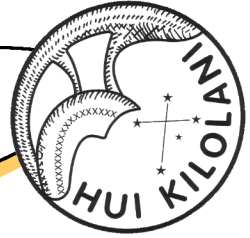


# The Astronews



Volume 64, Issue 7

[www.hawastsoc.org](http://www.hawastsoc.org)

July 2015

## Punching Optical Holes in the Atmosphere talk by Dr. Jessica Lu

Dr. Jessica Lu of the IFA will be giving a talk at the July 7 monthly club meeting. Her intention as of June 30 is to speak about finding and studying black holes with telescopes on Mauna Kea equipped with laser-guided adaptive optics.

Dr. Jessica Lu earned her Bachelors in Physics at the Massachusetts Institute of Technology in 2000 and her Ph.D. in Astronomy from the University of California Los Angeles in 2008. She currently works at the Institute for Astronomy at the University of Hawaii as an Assistant Astronomer. Dr. Lu was the recipient of both the NSF Postdoctoral Fellowship as

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## Membership List

Beginning on page 11 and continuing to page 15 (the penultimate page) you can find the complete the complete list of HAS members less those who requested to not be listed. This has been repeated from last month due to an oversight that did not include the newest members.

## Upcoming Events:

- The next meeting is on Tuesday, Jul. 7th 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., Jul 5 at 3:30 PM in POST building at UH

## President's Message

### July 2015

Get ready for a rare experience. We are about to get our first close look at Pluto. This dwarf planet has not even completed its first orbit of the Sun since its discovery in 1930. Actually, Pluto and Charon constitute a double dwarf planet. They orbit a barycenter outside of Pluto, and the other satellites orbit the central pair of bodies. The New Horizons spacecraft will fly by on July 14<sup>th</sup>. This will complete the initial reconnaissance of the major bodies of the solar system that were known when the space age began.

Humans have been physically exploring space since October 4<sup>th</sup>, 1957, when the Soviet Union launched Sputnik, the first artificial satellite of Earth. The space age is now nearing the length of a human life span, and space exploration has matured as time has passed. New Horizons is an example of how differently space exploration is conducted today compared to our initial efforts.

Our first steps into space were like those of a toddler learning to walk. There were many failures, and successful missions were short. As we gained experience, though, our trips became longer and accomplished more. Now we have the skill to attempt much more ambitious journeys.

New Horizons has traveled farther and longer than any other mission before reaching its primary objective. Launched on January 19<sup>th</sup>, 2006, it has been in space almost 9½ years and traveled nearly 3 billion miles. The radio signals it uses to communicate with Earth take over four hours to reach us. Four of Pluto's five moons were discovered after New Horizons launched.

The most important observations will occur over only a day or two around

*(Continued on page 6)*

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










- July 5, 19h, M 3.1° NW of Neptune (124° from sun in morning sky)
- July 8, 17h, M 0.78° SSE of Uranus (86° from sun in morning sky)
- July 18, 05h, M 4.0° SSW of Jupiter (29° from sun in morning sky)
- July 18, 15h, M 0.4° SSW of Venus (34° from sun in morning sky)
- July 25, 21h, M 2.4° SSW of Saturn (114° from sun in evening sky)

Mercury and Mars are closer than 15° from the sun when near the moon in July.

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

- July 1, 16:20h, Full Moon
- July 6, 00h, Pluto at Opposition
- July 6, 10h, Earth at aphelion (1.01668 au from the sun.)
- July 11, 19h, Venus Brightest, mag. - 4.5
- July 15, 15:24h, New Moon
- July 23, 09h, Mercury at superior conjunction (passes into morning sky)
- July 31, 00:43h, Full Moon

