

## *Hubble & Webb by Charles Rykken*

The image of the Crab Nebula on the last page is taken from the Hubble website ( <http://hubblesite.org/gallery/album/nebula/> ). Many of the images that have appeared on the sign off page have been images from Hubble. Like all things great and small, the Hubble Telescope too shall pass.

Astronomy is a peculiar science in that pretty much all of the data is comprised of sampling from different portions of the electromagnetic spectrum. Another distinguishing feature is that experiments are performed by the cosmos and the astronomer must spend a large portion of her research time hunting down the spectral data. It is interesting that the word spectral is used to refer to ghosts. I am sure few astronomers would like to be referred to as ghost hunters or ghost busters. But there is something fanciful and deeply mythological about the stars. After all, we are creatures of stardust.

I know many people who associate themselves with astronomy prefer to think of themselves as “hard” sci-

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## Upcoming Events:

The next meeting is on Tuesday, Oct. 6<sup>th</sup> at the Bishop Museum 7:30 PM.

- Bishop Museum's planetarium shows are every Saturday of the month at 8:00 PM [www.bishopmuseum.org/calendar](http://www.bishopmuseum.org/calendar)
- The next Board meeting is Sun., Oct. 4 at 3:30 PM in POST building at UH.

## President's Message October 2015

Astronomy has always been a forward-looking endeavor. It has roots in astrology, which observed the movement of planets through the sky, partly in order to predict their future positions and their supposed influence on future events. Once the telescope was invented, it wasn't long until aperture fever set in. What more could we discover if our instruments were just a little better?

The pace of progress was fairly leisurely, though. As through most of human existence, people's lives were pretty much the same as those of their parents and offspring, but the rate of change was already accelerating in Galileo's time. The discovery of the New World and technological innovations had given us more reasons to consider how the future might be different from the present.

Authors like Jules Verne, H.G. Wells, and Mary Shelley came along to help us consider various possible futures and the role that technology might play in them. Science fiction became quite popular in the 20<sup>th</sup> century, and we began to think more seriously about the changes we might realistically see. In the last few generations, we have seen many ideas that were once only in the realm of science fiction become everyday facts.

My grandmother was born in 1887, before automobiles, television, or radio. In 1969 she, my parents, and I traveled on a jet to Europe. There we watched on color TV as Apollo 11 lifted off to take the first humans to land on the Moon. That's a lot of change in one lifetime! Nowadays, a normal lifetime takes you from the past to the future in a way it never used to.

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**Planets Close To the Moon**  
Times are Hawaii Standard Time

Oct 8, 11h, M 0.97° SSE of Venus  
(44° from sun in morning sky)  
Oct 9, 05h, M 3.3° SSW of Mars  
(37° from sun in morning sky)  
Oct 9, 12h, M2.6° SSW of Jupiter  
(33° from Sun in morning sky)  
Oct 11, 02h, M 0.90° SSW of Mercury  
(17° from sun in morning sky)  
Oct 16, 04h, M 2.9° N of Saturn  
(40° from sun in evening sky)  
Oct 23, 09h, M 3.1° N of Neptune  
(127° from sun in evening sky)  
Oct 26, 00h, M 0.88° S of Uranus  
(165° from sun in evening sky)

**Other Events of Interest**  
Times are Hawaii Standard Time

Oct 2, 18h, Asteroid 15 Eunomia at Opposition  
Oct 9, 08h, Moon, Mars, Jupiter in circle of 3.99°  
(35° from sun in morning sky)  
Oct 11, 18h, Uranus at Opposition  
Oct 12, 14:06h, New Moon  
Oct 15, 17h, Mercury at greatest elongation  
(18.1° West of the sun in morning sky)  
Oct 17, 13h, Mars 0.38° NNE of Jupiter  
(40° from sun in morning sky)  
Oct 21, Orionid Meteors  
Oct 25, 14h, Venus 1.0° SSW of Jupiter  
(46° from sun in morning sky)  
Oct 25, 17h, Venus, Mars, Jupiter in circle of 3.35°  
(45° from sun in morning sky)  
Oct 25, 21h, Venus at greatest elongation  
(46.6° West of the sun in morning sky)  
Oct 27, 02:05h, Full Moon

