Potluck! @ December Club Meeting
by Charlie Rykken

Just a quick note and reminder. We have changed how often we have a potluck from twice to once per year. This is your chance to wow your fellow astronomers with your culinary craft. You aren’t feeling so crafty? That be no problemo. Simply bring your healthy appetite and enjoy this chance to eat excellent food (dang, we astronomers know about heavenly food too.) and share some gemütlichkeit (ask Peter) and out of this world conversation.

(Continued from page 2) President’s Message

This object, discovered with the Pan-STARRS 1 telescope on Haleakala, now has the informal name “’Oumuamua” (scout or messenger). It is travelling so fast that it was merely deflected by the Sun but will eventually exit the solar system in a different direction from which it came.

Such visitors are probably not extremely rare, but this one was large enough and came close enough to the Sun and Earth for us to detect it. These are two more examples of advances in understanding derived primarily from having and using appropriate instruments.

Chris Peterson
In last month’s Astronews, I talked about how LIGO (the Laser Interferometer Gravitational-wave Observatory) would produce new insights into how the universe works. Well, it’s already doing that. Two neutron stars merged, and the gravitational waves generated were detected by LIGO and the similar European VIRGO. Previous detections of black hole mergers were not observable by other means, but neutron star mergers produce light (in many wavelengths) that can be and was detected.

It is well known that stars fuse hydrogen into helium, and some create heavier elements up to iron. It had been theorized long ago that even heavier elements such as gold, silver, and uranium were created from neutron star mergers. This has now been verified through observations of the aftermath of this event. It took nearly a century to produce instruments that could detect the gravitational waves that Einstein predicted, but only a few years to use those instruments to verify a hypothesis central to our understanding of how nucleosynthesis works.

If that wasn’t enough for one month, another long-anticipated but never observed event occurred recently. Our solar system was visited by the first object that we are confident came from somewhere else. If you remember conic sections from geometry class, a cut through a cone parallel to its base produces a circle. A cut through both sides but not parallel to the base produces an ellipse. That is the shape of an orbit. A cut that is very steep and doesn’t reach the other side of the cone produces a hyperbola. That is the path of an object through a gravity field too weak to hold it in orbit.

(Continued on page 1)
### Planets in December

<table>
<thead>
<tr>
<th>Planet</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mercury</strong></td>
<td>Can be seen low in the east in the morning during the last week of December in one of its best views of the year.</td>
</tr>
<tr>
<td><strong>Venus</strong></td>
<td>Is too close to the sun to view in December.</td>
</tr>
<tr>
<td><strong>Mars</strong></td>
<td>Can be seen in the pre-dawn eastern sky after midnight.</td>
</tr>
<tr>
<td><strong>Jupiter</strong></td>
<td>Can be seen below Mars in the pre-dawn sky.</td>
</tr>
<tr>
<td><strong>Saturn</strong></td>
<td>Is too close to the sun to observe in December, reaching opposition on Dec 21.</td>
</tr>
<tr>
<td><strong>Neptune</strong></td>
<td>Is close to the meridian at sunset, so can be viewed during the evening hours.</td>
</tr>
<tr>
<td><strong>Pluto</strong></td>
<td>Is low in the southwest at sunset.</td>
</tr>
<tr>
<td><strong>Uranus</strong></td>
<td>Can be viewed high in the east after sunset, so is in the sky until after midnight.</td>
</tr>
<tr>
<td><strong>20 Massalia</strong> (Asteroid)</td>
<td>Reaches opposition on Dec 16 at magnitude +8.4.</td>
</tr>
</tbody>
</table>

### Other Events of Interest

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 3, 05:47h, Moon Full</td>
<td></td>
</tr>
<tr>
<td>Dec 3, 22:59h, Moon at perigee (17 hours after full Moon)</td>
<td></td>
</tr>
<tr>
<td>Dec 12, 16h, Mercury at inferior conj. with sun (Passes into morning sky)</td>
<td></td>
</tr>
<tr>
<td>Dec 14, Geminid meteors</td>
<td></td>
</tr>
<tr>
<td>Dec 16, 22h, Asteroid 20 Massalia at opposition (Magnitude 8.4)</td>
<td></td>
</tr>
<tr>
<td>Dec 17, 20:30h, Moon New</td>
<td></td>
</tr>
<tr>
<td>Dec 21, 06:28h, Winter solstice</td>
<td></td>
</tr>
<tr>
<td>Dec 21, 11h, Saturn at conj. with sun</td>
<td></td>
</tr>
</tbody>
</table>