**Planets in July**

<p><b>Mercury</b></p>  <p>can be viewed in the evening sky during the first half of the month.</p>	<p><b>Venus</b></p>  <p>shines very brightly in the evening sky, reaching its greatest brightness of mag. - 4.5 on July 11.</p>	<p><b>Mars</b></p>  <p>is too close to the sun to be observed in July..</p>
<p><b>Jupiter</b></p>  <p>shines brightly low in the southwest after sunset.</p>	<p><b>Saturn</b></p>  <p>is near the meridian at sunset and can be viewed in the evening sky.</p>	<p><b>Uranus</b></p>  <p>is in the eastern sky before dawn. Will be better placed for viewing later in the year.</p>
<p><b>Neptune</b></p>  <p>rises about midnight and is visible in the morning sky.</p>	<p><b>1-Ceres</b> (Dwarf Planet)</p>  <p>reached opposition last month on June 29 at magnitude +7.2, so is visible most of the month.</p>	<p><b>2-Pallas</b> (Asteroid)</p>  <p>reached opposition last month at magnitude +9.4, so is in the sky most of the night.</p>

*Due to unforeseen technical difficulties there will be no meeting minutes this month.*

*(Continued from page 1) Speaker Announcement*

well as the CalTech Millikan Postdoctoral Fellowship. She is the Project Scientist for the 'imaka Project as well as a member of the science and astrometry teams for the IRIS instrument on the Thirty Meter Telescope. Dr. Lu is an expert in astrometry and adaptive optics and is involved in a number of projects to develop next-generation AO systems.

Dr. Lu studies star formation in extreme environments such as in the cores of massive (greater than 10,000 solar masses) star clusters and around the supermassive black hole at the center of the Milky Way. These are ideal targets for understanding whether environment changes the star formation process and changes the resulting distribution of stellar masses known as the initial mass function (IMF). The IMF is a fundamental parameter for many areas of astrophysics. These extreme environments require specialized astronomical instruments that provide the highest spatial resolution at infrared wavelengths. Dr. Lu uses laser-guide star Adaptive Optics (AO) to obtain high-precision astrometry, photometry and spectroscopy.

## The Andromeda Galaxy writ Large by John Gallagher and Charles Rykken

For some of you this may well be old news but for those who haven't already seen this it may well blow your socks off. A youtube video gives you a taste of what was accomplished on January 5, 2015

( <https://youtu.be/udAL48P5NJU> ). The reference located by John is <http://www.collective-evolution.com/2015/01/20/nasa-has-released-the-largest-picture-ever-taken-it-will-rock-your-universe/> ) Here you can read about how this was accomplished.

If you want to get up close and personal with M31 you should check ( <https://www.spacetelescope.org/images/heic1502a/> ) they provide a viewer that you can pick and zoom to your hearts content. Only about 25 % of the full file is available for you online but you have the option to download files anywhere from 138.8 K to the full file of 4.3 GB. On the Star and Telescope webpage there is a zoomtool to navigate about M31 online.

# Hawaiian Astronomical Society Event Calendar

## JULY

SUNDAY

2015

FIRST DAY OF WEEK

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	 01	02	03	04
05 sunset 19:18	06	07 7:30 PM PM Club Meeting 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	11 6:45 PM Club Star Party (D) (Private) 8:00 PM Globe at Night
12 8:00 PM Globe at Night sunset 19:17	13 8:00 PM Globe at Night	14 8:00 PM Globe at Night	 15 8:00 PM Globe at Night	16 8:00 PM Globe at Night	17	18 6:45 PM Public Star Party (D)
19 sunset 19:16	20	21	22	 23	24	25 7:00 PM Public Star Party(G) 7:00 PM Public Star Party (K)
26 sunset 19:13	27	28	29	30	31	01