**Planets in October**

<p><b>Mercury</b></p> <p>☿</p> <p>can be seen in the morning with greatest elongation about the middle of October.</p>	<p><b>Venus</b></p> <p>♀</p> <p>shines brightly in the morning sky, reaching greatest elongation of 46.6° on October 26.</p>	<p><b>Mars</b></p> <p>♂</p> <p>is near Jupiter and Venus in the morning sky, but much dimmer.</p>
<p><b>Jupiter</b></p> <p>♃</p> <p>is visible in the morning sky near Venus and Mars.</p>	<p><b>Saturn</b></p> <p>♄</p> <p>is low in the southwestern sky after sunset.</p>	<p><b>Uranus</b></p> <p>♅</p> <p>reaches opposition on October 12, so will be in the sky all night. Best observed near midnight.</p>
<p><b>Neptune</b></p> <p>♆</p> <p>is near the meridian near sunset, so is easily viewed in the early evening hours.</p>	<p><b>15-Eunomia (Asteroid)</b></p> <p>★</p> <p>reaches opposition this month at magnitude +7.9. This is one of the brightest asteroids after the first four.</p>	<p><b>Vesta (Asteroid)</b></p> <p>♁</p> <p>reached opposition on September 28 at magnitude +6.2 - the brightest of the asteroids.</p>

Vice President Peter Besenbruch called the September 1, 2015 meeting of the Hawaiian Astronomical Society to order at 7:35 p.m. President Chris Peterson joined us a few minutes later. The meeting was held in the Planetarium, on the grounds of the Bishop Museum, Honolulu, Hawaii. There were twenty-eight members and three visitors in attendance.

Visitors – We had three visitors attending the general membership meeting tonight

Stepping Down - Members Calvin Oliveria and Mark Watanabe have agreed to jointly hold the position of Star Party Coordinators. Calvin will coordinate our outreach activities with schools and youth groups. Mark will continue to use the NASA Night Sky Network application to help organize and accommodate interested groups with our astronomers. Mark will be our NASA Night Sky liaison. Calvin introduced himself to the general membership, offered members gently used copies of *Astronomy* and *Sky & Tel* magazines. He also asked individuals to place their names in a pool of willing astronomers who would be willing to share the night skies with O'ahu schools.

V.P. Peter Besenbruch reviewed the recent group who spent time under the stars to view this year's Perseid meteor showers. Some of the members congregated at Mouna Farms in Waianae and had some success, even though the skies were somewhat overcast. The count between 10:00 and 12:00 numbered six, while in the following hour some saw five more. It was reported by others that about seven early morning sporadics had been seen.

Insurance - Treasurer April Lew reports that the yearly liability insurance premium of \$320 has been paid to the Astronomical League of the Pacific.

Lacy Veach Day of Discovery – The upcoming annual Lacy Veach Day of Discovery at Punahou School, will take place during October 31, 2015. Gretchen West reports that members who signed up to help out will receive a sumptuous mid-day meal, a hamburger, chips, a piece of fruit and a soda. It is a fun day to share with parents, students, and educators.

Missions Report – Chris Peterson reviewed the progress of the New Horizons' second phase. Data has been gathered, and will be transmitted back to Earth over the coming months. Astronomers must now figure out how to maximize the data gathered. They will also need to calculate the next target for the spacecraft.

Donation – There was a short discussion over a recent donation of an Astrophysics focuser.

Power Point – Peter B. shared a few astrophotographic pictures of the night sky, the Milky Way, and views of the Earth from the International Space

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Hawaiian Astronomical Society  
Event Calendar

OCTOBER

2015/10

FIRST DAY OF WEEK

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	01	02	03 6:00 PM Public Star Party(D) 8:00 PM Globe at Night
04 8:00 PM Globe at Night sunset: 18:16	05 8:00 PM Globe at Night	06 7:30 PM Club Meeting 8:00 PM Globe at Night	07 8:00 PM Globe at Night	08 8:00 PM Globe at Night	09 8:00 PM Globe at Night	10 8:00 PM Globe at Night 6:00 PM Club Star Party(D)(Private)
11 8:00 PM Globe at Night sunset: 18:10	12 8:00 PM Globe at Night	13	14	15	16 6:30 PM Teen Night at ARA (Private)	17 5:45 PM Public Star Party(G) 5:45 PM Public Star Party(K)
18  sunset: 18:05	19	20 3:00 PM TC: Astronomy in the Andes (Private)	21	22	23	24
25  sunset: 18:00	26	27	28	29	30	31 7:45 AM Lacey Veach Day
11.1	11.2	11.3	11.4	11.5	11.6	11.7