### Planets Close To the Moon

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Moon Position</th>
<th>Sun Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 13, 09h</td>
<td>M 3.9º NNE of Mars</td>
<td>49º from sun in morning sky</td>
<td></td>
</tr>
<tr>
<td>Dec 07, 07h</td>
<td>M 4.1º NNE of Jupiter</td>
<td>39º from sun in morning sky</td>
<td></td>
</tr>
<tr>
<td>Dec 24, 04h</td>
<td>M 1.4º SSE of Neptune</td>
<td>69º from sun in evening sky</td>
<td></td>
</tr>
<tr>
<td>Dec 27, 11h</td>
<td>M 4.3º SSE of Uranus</td>
<td>108º from sun in evening sky</td>
<td></td>
</tr>
</tbody>
</table>

Mercury, Venus and Saturn are closer than 15º from the sun when near the moon in October.

### Times are Hawaii Standard Time

- Dec 13, 09h, M 3.9º NNE of Mars (49º from sun in morning sky)
- Dec 07, 07h, M 4.1º NNE of Jupiter (39º from sun in morning sky)
- Dec 24, 04h, M 1.4º SSE of Neptune (69º from sun in evening sky)
- Dec 27, 11h, M 4.3º SSE of Uranus (108º from sun in evening sky)

Mercury, Venus and Saturn are closer than 15º from the sun when near the moon in October.

### Times are Hawaii Standard Time

- Dec 3, 05:47h, Moon Full
- Dec 3, 22:59h, Moon at perigee (17 hours after full Moon) (Above average high and low tides)
- Dec 12, 16h, Mercury at inferior conj. with sun (Passes into morning sky)
- Dec 14, Geminid meteors
- Dec 16, 22h, Asteroid 20 Massalia at opposition (Magnitude 8.4)
- Dec 17, 20:30h, Moon New
- Dec 21, 06:28h, Winter solstice
- Dec 21, 11h, Saturn at conj. with sun
President Chris Peterson called the November 7, 2017 meeting of the Hawaiian Astronomical Society to order at 7:32 p.m. The meeting was held in Planetarium, on the grounds of the Bishop Museum, Honolulu, Hawaii. There were twenty members and two visitors in attendance.

Star Party Report – Calvin Olivera reports that we had three school star parties during the month of October.

• Helemano Elementary School – H.A.S. members helped out at the school near Whitmore village, on Friday, night October 27.
• Punahou Astronomy Club Star Party – This was the second scheduled star party for the Punahou Academy club. The first star party was cancelled due to weather problems. The make up viewing was a bit cloudy but successful.
• Boy Scouts at the Bishop Museum – The H.A.S. members helped out at the two evening-overs. There were between 200 to 250 scout members at the well-attended events, October 13th and 20th.

During the month of November we will have one event.

• Lehua Elementary School – Calvin asked for sign-ups for the Friday night, November 17th event in Pearl City. The suburban star parties were problematic during October, as the skies were not cooperative.

Help needed at Bishop Museum – Joanne Bogan requested help from club members to man the observatory at Bishop Museum the first Saturday of each month, from 6:30 p.m. to about 10:00 p.m. Upcoming events are: December 2, 2017, January 6, 2018, and February 3, 2018.

Visitors - We had two newcomers to our meeting this month. Alice and Isabella, who are interested in astrophotography, came to learn about the club. Isabella is hoping to do a school project in astrophotography and is hoping for some help.

Upcoming Elections– President Chris Peterson announced that there will be yearly elections held during the December 5th General Membership meeting of the H.A.S. The slate is as follows:

• President – Chris Peterson
• Vice President – Gretchen West
• Treasurer – Peter Besenbruch
• Secretary – April Lew
• Astronews Editor – Charles Rykken

(Continued on page 6)
### December 2017

<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></td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Board Meeting</td>
<td>Club Meeting</td>
<td>Globe at Night</td>
<td>Public Star Party(D)</td>
<td>Club Star Party(D)</td>
<td>Public Star Party(G)</td>
<td></td>
</tr>
<tr>
<td>3:30 PM</td>
<td>Potluck @ 6 PM</td>
<td>Globe at Night</td>
<td>5:54 PM</td>
<td>5:53 PM</td>
<td>5:56 PM</td>
<td></td>
</tr>
<tr>
<td>sunset 17:48</td>
<td>Mtg @ 7:30 PM</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Club Star Party(D)</td>
</tr>
<tr>
<td>sunset 17:50</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>5:53 PM</td>
</tr>
<tr>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>Public Star Party(D)</td>
<td>Public Star Party(V)</td>
<td>Public Star Party(D)</td>
<td></td>
</tr>
<tr>
<td>sunset 17:53</td>
<td>Globe at Night</td>
<td>Globe at Night</td>
<td>5:54 PM</td>
<td>5:56 PM</td>
<td>5:56 PM</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>sunset 17:56</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Board Meeting</td>
<td>Club Meeting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:30 PM</td>
<td>7:30 PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sunset 18:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**--Upcoming Star Parties--**