### < < Upcoming Star Parties > >

**Public Party-Dillingham Jul. 18 Charles Rykken**

**Public Party Geiger Jul. 25**

**Public Party Kahala Jul. 25**

**President's Report** (Continued from page 2)

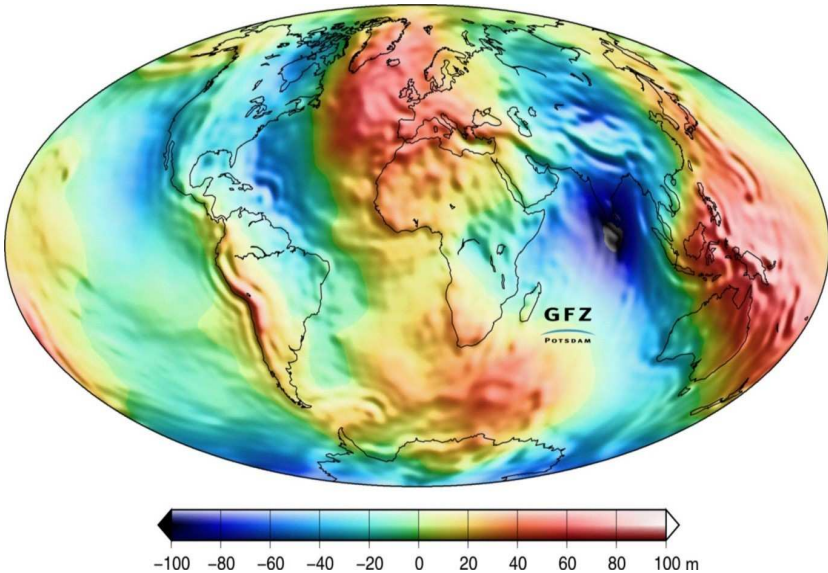
the time of closest approach, but it will take about 18 months to return all the data. That's not the end for New Horizons, though. It will next head to a newly discovered Kuiper belt object that it will reach "only" about three years from now.

This is the last first look at a major body in our solar system. Savor the experience. You won't get another quite like this.

**Chris Peterson**

(Continued from page 7) *Nasa's Space Place*

K-band ranging system and the onboard GPS receiver, have enabled the construction of the most accurate map of Earth's gravitational field ever: to accelerations of nanometers per second squared. While the mountaintops may be farther from Earth's center than any other point, the extra mass of the mountains and their roots – minus the mass of the displaced mantle – accounts for the true gravitational accelerations we actually see. It's only by the grace of these satellites that we can measure this to such accuracy and confirm what was first conjectured in the 1800s: that the full layer-cake structure of Earth must be accounted for to explain the gravity we experience on our world!



*Image credit: NASA / GRACE mission / Christoph Reigber, et al. (2005): An Earth gravity field model complete to degree and order 150 from GRACE: EIGEN-GRACE02S, Journal of Geodynamics 39(1),1–10. Reds indicate greater gravitational anomalies; blues are smaller ones.*

By Dr. Ethan Siegel

Put more mass beneath your feet and feel the downward acceleration due to gravity increase. Newton's law of universal gravitation may have been superseded by Einstein's, but it still describes the gravitational force and acceleration here on Earth to remarkable precision. The acceleration you experience is directly proportional to the amount of mass you "see," but inversely proportional to the distance from you to that mass squared.

The denser the mass beneath your feet, the stronger the gravitational force, and when you are closer to such a mass, the force is even greater. At higher elevations or even higher altitudes, you'd expect your gravitational force to drop as you move farther from Earth's center. You'd probably also expect that downward acceleration to be greater if you stood atop a large mountain than if you flew tens of thousands of feet above a flat ocean, with nothing but ultra-light air and liquid water beneath you for all those miles. In fact this is true, but not just due to the mountain's extra mass!

Earth is built like a layer-cake, with the less dense atmosphere, ocean, and crust floating atop the denser mantle, which in turn floats atop the outer and inner cores of our planet. An iceberg's buoyancy is enough to lift only about one tenth of it above the sea, with the other nine tenths below the surface. Similarly, each and every mountain range has a corresponding "invisible mountain" that dips deep into the mantle. Beneath the ocean floor, Earth's crust might be only three to six miles thick, but it can exceed 40 miles in thickness around major mountain ranges like the Himalayas and the Andes. It's where one of Earth's tectonic plates subducts beneath another that we see the largest gravitational anomalies: another confirmation of the theory of continental drift.

