A word from your editor by Sapavith ‘Ort’ Vanapruks

Since 2010, my wife and I enjoyed rooting for Kapolei High School FIRST robotic team 2445 at Hawaii Regional Competition. These high school students spent six weeks from the 1st Saturday of the year to designed and built a 120 lbs. robot to compete with other high school from Hawaii, mainland, & other countries like China & Australia. My daughter, Sarah, was a member of 2010 & 2011 team. She is now a mechanical engineer working for Pearl Harbor Shipyard.

2019 is a 30th season. The game is Destination: Deep Space.

In DESTINATION: DEEP SPACE, Presented By The Boeing Company, we join two competing ALLIANCES collecting samples on Planet Primus. Unpredictable terrain and weather patterns make remote ROBOT operation essential to their mission on the planet. With only 2:30 until liftoff, the ALLIANCES must gather as many CARGO pods as possible and prepare their spaceships before the next SANDSTORM arrives. This year Hawaii Regional Game will be at Stan Sheriff Center. It will be on Friday, March 29, 2019 (Qualification) & Saturday, March 30, 2019 (Qualification in the morning & Tournament in the afternoon. The winning alliance will be going to Championship in April. You can watch the game animation at https://www.youtube.com/watch?v=Mew6G_og-PI

Upcoming Events:
• The next meeting is on Tuesday, March 5th at the Bishop Museum 7:30 PM.
• Bishop Museum’s planetarium shows are every 1st Saturday of the month at 8:00 PM www.bishopmuseum.org/calendar.
• The next Board meeting is Sun., March 3rd 3:30 PM in POST building at UH.
President’s Message
March 2019

HAS has a long history with the Bishop Museum. We have been holding our meetings in the planetarium most of the time as long as I have been a member (since about 1988 or ’89), and we supply telescopes and operators for many events. We are now being asked to formalize this relationship. We have been asked to sign a Memorandum of Understanding outlining our respective rights and duties. Nothing much should change under this new agreement, but we will now be expected to supply two people a month for various events at Bishop Museum rather than just supplying people on demand for special events. In return, we will be able to continue meeting in the planetarium. We are also negotiating for access to planetarium shows by those who are active volunteers for the museum.

This seems like a reasonable proposal to me, and I am prepared to sign the document on behalf of the club. However, since this will obligate HAS to provide people every month, it is only right that the membership be informed about this and have the opportunity to comment. If you have any thoughts or objections, please voice them at the March meeting or communicate them some other way. This is only a small part of the service we perform for the public, but it is the first time we will be actually obligated to provide such service. However, I think we are getting a good deal in return, so I am in favor.

Much of our service to the public is provided at star parties, and I attended three in February. The Kahala event was well attended although the weather didn’t look very promising. No rain, though, and we managed to show the attendees several

(Continued on page 4)
Observer’s Notebook—March 2019 by Jay Wrathall

### Planets Close To the Moon

**Times are Hawaii Standard Time**

- Mar 1, 09h, Moon 0.40° NE of Saturn (53° from sun in morning sky)
- Mar 2, 13h, Moon 1.23° SSE of Venus (40° from sun in morning sky)
- Mar 9, 15h, Moon 4.6° SSE of Uranus (41° from sun in evening sky)
- Mar 11, 07h, Moon 5.5° SSE of Mars (76° from sun in evening sky)
- Mar 26, 18h, Moon 1.91° NNE of Jupiter (102° from sun in morning sky)
- Mar 28, 20h, Moon 0.25° E of Saturn (78° from sun in morning sky)

Mercury and Neptune are closer than 15° from the sun when near the moon in March.

### Other Events of Interest

**Times are Hawaii Standard Time**

- Mar 6, 06:04h, Moon New
- Mar 6, 15h, Neptune in conjunction with sun (Passes into Morning sky)
- Mar 14, 16h, Mercury in inferior Conj. with sun (Passes into morning sky)
- Mar 20, 12:01h, Spring or Vernal equinox
- Mar 20, 15:42h, Moon Full