☐ ☐ **Upcoming Star Parties** ☐ ☐  
**Public Party-Dillingham Oct. 3 (J. Stroble)**  
**Public Party Geiger Oct. 17**  
**Public Party Kahala Oct. 17**

Upcoming School Star Parties

	No School Star Parties for October
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***President's Report (Continued from page 2)***

Clyde Tombaugh discovered Pluto in 1930, and his cremated remains just flew past on the New Horizons spacecraft. Venetia Burney, who named Pluto, lived long enough to see New Horizons launch. They only missed by a few years seeing the amazing images now being returned by that mission.

What will the future hold for children born this year? One thing is for certain. Astronomers will still be pushing the edge of the unknown, wondering what they could find if their instruments were just a little better.

**Chris Peterson**

*(Continued from page 4 Meeting Minutes)*

**Station.** Going along with an earlier discussion of the New Horizons mission, discussion included Kuiper Belt objects. Discussion also touched on possible active ice flows and the questions we have regarding their origins.

**Images** – Members saw images from Cassini, a kind of a space tour across Dionne. We also had a peek at a closer image of Ceres.

**Lunar Eclipse** – Members were reminded that the U.S. East Coast will have a fine view of the lunar eclipse that will happen September 26, 2015. While not much of a thrill for us, here in Hawaii, the mainland U.S. will have a fine chance to see the event.

**Reminder** – Barry Peckham wanted to remind members that although John Dobson is no longer with us, he will not soon be forgotten. John Dobson would have been one hundred years old this September 14<sup>th</sup>. His legacy of a mobile force of telescopes continues.

The Planetary Data Center at U.H. Manoa will be hosting Kim Binsted as a speaker.

**The Planetarium** – The Hawaiian Astronomical Society is fortunate that the Bishop Museum allows us to use their facilities for our monthly meetings. We also should take our hats off to thank our friend and fellow member Joanne Bogan, who shares a pretty special view of the night skies over Hawaii with us.

**Mahalo** – As there was no further business, the meeting was adjourned at 9:34 p.m. Refreshments were served in the rotunda

*Respectfully Submitted,*

*Gretchen West*

*H.A.S. Secretary*

The moon represents perhaps the first great paradox of the night sky in all of human history. While its angular size is easy to measure with the unaided eye from any location on Earth, ranging from 29.38 arc-minutes ( $0.4897^\circ$ ) to 33.53 arc-minutes ( $0.5588^\circ$ ) as it orbits our world in an ellipse, that doesn't tell us its physical size. From its angular size alone, the moon could just as easily be close and small as it could be distant and enormous.

But we know a few other things, even relying only on naked-eye observations. We know its phases are caused by its geometric configuration with the sun and Earth. We know that the sun must be farther away (and hence, larger) than the moon from the phenomenon of solar eclipses, where the moon passes in front of the sun, blocking its disk as seen from Earth. And we know it undergoes lunar eclipses, where the sun's light is blocked from the moon by Earth.

Lunar eclipses provided the first evidence that Earth was round; the shape of the portion of the shadow that falls on the moon during its partial phase is an arc of a circle. In fact, once we measured the radius of Earth (first accomplished in the 3rd century B.C.E.), now known to be 6,371 km, all it takes is one assumption—that the physical size of Earth's shadow as it falls on the moon is approximately the physical size of Earth—and we can use lunar eclipses to measure both the size of and the distance to the moon!

Simply by knowing Earth's physical size and measuring the ratios of the angular size of its shadow and the angular size of the moon, we can determine the moon's physical size relative to Earth. During a lunar eclipse, Earth's shadow is about 3.5 times larger than the moon, with some slight variations dependent on the moon's point in its orbit. Simply divide Earth's radius by your measurement to figure out the moon's radius!

Even with this primitive method, it's straightforward to get a measurement for the moon's radius that's accurate to within 15% of the actual value: 1,738 km. Now that you've determined its physical size and its angular size, geometry alone enables you to determine how far away it is from Earth. A lunar eclipse is coming up on September 28th, and this supermoon eclipse will last for hours. Use the partial phases to measure the size of and distance to the moon, and see how close you can get!