**Public Party-Dillingham December 9 (Andy Stroble)**

**Public Party Geiger December 23**

**Public Party Kahala December 23**

**Upcoming School Star Parties**

|       |       | No school parties for December |
• At-Large Members – Andy Stroble and Mark Watanabe. Mark Watanabe and Calvin Olivera will continue to work as Star Party Coordinators. Anyone interested in placing his or her name into nomination for any of the above Board positions is asked to contact Chris Peterson.

Potluck Supper – We will be having our annual December Pot Luck supper prior to the December 5th General Membership meeting of the H.A.S. If you are thinking of joining us, please contact April Lew to indicate the item or items you will bring to share. Yum!

Total Solar Eclipse 2019 - There will be a total solar eclipse June 27, 2019 in Chile. If you are interested in travelling to the South America to view it, start planning. Start looking for groups going south. Don’t wait. Get planning!

Sad News – We regret to inform members that former astronaut Richard Francis Gordon Jr. passed away November 6, 2017. He was an American naval officer and aviator. In addition to that Commander Gordon was a chemist, test pilot and NASA astronaut. He was the Command Module Pilot for the Apollo 12 mission and was one of only 24 people to have flown to the Moon.

Astronaut Lacy Veach Day – This is the sixteenth year for the science workshop experience for students, parents, and teachers. It took place on the Puna-hou School campus October 28, 2017. We had great helpers to make our participation some a success. H.A.S. would like to thank Susan Girard, April Lew, Sapavith “Ort” Vanapruks, Peter Besenbruch, Lytha Conquest, and Gretchen West for their help.

PhotoCon Hawaii - We would like to thank Lytha Conquest for leading the way in our participation at PhotoCon Hawaii, which took place on October 6, 7, and 8, 2017. The thrust of our participation was to generate interest in astrophotography and astroimaging within the “photo community.” We would also like to thank Ort Sapavith, who was instrumental in the set up at the event. Others who have been working hard to make this come to pass are John Taylor, Mark Watanabe, Gretchen West, Steve Chun and Edmar.

Peter’s Presentations – Vice President Peter Besenbruch presented the following:

• Tabby Star – A study of light data is on going and is focused on the dimming of ultraviolet light.

• Moon Paradise - It is now believed that 3.8 to 3.5 billion years ago that our moon had a stratified atmosphere, with gases in layers. While it only lasted some 70 million years, it left behind vestiges of materials that

(Continued on page 10)
The United States had a rough hurricane season this year. Scientists collect information before and during hurricanes to understand the storms and help people stay safe. However, collecting information during a violent storm is very difficult.

Hurricanes are constantly changing. This means that we need a lot of really precise data about the storm. It’s pretty hard to learn about hurricanes while inside the storm, and instruments on the ground can be broken by high winds and flooding. One solution is to study hurricanes from above. NASA and NOAA can use satellites to keep an eye on storms that are difficult to study on the ground.

In Puerto Rico, Hurricane Maria was so strong that it knocked out radar before it even hit land. Radar can be used to predict a storm’s path and intensity—and without radar, it is difficult to tell how intense a storm will be. Luckily, scientists were able to use information from a weather satellite called GOES-16, short for Geostationary Operational Environmental Satellite – 16.

The “G” in GOES-16 stands for geostationary. This means that the satellite is always above the same place on the Earth, so during Hurricane Maria, it never lost sight of the storm. GOES-16’s job as a weather satellite hasn’t officially started yet, but it was collecting information and was able to help. From 22,000 miles above Earth, GOES-16 watched Hurricane Maria, and kept scientists on the ground up to date. Knowing where a storm is—and what it’s doing—can help keep people safe, and get help to the people that need it.

Hurricanes can also have a huge impact on the environment—even after they’re gone. To learn about how Hurricane Irma affected the Florida coast, scientists used images from an environmental satellite called Suomi National Polar-orbiting Partnership, or Suomi-NPP. One of the instruments on this satellite, called VIIRS (Visible Infrared Imaging Radiometer Suite), took pictures of Florida before and after the Hurricane. (see picture on page 11)

Hurricane Irma was so big and powerful, that it moved massive amounts of dirt, water and pollution. The information captured by VIIRS can tell scientists how and where these particles are moving in the water. This can help with recovery efforts, and help us design better ways to prepare for hurricanes in the future.