### Planets in March

<table>
<thead>
<tr>
<th>Planet</th>
<th>Position and Observational Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>Can be seen low in the evening twilight during the first few days of March</td>
</tr>
<tr>
<td>Venus</td>
<td>Shines brightly in the morning sky at magnitude ~4.0. It rises at about 4:30 AM. Look for it close to the crescent moon on March 2.</td>
</tr>
<tr>
<td>Mars</td>
<td>Is visible all month in the southwest after sunset at a magnitude of +1.3..</td>
</tr>
<tr>
<td>Jupiter</td>
<td>Rises about 2:30 AM early in the month and 1:00 AM late in the month and shines brightly above Venus until dawn.</td>
</tr>
<tr>
<td>Saturn</td>
<td>Is low in the southeastern sky before dawn.</td>
</tr>
<tr>
<td>Neptune</td>
<td>Reaches conjunction with the sun this month and cannot be observed.</td>
</tr>
<tr>
<td>532 Herculis (Asteroid)</td>
<td>Reached opposition on Feb 4&lt;sup&gt;th&lt;/sup&gt; and is still brighter than magnitude +9.5.</td>
</tr>
<tr>
<td>Pluto (Dwarf Planet)</td>
<td>Is near Saturn in the eastern sky before sunrise. It will be better placed for viewing later in the year.</td>
</tr>
</tbody>
</table>
President Chris Peterson called the February 5, 2019 meeting of the Hawaiian Astronomical Society to order at 7:30 p.m. The meeting was held in the Planetarium on the grounds of the Bishop Museum, Honolulu, Hawaii. There were approximately twenty-five members in attendance.

Mark Watanabe reported on upcoming school star parties:
March 8 Lincoln Elementary School
February 22 Iolani School
March 15 Hokulani Elementary School

The MOU, Memorandum of Understanding, with Bishop Museum Planetarium is being considered. We will try to reinstate free parking for volunteers, free ticket for Planetarium show. We will need to give membership cards to members.

Currently 55% members receive the email version of the Astronews. We can increase dues to $26.00 for members who want a mailed hard copy of the Astronews.

The HAS by-laws are on the HAS website with proposed changes. Members can email or call with their vote on the by-law changes. We can vote on the changes at the March meeting.

Hawaii State Science and Engineering Fair is on April 8 – 10, 2019. HAS presents two awards for astronomy projects.
Chris, Poly, and Dee Conquest have volunteered to be judges.

Chris noticed that there were brighter street lights in his neighborhood, and that they are shielded.

Due to the Sony open the Kahala star party may be canceled.

Chris talked about several astronomy news stories:
China's Chang'e-4 moon mission has sprouted a seed but died when the temperature dropped to -190 F. The location of the probe is always shielded from the earth which creates a quiet radio zone. During the solar eclipse an impact was witnessed on the moon, it looked like a flash of light. The Lunar reconnaissance orbiter images of a crater. The images have a size of 1 meter per pixel. An image appears to show ejecta. It takes a grape size object to make visible crater.

(Continued on page 6)

(Continued from page 2) President’s Message

objects. The annual Iolani School Space Night was plagued by partly cloudy skies, but Mars and the Orion nebula remained in view most of the time. The Dillingham public star party had only a few minutes of mostly clear skies, but we had many telescopes set up, so most of the attendees probably saw something nice during that brief interval. After most of the public left, we had another short chance to observe, but by 9:30 we decided to call it a night.
Hawaiian Astronomical Society
Event Calendar

March 2019

<<Upcoming Star Parties>>

Public Party Kahala/Geiger March 16
Public Party-Dillingham March 23
Club Party Dillingham March 30

Upcoming School Star Parties

<table>
<thead>
<tr>
<th>Time</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00A</td>
<td>March 2</td>
<td>Mililani Mauka STEM</td>
</tr>
<tr>
<td>6:30P</td>
<td>March 8</td>
<td>Lincoln ES Star Party</td>
</tr>
<tr>
<td>6:30P</td>
<td>March 13</td>
<td>Kanoelani Star Party</td>
</tr>
<tr>
<td>6:00P</td>
<td>March 15</td>
<td>Hokulani Star Party</td>
</tr>
</tbody>
</table>
New Horizon Ultima Thule images revealed a 2-lobed object that looks like a snowman. Nuclear powered probe on Mars with dust storms can still have power. Dan Steed announced that an event on March 2, 9am-12noon, needs volunteers to set up telescope(s) at the Science Fair at Mililani Mauka, also wants to have an HAS info table.

Meeting minutes of January 8 were approved.

Jay Wrathall has donations to the club: magazines, 70 mil telescope F25 – F26 to use as a tracking telescope, filter wheel 2” focus. We can sell for fundraising or list in the Astronews.

