

## A sure look through a cosmic keyhole

by Charlie Rykken

A galaxial harmonium? New galaxies spewing ejecta in the same direction? What is going on here?

<https://www.quantamagazine.org/20160614-a-glimpse-through-a-cosmic-keyhole/>

Russ Taylor and Preshanth Jagannathan of the University of Cape Town in South Africa spent 300 hours of observation time on India's Giant Metrewave Radio Telescope ( <http://gmrt.ncra.tifr.res.in/> ) and discovered 12 of 65 active galaxies with jets all oriented in the same direction. Taylor and Jagannathan calculated the odds of that happening at 0.1 percent. Since we only need  $p < 0.05$  or for a really exacting study  $p < 0.01$  we can reject the null hypothesis and confidently claim that it is the work of God or aliens. What else could it possibly be? (see President's message). It is wonderful that we keep finding new mysteries. Since the general theory of consistent theory formation is still in its infancy, we can still have fun with wild and crazy ideas. Just don't expect to be published!

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## Upcoming Events:

The next meeting is on Tuesday, July 5<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., July. 3<sup>rd</sup> 3:30 PM in POST building at UH.

## President's Message July 2016

If I were ever called to the witness stand and asked to swear that I would tell “the truth, the whole truth, and nothing but the truth,” I think I would laugh. Then I would say, “Of course not. Such a thing is not possible.” I have done scientific research, and I know how difficult it is to even approach a small bit of what might be called the “truth.”

Humans are good at imagining things, but we are not very good at imagining everything that is possible. Years ago, some scientists thought they had proved that meteorites could not be delivered to Earth by impacts on Mars. Then we found meteorites on Earth that were almost certainly from Mars. It didn't take long for someone to figure out how that could have happened.

We are seeing a similar thing happening now with exoplanets. When the Kepler mission began discovering a large number of exoplanets, some large planets, dubbed “hot Jupiters,” were found to be orbiting rather close to their parent stars. It was thought that these planets must have formed farther out and migrated closer to the stars over a long period of time.

Now the Kepler K2 mission has discovered a planet larger than Neptune orbiting a 5- to 10-million-year-old star every five days. This is a very young star, far too young for the planet to have formed farther out and migrated inward in the manner conceived of for other such planets. Now that this example has been discovered, I am confident that an explanation will be produced to explain its existence. When what was thought to be impossible is shown to actually exist, it is surprising how quickly an explanation can arise.

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# Observer's Notebook—July 2016 by Jay Wrathall

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










July 9, 00h, M 0.81° SSW of Jupiter  
(61° from sun in evening sky)  
July 12, 12h, M 7.6° NNE of Mars  
(121° from sun in evening sky)  
July 15, 20h, M 3.4° N of Saturn  
(136° from sun in evening sky)  
July 22, 19, M 1.1° NNW of Neptune  
(139° from sun in morning sky)  
July 25, 20h, M 2.8° SSE of Uranus  
(99° from sun in morning sky)

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

## Other Events of Interest Times are Hawaii Standard Time

July 4, 01:01h, New Moon  
July 6, 17h, Mercury at superior conj with  
sun  
(Passes into evening sky)  
July 7, 06h, Pluto at opposition  
(Best month to observe this dwarf planet)  
July 19, 12:57h, Full Moon

## Planets in July

 <b>Mercury</b> begins an evening appearance during the last few days of July. Look low in the sunset sky	 <b>Venus</b> is still too close to the sun to be viewed this month.	 <b>Mars</b> is still well placed for viewing after it's opposition last month, but is decreasing in brightness and apparent size rapidly.
 <b>Jupiter</b> shines brightly in the southeastern sky during the evening hours.	 <b>Saturn</b> Shines brightly near the meridian during mid-evening hours	 <b>Uranus</b> can be seen in the east before dawn.. Will be easier to observe later in the year.
 <b>Neptune</b> above Uranus in the predawn sky. Will be better placed for viewing in the fall.	 <b>2-Pallas (Asteroid)</b> will reach opposition next month at magnitude +9.2	 <b>Pluto (Dwarf Planet)</b> reaches opposition this month so this is the best month to try to observe this very dim dwarf planet. Best viewed near midnight.

## HAWAIIAN ASTRONOMICAL SOCIETY GENERAL MEMBERSHIP MEETING June 7, 2016

President Chris Peterson called the June 7, 2016 meeting of the Hawaiian Astronomical Society to order at 7:33 p.m. The meeting was held in Planetarium, on the grounds of the Bishop Museum, Honolulu, Hawaii. There were twenty-eight members and four visitors in attendance.

Observing: President Chris Peterson announced that there will be viewing of the night sky on the observing deck after this evening's meeting.

Observing should be good this month with three planets in the early evening sky. Jupiter, which is just past the meridian at sunset, will be easy viewing for all. Mars will be well placed for observation in the coming month. It can be observed in the constellation Scorpius and pass opposition May 22<sup>nd</sup>. Due to its close proximity with Earth, Mars will appear larger than normal. Saturn also reached opposition June 3<sup>rd</sup>. It is also placed in the constellation of Scorpius. Viewing of all three planets should be enjoyable to all with binoculars and/or telescopes.