*Note from Editor : This article is not of immediate use to us in Hawai'i as by the date of publication of this Astronews, September 28 will be past. Also, this eclipse was better viewed on that date (9/28) on the mainland. The calculation information can be used at a later date, however. There are more eclipses coming for HI! See page 10 for accompanying images.*

October hosts Halloween and six meteor showers! The Orionids are the featured attraction. October's waxing gibbous Moon sets between local midnight and one a.m. in Hawaii for the peak night of October 21/22 this year, providing favorable viewing. The shower's radiant, near the celestial equator, is at a useful elevation for observing this shower.

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First Quarter		Full Moon		Last Quarter		New Moon		
September 21		September 28		September 5		September 13		
Shower	Activi-ty	Maximum		Radiant		$V_{\infty}$	$r$	ZHR
		Date	$\lambda_{\odot}$	$\alpha$	$\delta$	km/s		
Draco-nids (DRA)	10/6→10/10	(Oct 08)	195.4 $^{\circ}$	262 $^{\circ}$	+54 $^{\circ}$	20	2.6	Var
South-ern Tau-rids (STA)*	9/10→11/20	(Oct 10)	197 $^{\circ}$	32 $^{\circ}$	+09 $^{\circ}$	27	2.3	5
δ-Aurigids (DAU)	10/10→10/18	(Oct 11)	198 $^{\circ}$	84 $^{\circ}$	+44 $^{\circ}$	64	3.0	2
ε-Gemi-nids (EGE)	10/14→10/27	(Oct 18)	205 $^{\circ}$	102 $^{\circ}$	+27 $^{\circ}$	70	3.0	3
Orionids (ORI)	10/2→11/7	(Oct 21)	208 $^{\circ}$	95 $^{\circ}$	+16 $^{\circ}$	66	2.5	20*
Leo Mi-norids (LMI)	10/19→10/27	(Oct 24)	211 $^{\circ}$	162 $^{\circ}$	+37 $^{\circ}$	62	3.0	2

\*May have multiple peaks

Keep taking those meteor pics, but keep it real! For more info contact: Tom Giguere, 808-782-1408, [Thomas.giguere@yahoo.com](mailto:Thomas.giguere@yahoo.com); Mike Morrow, PO Box 6692, Ocean View, HI 96737.



HAS Financial Report August 16, 2015 to September 15, 2015			
Beginning Balance	1901.97		
Income:			
	Dues Received	32.00	
Total Income			32.00
Expenses:			
	August Astronews printing & mailing	119.74	
Total Expenses			119.74
Ending Balance			1814.23

. We welcome two new members this month. They are **Alexander Kawelo and Sandra Gibson.**

. As a reminder, please check your membership anniversary date listed on the Astronews address label. Clear skies to all!

(Continued from page 8) Meteor Log



Orionid Meteor Shower. The photographer explains his process, "*12 shots stacked*"  
(Continued on page 10)

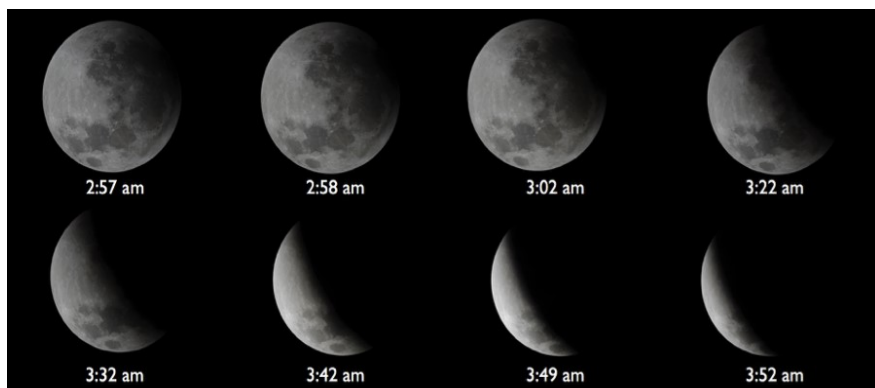


Image credit: Daniel Munizaga (NOAO South/CTIO EPO), using the Cerro Tololo Inter-American Observatory, of an eight-image sequence of the partial phase of a total lunar eclipse.