Peter showed:
Gary Ward’s eclipse pictures.
Ort’s Fantastic time lapse layered picture of the lunar eclipse taken in Ewa Makai.
Warped galaxy M85
Video of the Delta 4 heavy rocket ULA launch.
Two Chinese satellite pics.

Bishop Museum is planning an event for Valentines Day, $125 per person with stargazing, food and drinks. Tony Smith needs volunteers.

As there was no other business, the meeting was adjourned at 9 pm.

Sincerely,

April Lew
Secretary

Wishing us all a good morning on Feb. 21, 2019, from aboard the International Space Station, astronaut Anne McClain wrote on Twitter: "Good morning to our beautiful world, and to all the beautiful people who call it home! #TeamHuman"

Image Credit: NASA
Hawaiian Astronomical Society By—Laws

I. MEMBERSHIP

Section 1.

Membership is open to the general public. Membership other than honorary shall take effect January 1, provided that payment of the appropriate annual dues, payable on or before January 1 of each year, is made. Payment after this date shall be prorated for the remainder of that calendar year. Members whose dues are not paid by March 10 shall be automatically dropped from membership in the Society.

Rewrite: Membership is open to the general public, and shall take effect the month of the first issue of the Astronews after the payment of dues. Membership expires in twelve months.

B. Four classifications of membership shall exist:

a) Student membership, open to any person who is a full-time student.

b) Family membership, open to any group of persons who live in one household as a family.

c) Regular membership

d) Honorary membership, open to those so elected by the Society.

In addition, there will be a surcharge for people who wish to receive a printed copy of the “Astronews” newsletter, rather than an electronic version.

C. Upon recommendation by the officers and a two thirds vote by the Society, honorary memberships will be conferred. Honorary membership takes effect immediately and lasts for the life of the honorary member. Honorary members shall have no obligations to the Society, shall have all privileges, but may not hold office.

D. Upon joining the Society, families must indicate names of each person who is to be a member so that individual membership cards may be assigned. Each then shall have full privileges of membership. Additional family members may be added any time for a fee.

E. Any member may resign from the Society by submitting his or her resignation in writing to the treasurer.

F. Every member and member family shall be mailed a copy of these By—Laws upon request.

A copy of these bylaws will be placed on the H.A.S. Web site.

Section 2.

A. The general membership meeting of the Society shall be held at 7:30 p.m. on the first Tuesday of the month unless otherwise ordered by the Society or by the Board of Directors; provided the Society meets quarterly.

(Continued on page 8)
B. Seminars, observing sessions, star parties and other special events may be called by the Society.

C. The annual meeting will be the December general membership meeting.

D. Notice of the general and annual membership meetings shall be published in the "Astronews".

Section 3.
All members (excluding honorary) have voting rights, one per member. Proxy votes will not be allowed.

II. BOARD OF DIRECTORS

Section 1.
A. Powers of the Board of Directors (BOD) shall be to initiate and complete business for the Society by a two thirds vote of the BOD.

B. A quorum shall consist of five (5) directors.

C. The BOD shall consist of the five officers and two directors elected at large by the Society.

Section 2.
A. Nominees for the board members shall have been members of the Society for at least six (6) months and currently be members in good standing.

B. At the November general membership meeting, a committee shall be appointed by the president to present nominations for each member of the board at the December meeting. The Society then shall elect by ballot two (2) board members at-large and five officers.

C. BOD members will serve for one year beginning at the close of the meeting at which they are elected or until the next annual membership meeting in December if elected in mid-year to fill a vacancy.

Section 3.
A. Board members may resign by submitting a written resignation to any other board member.

B. By a two-thirds vote of attending membership, a director may be removed provided previous notice of intent has been published in the "Astronews". A notice of intent to impeach must be published by the "Astronews" Editor provided he or she has been presented with a petition stating cause and signed by 10 percent of the general membership or if a motion to impeach has been passed by a two thirds majority during a general membership meeting.

C. Vacancies will be filled by special election at the general membership meeting following publication of the vacancy in the "Astronews".

Section 4.
A. Board of Director meetings shall be held as often as necessary, or upon the request of three (3) board members. The President shall chair the meetings and any H.A.S. member may attend.

B. Notice of BOD meetings will be available from board members.

III OFFICERS

(Continued on page 9)
Section 1.
A. The officers of this Society shall be a President, a Vice President, a Secretary, a Treasurer, and an "Astronews" Editor.
B. Officers shall perform the duties prescribed by these By—Laws.