By using satellites like GOES-16 and Suomi-NPP to observe severe storms, researchers and experts stay up to date in a safe and fast way. The more we know about hurricanes, the more effectively we can protect people and the environment from them in the future.

To learn more about hurricanes, check out NASA Space Place: https://spaceplace.nasa.gov/hurricanes/
Ort and I observed last month’s Leonid meteor shower, each in our own way. We arose in the wee hours on the morning of the 17th (Friday), the sky was clear with cool temperatures. Text msgs were exchanged since we observed from our respective homes. The plan was to image Leonids with our cameras. Here’s where our stories diverge… I set up my camera/tripod on the side yard, set the camera on automatic and promptly went back to bed. After all, I had only slept for two hours, so was quite tired. Ort also set up his camera in automatic mode, the continued to observe from 3:15 – 5:45am. He also was working with two hours of sleep – dedication takes many forms! He saw 9 Leonids and 1 Sporadic. As for the camera work – not very productive – 700

(Continued on page 10)
There are threenu members this month. They are Fred Clews, Alice Keesing & Isabella Chow.

Many thanks to those renewing their membership (Donald Andera & Donna Hanson and Johnson Chen).

As a reminder, please check your membership anniversary date listed on the As-tronews address label. Clear skies to all!
images taken, not a single meteor captured. It’s good that “film” is cheap these days.

The Geminids - One of the best, and probably the most reliable, of the major annual showers presently observable reaches its broad maximum on December 14 centered at 06h 30m UT. Well north of the equator, the radiant rises about sunset, reaching a usable elevation from the local evening hours onwards.

The Geminid peak has shown slight signs of variability in its rates and timing in recent years, with the more reliably-reported maxima during the past two decades (WB, p. 66) all having occurred within $\lambda = 261.5^{\circ}$ to $262.4^{\circ}$, 2017 December 13, 14h to December 14, 11h UT. Usually, near-peak Geminid rates persist for almost a day, so observers everywhere have the chance to enjoy something of the shower’s best. Mass-sorting within the stream means fainter meteors should be most abundant almost a day ahead of the visual maximum. The 2017 return comes with a thin waning crescent (new Moon December 18) – almost optimal conditions for all observers.

*** The Meteor Group will be observing the Geminid meteor shower in December, on or near the peak. Call/email for observing location and dates/times.

(Continued from page 8) Meteor Log by Tom Giguere

(Continued from page 6) Meeting Minutes

we might be able to use when we return to visit our nearest neighbor.

• Lunar Lave tube – The Japan Space Agency is looking into possibly using the lava tube to shield astronauts. It is estimated to be 50 km long and approximately 100 m. wide.

• LRO Birthday Bash – November 7, 2017 is LRO’s 100th lunar day celebration. NASA has 8 years

(Continued on page 11)
(Continued from page 10) Meeting Minutes

of data collected sketching out the lunar surface features, impact craters, and providing topographic maps that expand our knowledge of the lunar surface.

• Alien Visitor – An object that is a quasi-satellite of our solar system is finishing a swing by the solar system.
• New Bishop Museum Director – Melanie Ide has been named as the new Director of the Bishop Museum.
• More on Gravitational Waves – More information has been added to our understanding of gravitational wave.
• Haumea – Is it our tenth planet? Haumea is a plutoid that is a dwarf planet beyond Neptune’s orbit. The object has been classified as a dwarf planet because it is presumed to be massive enough to have been rounded by its own gravity into almost a sphere, but not massive enough to have cleared its neighborhood of similarly sized objects.

Planetarium Joys with Joanne – Yea, Joanne! Joanne Bogan walked us through the current late-night and early morning skies. As always, your planetarium romps are a pleasure and so much fun. Thank you!

Mahalo – As there was no further business, the meeting was adjourned 9:03 p.m. Refreshments provided by Hiroko and Andy Stroble, consisting of cookies, juice, and other goodies, were available in the rotunda.

Respectfully Submitted

Gretchen West

Continued from page 7 Space Place

These images of Florida and the Bahamas were captured by a satellite called Suomi-NPP. The image on the left was taken before Hurricane Irma and the image on the right was taken after the hurricane. The light color along the coast is dirt, sand and garbage brought up by the storm. Image credit: NASA/NOAA
H.A.S.
P.O. Box 17671
Honolulu, HI 96817

Illustration Credit: European Southern Observatory, M. Kornmesser

https://apod.nasa.gov/apod/astropix.html

Holy Mackerel Batman!