*(Continued from page 9) Meteor Log*  
*into one frame. I shot 750 images and ended up with 35 photos with meteors in them but only used 12 since the rest were very faint."*

What a beautiful, but also a deceptive image. Congrats to Mr. O'Brien for a capturing such a picture, but what is it telling us? I count at least 14 meteors. Are they all Orionids? They really can't be all Orionids because a line drawn from the head of each meteor back to the radiant won't intersect. However, if we examine the photographers' technique carefully we may come to a different conclusion. He took 750 images! He doesn't tell us what the exposure length was, but to pick up faint stars it has to be reasonably long. Let's give him the benefit of the doubt and say that each was 10 seconds; adding in readout and processing time of another 10 seconds; this would mean that he was shooting for more four hours. We all know how far the star background moves in this amount of time. Were all images even captured in a single evening? I think we have arrived at another story for this image – all of these meteors pictured actually could be Orionids, but when captured up to four hours apart in time they appear to rotate against the sky background. If you draw a new line from the head of each meteor back to the radiant at the time the exposure was taken, each would intersect the same position in the sky (radiant). Based on these clues we can tell that he stacked the frames by aligning on the stars. What about the mountains in the foreground?!? My bet is that he added one image of the mountains in at the end... Boy, can we trust our eyes? Yes, but it pays to inspect an image carefully before sharing with others!

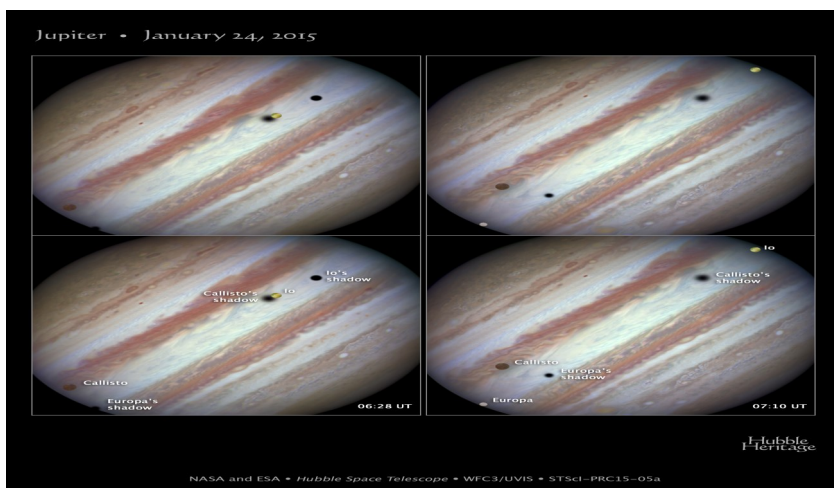
*(Continued from page 1)*

tists but I would bet that most professional astronomers began as wild eyed kids who shared the same sense of wonder that Paleolithic humans probably felt. I believe that an artistic sensibility is part of being a good scientist. Does not PhD stand for doctor of philosophy, not doctor of technology. Speaking for myself and I suspect most star gazers, what really draws us to the stars is the romance, mystery, and wonder that has always been the gift of an open and curious mind.

Hubble may be leaving the stage, but we can look forward to the Webb telescope. (<http://www.jwst.nasa.gov/>). The telescope will be launched on an Ariane 5 rocket from French Guiana in October of 2018. That is three years from this month! Even though the thrill of seeing an actual image, knowing that the light that is firing up my retina comes from stars of such vast distances, cannot be replaced by picture images from any super telescope, I still am in awe of the images that come from these great super telescope projects that rival the pyramids in Egypt as the greatest achievements of humanity.

I confess that I have been biased towards galaxies and nebulae. No artist can surpass some of these marvelous pictures. There is another reason that I hold such reverence for these heroic efforts. They bring humanity together in that childlike sense of wonder. Much like Earthrise, these are pictures where we can celebrate our common humanity.

In the future I will make a concerted effort to include images from other astronomical phenomena. Below is a picture of Jupiter from January of this year.



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The Crab Nebula is a supernova remnant, all that remains of a tremendous stellar explosion. Observers in China and Japan recorded the supernova nearly 1,000 years ago, in 1054.

Credit: NASA, ESA, J. Hester and A. Loll (Arizona State University)