Section 2.

A. The duties of the President shall be:
   a) The President shall govern the monthly membership meeting in an orderly manner.
   b) The President shall preside over BOD meetings.
   c) The President shall effect the objectives of the Society as directed in the Articles of Incorporation.
   d) The President will establish committees as the need arises.

B. The duties of the Vice President shall be:
   a) In the absence of the President, the Vice President shall perform the President's duties.
   b) The Vice President shall assist the President in the President's duties.
   c) The club telescopes shall be the responsibility of the Vice—President. The Vice—President shall keep track of the telescopes and collect all users fees.

C. The duties of the Treasurer shall be:
   a) Keep correct books and records of account.
   b) File the yearly corporate exhibit with the Department of Commerce and Consumer Affairs. reports with the appropriate governmental agencies.
   c) Maintain membership records.
   d) Present monthly Treasurer's reports at the general membership meeting and supply the Secretary with a copy for records, for inclusion in the “Astronews”.
   e) Publish an HAS Directory

D. The duties of the Secretary shall be:
   a) Keep and maintain minutes of the general membership meetings and the BOD meetings.
   b) Keep up to date on laws affecting non-profit corporations.
   c) Keep By—Laws current.

E. The duties of the Editor shall be:
   a) To publish the HAS "Astronews".

IV. COMMITTEES

Section 1.

(Continued on page 10)
(Continued from page 9) By-Laws

A. Committees shall be appointed by the President as the need arises.

V. EXECUTION OF INSTRUMENTS

Section 1.

A. All officers' signatures are required for any and all legal documents pertaining to Society business, with the exception of bank documents.

B. The President's or the Treasurer's signature shall be required for bank transactions.

VI. FISCAL YEAR

Section 1.

A. The fiscal year is the calendar year.

VII. AMENDMENTS

Section 1.

A. These By-Laws may be amended by a two-thirds vote of the general membership following publication of intent in the "Astronews".

B. As the By-Laws are amended, the revisions will be published in the "Astronews".

VIII. PUBLICATIONS

Section 1.

A. During the month of March each year, the Treasurer shall compile and publish an HAS Directory which will be issued to all members.

B. The HAS Directory shall list the name, address, and phone number of each member. Any member may refuse to allow the publishing of information concerning himself or herself.

Section 2.

A. The Society shall publish a monthly newsletter entitled "Astronews" which shall be issued to all members, except member families which shall receive one copy per family. "Astronews" shall contain the announcement of the next general membership meeting, the minutes of previous membership meetings, club news, astronomy news and room permitting, notices of other topical meetings.

B. The Editor shall be responsible for the publication of "Astronews".

IX- FINANCES

Section 1.

A. All money collected and earned and all gifts received by the Society shall become the absolute property of the Society.

B. All allocation of monies and assets greater than $200.00 in value shall be accom-

(Continued on page 15)
March brings longer days for Northern Hemisphere observers, especially by the time of the equinox. Early risers are treated to the majority of the bright planets dancing in the morning skies, with the Moon passing between them at the beginning and end of the month.

The vernal equinox occurs on March 20, marking the official beginning of spring for the Northern Hemisphere. Our Sun shines equally on the Northern and Southern Hemispheres during the moment of equinox, which is why the March and September equinoxes are the only times of the year when the Earth’s north and south poles are simultaneously lit by sunlight. Exacting astronomers will note that the length of day and night on the equinox are not precisely equal; the date when they are closest to equal depends on your latitude, and may occur a few days earlier or later than the equinox itself. One complicating factor is that the Sun isn’t a point light source, but a disc. Its edge is refracted by our atmosphere as it rises and sets, which adds several minutes of light to every day. The Sun doesn’t neatly wink on and off at sunrise and sunset like a light bulb, and so there isn’t a perfect split of day and night on the equinox - but it’s very close!

Ruddy Mars still shines in the west after sunset. Mars scoots across the early evening skies from Aries towards Taurus and meets the sparkling Pleiades star cluster by month’s end.

March opens with the morning planets of Jupiter, Saturn, and Venus spread out over the southeastern horizon before sunrise. A crescent Moon comes very close to Saturn on the 1st and occults the ringed planet during the daytime. Lucky observers may be able to spot Mercury by the end of the month. March 31 opens with a beautiful set of planets and a crescent Moon strung diagonally across the early morning sky. Start with bright Jupiter, almost due south shortly before dawn. Then slide down and east towards Saturn, prominent but not nearly as bright as Jupiter.