Good viewing in the evening skies at present are Mars, Jupiter and Saturn. Chris urged all interested members to join us at either the dark sky viewing site at Dillingham Airfield on the North Shore of O'ahu, or at our suburban star parties at Geiger Park or Kahala Community Park. You don't need to be a university professor to come out and have a great time helping us to share the night sky with the public.

Hawaii Space Lecture Series – This month the Hawaii Space Lecture Series will not present a free lecture. Regular lectures usually take place at the NASA Pacific Regional Planetary Data Center, room 544 in the Pacific Ocean  
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(Continued from page 2) *President's Report*

That is one reason we explore. We look for things we haven't imagined. Our search for other life beyond Earth may follow a similar path. We think we know some of the factors necessary to sustain any life "as we know it," but other life may not be anything like the life we know. Scientific theorizing is good and important, but it will never negate the need to explore to find things we haven't imagined.

## Chris Peterson

# Hawaiian Astronomical Society

## Event Calendar

July 2016						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
26	27	28	29	30	1	2
					8:00 PM Globe at Night 6:45 PM Star Party for Cub Scouts	8:00 PM Globe at Nigh 6:45 PM Club Star Party (D) (Private)
3	4	5	6	7	8	9
8:00 PM Globe at Night sunset 19:18	8:00 PM Globe at Night	8:00 PM Globe at Night 7:30 PM Club Meeting	8:00 PM Globe at Night			7:00 PM Public Star Party (G) 7:00 PM Public Star Party (K)
10	11	12	13	14	15	16
sunset 19:17						
17	18	19	20	21	22	23
sunset 19:16						
24	25	26	27	28	29	30
sunset 19:14				8:00 PM Globe at Night	8:00 PM Globe at Night	6:45 PM Public Star Party (D) 8:00 PM Globe at Night
31	1					
8:00 PM Globe at Night sunset 19:10						

Upcoming Star Parties

Public Party-Dillingham July 30 (Andy Stroble)

Public Party Geiger July 9

Public Party Kahala July 9

### Upcoming School Star Parties

		No School Parties Scheduled at “Press Time”
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*(Continued from page 4) Meeting Minutes*

Science and Technology Building on the Manoa campus of the University of Hawaii. Should you be interested in upcoming lectures or for information you can contact NASA PRPDC at 808-956-3132 or on the Web go to <http://www.higp.hawaii.edu/prpdc>.

Visitors - We had four visitors to this H.A.S. monthly meeting. Polly Nieow, a fellow is residence at the University of Hawaii, Manoa, joined us this evening, as did Cindy and Steve Fenick of Kaneohe. The last of our visitors was a John Borders.

Authorization: H.A.S. and its Board of Directors have received the letter of authorization from the Department of Transportation giving us the written permission to conduct star viewing on the ground of the Dillingham Airfield.

In the News- President Chris Peterson directed a discussion regarding the Juno Mission. The mission launched in August of 2011. It obtained a polar orbit in July of 2016.

Treasurer's Report: H.A.S. Treasurer, April Lew, reports that the balance on account for the club is under \$2000. Our membership is stable. We received a \$500 donation. A letter of appreciation will be sent to the donor. We spend some money on new eyepieces for the rental scopes.

Star Party Report – Calvin Olivera reported on the May school star parties. They were as follows:

May 6 – Wednesday night 8<sup>th</sup> Graders at Hawaii Baptist Academy.

May 18 – Webling Elementary School.

Maryknoll students will be our guests at an upcoming Dillingham Airfield star party.

Peter's Power Point – Vice-President Peter Besenbruch presented a Power Point presentation on the following:

Super novae

Gravitational lensing

One galaxy stealing energy from another.

Red geysers

A short discussion of Milky Way dynamics. and

Hubble Space Telescopes view of Mars.

Cometary Dates- Rosetta mission to Mars

Galaxy expansion

A newly released ultra-high definition photograph of floating shaped on a Pluto.

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# Hubble's bubble lights up the interstellar rubble

by  
By Dr. Ethan Siegel



When isolated stars like our Sun reach the end of their lives, they're expected to blow off their outer layers in a roughly spherical configuration: a planetary nebula. But the most spectacular bubbles don't come from gas-and-plasma getting expelled into otherwise empty space, but from young, hot stars whose radiation pushes against the gaseous nebulae in which they were born. While most of our Sun's energy is found in the visible part of the spectrum, more massive stars burn at hotter temperatures, producing more ionizing, ultraviolet light, and also at higher luminosities. A star some 40-45 times the mass of the Sun, for example, might emit energy at a rate hundreds of thousands of times as great as our own star.

The Bubble Nebula, discovered in 1787 by William Herschel, is perhaps the classic example of this phenomenon. At a distance of 7,100 light years away in the constellation of Cassiopeia, a molecular gas cloud is actively forming stars, including the massive O-class star BD+60 2522, which itself is a magnitude +8.7 star despite its great distance and its presence in a dusty region of space. Shining with a temperature of 37,500 K and a luminosity nearly 400,000 times that of our Sun, it ionizes and evaporates off all the molecular material within a sphere 7 light years in diameter. The bubble structure itself, when viewed from a dark sky location, can be seen through an amateur telescope with an aperture as small as 8" (20 cm).