A combination of instruments aboard NASA's Gravity Recovery and Climate Experiment (GRACE) satellites, including the SuperSTAR accelerometer, the

*(Continued on page 6)*

## Who Are the Shining Stars of HAS ?

Please refer to the May 2015 issue of the ASTRONEWS for an explanation of this column. This column recognizes and commends members of the club who go the extra miles to support school and other star parties that are outside the club's Public star parties thus fulfilling a prime mission of the club to provide outreach on the Wonders of the Night Sky. This report covers the period from 21 May 15 through 20 June 15:

Peter Faso, John Gallagher (2), Tom Giguere (2), Dyron Mack, Calvin Olivera (2), Chris Peterson (2), Sapavith (ORT) Vanaprucks

The Delta Aquariids is a strong shower best seen from the southern hemisphere. North of the equator the radiant is located lower in the southern sky and therefore rates are less than seen from further south. These meteors produce good rates for a week centered on the night of maximum. These are usually faint meteors that lack both persistent trains and fireballs. The parent comet for this shower is thought to be 96P/Machholz.

The Alpha Capricornids are active from early July through August with a "plateau-like" maximum centered on July 29/30. This shower is not very strong and rarely produces in excess of five shower members per hour. What is notable about this shower is the number of bright fireballs produced during its activity period. Since the radiant has a low latitude this shower is seen equally well on either side of the equator. The Alpha Capricornids are hosted by comet 169P/NEAT. The full moon will be a hindrance for both of these showers.

*(Continued on page 10)*

<b>First Quarter</b>	<b>Full Moon</b>	<b>Last Quarter</b>	<b>New Moon</b>
July 24	July 2, 31	July 8	July 16

Shower	Activity	Maximum		Radiant		$V_{\infty}$ km/s	$r$	ZHR
		Date	$\lambda \square$	$\alpha$	$\delta$			
Piscis Austrinids (PAU)	7/15→ 8/10	(Jul 28)	125°	341°	-30°	35	3.2	5
South. $\delta$ -Aquariids (SDA)	7/12→ 8/23	(Jul 30)	127°	340°	-16°	41	3.2	16
$\alpha$ -Capricornids (CAP)	7/3→ 8/15	(Jul 30)	127°	307°	-10°	23	2.5	5

If you see, hear, or find a meteor(ite), inform us right away! 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.



# Treasurer's Report

by April Lew

HAS Financial Report May 16, 2015 to June 15, 2015			
Beginning Balance			2505.81
Income:			
	Dues Received	174.00	
	Donation	43.00	
Total Income			217.00
Expenses:			
	June Astronews printing & mailing	133.70	
	Astronomical League dues	710.00	
	State of Hawaii DCCA yearly fee	5.00	
	State of Hawaii tax year 2014	4.66	
Total Expenses			853.36
Ending Balance			1,869.45

.We welcome four new members this month. They are **Christopher Ohnheiser, (Joe, Jim, & Karen) McClelland, (Rachel, Michael, & Ann) Antal, and Christian Traverson (donation).**

Many thanks to those renewing their membership ( Maurice Hood (donation), Steven Chun, Charles & Ann Rykken(donation), Stephany & Daniel Taba, Gregory Wilson, (Nathaniel, Elizabeth, & Ian) Shippen). 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*

Continuing with our discussion of the shower table parameters,  $\alpha$ ,  $\delta$ : are coordinates for a shower's radiant position, usually at maximum.  $\alpha$  is right ascension,  $\delta$  is declination. Radiants drift across the sky each day due to the Earth's own orbital motion around the Sun.



*Cape Hatteras Lighthouse under the Milky Way.  
A nice meteor on the east coast. This one happens to be a Lyrid. By Jeff Berkes*