(Continued on page 14)
March is a quiet month for meteor showers. If you want to observe this month your best chance is to look for sporadic meteors (not associated with a named shower) or check out the γ-Normid on March 14. For most of their activity, γ-Normid ZHRs seem to be virtually undetectable above the background sporadic rate. An analysis of IMO data from 1988–2007 showed an average peak ZHR of $\approx 6$ at $\lambda \odot = 354^\circ$, with ZHRs $< 3$ on all other dates during the shower (HMO, pp. 131–132). Results since 1999 have suggested the possibility of a short-lived peak alternatively between $\lambda \odot \approx 347^\circ$–$357^\circ$, equivalent to 2019 March 8–18. A later analysis of video data obtained only from locations south of the equator has indicated that the activity occurs pref-
Treasurer’s Report

Cash Flow - 12/10/2018 to 01/09/2019

Beginning Balance $2,261.27

Money into selected accounts comes from

Calendar $6.50
Donation $226.34
Membership - Electronic $280.00
Membership - Electronic—Student $24.00
Membership - Family $14.00
Membership - Paper $150.00
Membership - Paper—Student $15.00
Subscription - Astronomy $34.00
Subscription - Sky & Tel $65.90

Money In $815.74

Money out of selected accounts goes to

Astronews $201.26
Office-supplies $136.00
snacks $14.10
Subscription – Astronomy 34.00
Subscription - Sky & Tel $65.90

Money Out $552.21

Ending Balance $2813.48

Thanks to all the people who renewed or joined. To all the newcomers, if you have any questions, please drop me a line by clicking the e-mail link on the HAS Web site. Feel free to ask other people at meetings and star parties, too. It’s more old fashioned, but it works.

I especially thank those who made generous donations.

(Continued on page 15)
Continue east to the Moon, and then towards the beacon that is Venus, its gleam piercing through the early morning light. End with a challenge: can you find elusive Mercury above the eastern horizon? Binoculars may be needed to spot the closest planet to the Sun as it will be low and obscured by dawn’s encroaching glow. What a way to close out March!

Caption: Earth from orbit on the March equinox, as viewed by EUMETSAT. Notice how the terminator – the line between day and night - touches both the north and south poles. Additional information can be found at http://bit.ly/earthequinox Image credit: NASA/Robert Simmon

Caption: The morning planets on March 31. Image created with assistance from Stellarium.
erentially around March 25 ($\lambda = 4^\circ$) instead, from a radiant at $\alpha = 246^\circ, \delta = -51^\circ$. Post-midnight watching yields better results, when the radiant is rising to a reasonable elevation. Moonlight circumstances are best for the March 15 period (just after first quarter) but will strongly interfere with the possible late maximum timing. Credit: IMO.

(Continued from page 13) Treasurer’s Report

We have two Astronomy Magazine calendars left. One is an extra, the second is one that hasn’t been picked up.

I have posted the club’s bylaws on-line with proposed changes. Please take a look at them, as we will be voting at an upcoming meeting, and setting up an on-line vote.

Finally, with the increase in postage rates, HAS will be increasing the dues by a dollar for those who want paper copies of the Astronews. E-mail recipients will pay the same.

(Continued from page 10) By-Laws

plished by a two thirds vote of attending members in good standing at general membership meetings.

C. The BOD with a quorum vote may allot monies and assets of $200.00 $500.00 or less. All such allocations will be noted in Board of Directors Minutes and published in the "Astronews".

X. DISSOLUTION OF THE HAWAIIAN ASTRONOMICAL SOCIETY

Section 1.

A. The Society will be considered defunct and inviable only when there are not enough regular dues paying members to fill all Board of Directors positions.

B. Only if the Society is defunct may the Society dissolve.

C. The remaining regular members may declare the dissolution of the Society by a simple majority vote of all remaining regular dues paying members. Then all assets of the Hawaiian Astronomical Society will be given to the Bishop Museum Planetarium for the exclusive use of the Planetarium.
This picture showcases a gravitational lensing system called SDSS J0928+2031. Astronomers are using NASA/ESA Hubble Space Telescope observations of this type of lensing to research how stars form and evolve in distant galaxies.

Image credit: ESA/Hubble & NASA, M. Gladders et al; Acknowledgment: Judy Schmidt

Text credit: European Space Agency (ESA)