As viewed by Hubble, the thickness of the bubble wall is both apparent and spectacular. A star as massive as the one creating this bubble emits stellar winds at approximately 1700 km/s, or 0.6% the speed of light. As those winds slam into the material in the interstellar medium, they push it outwards. The bubble itself appears off-center from the star due to the asymmetry of the surrounding interstellar medium with a greater density of cold gas on the "short" side than on the longer one. The blue color is due to the emission from partially ionized oxygen atoms, while the cooler yellow color highlights the dual presence of hydrogen (red) and nitrogen (green).

The star itself at the core of the nebula is currently fusing helium at its center. It is expected to live only another 10 million years or so before dying in a spectacular Type II supernova explosion. See page 11 for photo

Very little information has been collected on the Piscis Austrinids in recent years, so the details on the shower are not well-confirmed, and it seems possible the zenith hourly rate (ZHR) may be a little optimistic. However, that impression could be due simply to the large amount of northern hemisphere summer data, and the almost complete lack of southern hemisphere winter results, on it. Observations are needed to establish the listed parameters.

The Delta Aquariids is a strong shower best seen from the southern hemisphere. Radio work can pick up the South.  $\delta$ -Aquariids (SDA) as well, and indeed the shower has sometimes given a surprisingly strong radio signature. Visually, careful plotting is advised to help with accurate shower association. The SDA maximum may not be quite as sharp as the single date here could imply, with perhaps similar ZHRs and several sub-maxima between July 26 and 31, all equally favorable for dark-sky coverage this time.

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<b>First Quarter</b>	<b>Full Moon</b>	<b>Last Quarter</b>	<b>New Moon</b>
July 12	July 19	July 26	July 4

Shower	Activity	Maximum		Radiant		$V_{\infty}$	$r$	ZHR
		Date	$\lambda \odot$	$\alpha$	$\delta$	km/s		
Piscis Austrinids (183 PAU)	07/15→ 08/18	Jul 28	125°	341°	-30°	35	3.2	5
South. $\delta$ -Aquariids (005 SDA)	07/12→ 08/23	Jul 30	127°	340°	-16°	41	3.2	16
$\alpha$ -Capricornids (001 CAP)	07/03→ 08/15	Jul 30	127°	307°	-10°	23	2.5	5

Report all meteors, especially bright ones! 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 May 16 – June 15 2016			
Beginning Bal- ance	1644.31		
Income:			
	Dues Received	84.00	
	Donation	100.00	
	Sky & Telescope	32.95	
Total Income	216.95		
Expenses:			
	May Astronews printing & mailing	160.14	
	Sky & Telescope	32.95	
Total Expenses	193.09		
Ending Balance	1,668.17		

We welcome a new member this month. He is *Alan Lum*.

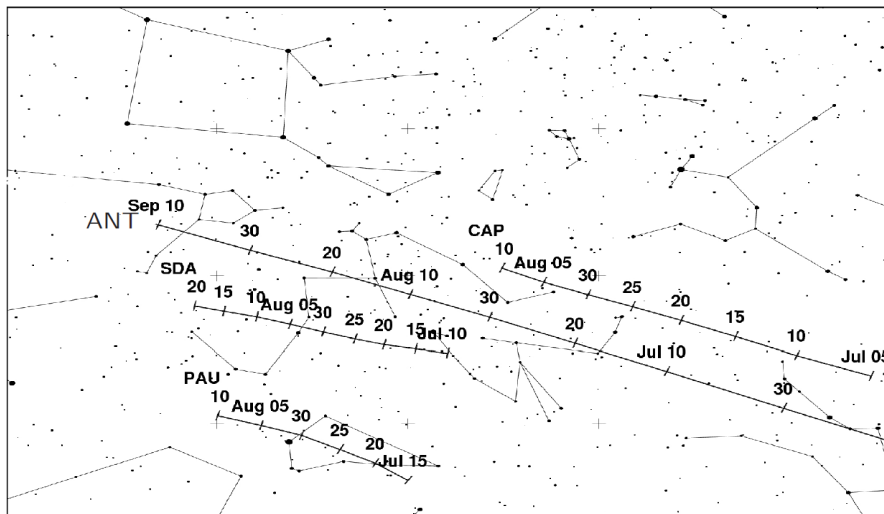
Many thanks to those renewing their membership (Peter Besenbruch, Bob Black & Libby Stoddard, Duane Wenzel & Joanna Mackin).

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





Image credit: NASA, ESA, and the Hubble Heritage Team (STScI/AURA), of the Bubble Nebula as imaged 229 years after its discovery by William Herschel.



*Radiants plotted for all showers this month. Courtesy the IMO.*

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Let the rockets yellow glare! Photo Credit: (NASA/Bill Ingalls)  
<http://www.nasa.gov/image-feature/booster-test-for-space-launch-system-rocket-1>