! You can download both versions at bit.ly/exploresolarsystem. Young astronomers can find many Mars resources and activities on NASA’s Space Place: bit.ly/spaceplacemars. Here’s to clear skies and good seeing for Mars’s best appearance until 2033!

(Continued on page 11)
Great news for end of the year meteor observers – the three most reliable showers: the Orionids (008 ORI), the Leonids (013 LEO), and our favorite Geminid (004 GEM) reach their maximum either shortly after or coincident with the new Moon.

The most productive shower in October is the Orionids (008 ORI), which peaks on the 20\textsuperscript{th}/21\textsuperscript{st}. Orionid meteors are rather swift (66 km/sec) and produce a maximum of 20 per hour. The Moon is young and in the western sky, thus will not affect any post midnight observations. There have been unexpected peaks in the past of 40-70 per hour in years 2006 to 2009. There is a suspected 12-year periodicity that could boost ZHRs between 2020 and 2022. Despite the stated 20 per hour peak, the IMO measured a peak slightly above that average at 20 to 25 per hour. It’s good that enthusiasts are watching closely from year to year for slight variations. The bottomline is that the Orionids are on the increase and may give us a good show this year.

This “shower” is not listed in the monthly table of meteor showers and may be worth a look for the novelty. The Near Earth Object 2015 TB145 is suspected to be an extinct comet nucleus. If it was recently active, the Earth may encounter the associated meteoroid stream on 2020 October 20 at 22h09m UT ($\lambda_\odot = 217.659$) according to the calculations of Jérome Vaubaillon. The theoretical radiant is at $\alpha = 64^\circ$, $\delta = -3^\circ$, less than 5° west of ν Eridani. Depending on the latitude, the radiant rises at about 21h local time. The shower meteors have medium velocity ($V_\infty = 34$ km/s). Give this very unusual meteor shower a try with the finder chart for the constellation of Eridanus (west of Orion).

(Continued on page 10)}
Here are the financials up through September 9. Thanks for those who sent in their memberships, and who generously made donations. We had a large payout for liability insurance. We get that every year.

We continue on lockdown, at least through much of October. That means no club star party until we are allowed at least a maximum group size of ten.

In the mean time, check out the planets. Mars at 360x looks stunning, even if I get concerned at the bright spot just south of Aurorae Sinus. Bright spots mean dust storms, which would be a shame as by the time you read this Mars should be at its closest. It’s been a fabulous opposition thus far.

---

This latest image of Jupiter, taken by NASA’s Hubble Space Telescope on Aug. 25, 2020, was captured when the planet was 406 million miles from Earth. Hubble’s sharp view is giving researchers an updated weather report on the monster planet’s turbulent atmosphere, including a remarkable new storm brewing, and a cousin of the famous Great Red Spot region gearing up to change color – again.
Most astrophotographers seek out dark skies. This city and stars image bucks that trend. This article and image from the Sierra Club brings attention to light pollution to a wide audience. “The star trails over downtown Los Angeles Freeway.” | Credit to Mikey Jane Moran (article) and Nathaniel Smith/Harun Mehmedinovic/Gavin Heffernan (image).
(Continued from page 7) NASA’s Night Sky Notes

(Left) If you are paying this much attention to Mars, you’re likely curious about the skies surrounding it! Find Mars in the constellation Pisces, with constellations Aries, Triangulum, and Cetus nearby. Aries may be the only one of these dimmer patterns readily visible from light-polluted areas. The Pleiades rises shortly after Mars. Dim Uranus is found close by, in Aries. If you are observing Mars up close, use the same eyepiece to check out Uranus’ tiny blue-green disc. If you are uncertain whether you spotted Uranus, you didn’t see it! Unlike stars, Uranus doesn’t resolve to a point at high magnifications.

(Right) The path of Mars during the last five months of 2020. Notice the retrograde motion from September 10 to November 16, with prime Mars observing time found in between. October 6 is the day of closest approach of Earth and Mars, “just” 38.6 million miles apart. Images created with help from Stellarium: stellarium.org

Moon Shadow Over Jupiter
Jupiter's volcanically active moon Io casts its shadow on the planet in this dramatic image from NASA’s Juno spacecraft.
Image Credit: NASA/JPL-Caltech/SwRI/MSSS/Kevin M. Gill (CC-BY)
This image shows the Twin Peaks, which are modest-size hills to the southwest of the Mars Pathfinder landing site. They were discovered on the first panoramas taken by the IMP camera on the July 4, and subsequently identified in Viking Orbiter images taken more than 20 years before.

Image Credit: NASA/JPL