

Hopes for Hologram Universe ring Hollow by Charles Rykken

In the November 2014 issue of Astronews I wrote about research at Fermilab that might provide experimental verification that the universe is a hologram. In a recent news release (<http://news.fnal.gov/2015/12/holometer-rules-out-first-theory-of-space-time-correlations/>) Fermilab reports that the experimental evidence gathered over the last year indicates a pixilated 2d hologram universe is unlikely (confidence intervals based on model).

This still leaves open the possibility for other models that would require a reworking of the present apparatus that showed unprecedented accuracy of plank scale measurements.

This project has been a brainchild of one of the lead investigators, Carl Hogan for quite some time. For a sketch of his 2009 project proposal which explains in semi-technical detail see https://www.fnal.gov/directorate/program_planning/Nov2009PACPublic/HoganPACNov09.pdf

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Upcoming Events:

The next meeting is on Tuesday, Jan. 5th 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
- The next Board meeting is Sun., Jan. 3rd at 3:30 PM in POST building at UH.

President's Message January 2016

The International Astronomical Union has begun naming exoplanets and the stars they orbit. By international agreement, the IAU is the body responsible for authorizing the names of all celestial bodies and features on them. Until now, they had ratified existing star names but had never added a new proper name. (I'm not counting alpha-numeric designations derived from a constellation or the star's location in right ascension/declination space.) They held a contest in which over half a million people voted to choose the names.

Fourteen stars and thirty-one planets were named. The IAU often chooses themes for its choices of names. For example, satellites of Uranus are named for characters from Shakespeare's plays and from Pope's "Rape of the Lock." Craters on Mercury are named after deceased artists, musicians, painters, and authors. Some of the names of stars and exoplanets also are organized by themes.

Copernicus, the new name for 55 Cancri, is orbited by Galileo, Brahe, Lippershey, Janssen, and Harriot. Mu Arae, now named Cervantes, has the planets Quixote, Dulcinea, Rocinante, and Sancho. I would expect more themes to be applied to other systems, especially those with multiple planets.

How long before they start running out of names? I multiplied 26 by itself 10 times to find out how many combinations of letters a ten-letter word could contain. The answer is over 141 trillion. Using 27 instead of 26 to accommodate a space in any location brings the total to over 205 trillion. Of course, many of the possible

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The **Astronews** is the monthly newsletter of the Hawaiian Astronomical Society. Some of the contents may be copyrighted. We request that authors and artists be given credit for their work. Contributions are welcome. Send them to the Editor via e-mail. The deadline is the 15th of each month. We are not responsible for unsolicited artwork.

Planets Close To the Moon
Times are Hawaii Standard Time

- Jan 3, 10h, M 1.4° NNE of Mars (73° from sun in morning sky)
- Jan 6, 15h, M 3.1° N of Venus (37° from sun in morning sky)
- Jan 6, 19h, M 3.3° N of Saturn (35° from Sun in morning sky)
- Jan 13, 04h, M 2.2° NNW of Neptune (45° from sun in evening sky)
- Jan 15, 21h, M 1.4° SSE of Uranus (81° from sun in evening sky)
- Jan 27, 14h, M 1.3° SSW of Jupiter (135° from sun in morning sky)

Mercury is closer than 15° from the sun when near the moon in January.

Other Events of Interest
Times are Hawaii Standard Time

- Jan 2, 13h, Earth at Perihelion. (0.98330 au from sun)
- Jan 5, 12h, Pluto at conjunction with sun (Passes into morning sky)
- Jan 8, 18h, Venus 0.06° N of Saturn (36° from sun in morning sky)
- Jan 9, 15:31h, New Moon
- Jan 14, January 1st in Julian Calendar
- Jan 14, 04h, Mercury at inferior conj. with sun (Passes into morning sky)
- Jan 23, 15:46h, Full Moon

Planets in January

<p>Mercury</p>  <p>may be viewed in the morning twilight late in the month.</p>	<p>Venus</p>  <p>shines brightly in the morning sky, at about magnitude -4.0.</p>	<p>Mars</p>  <p>above Venus in the morning sky, but much dimmer</p>
<p>Jupiter</p>  <p>rises well before midnight in January and is well placed for viewing late in the evening.</p>	<p>Saturn</p>  <p>is low in the eastern sky before dawn.</p>	<p>Uranus</p>  <p>is in the southwestern sky after sunset.</p>
<p>Neptune</p>  <p>is low in the southwest after sunset.</p>	<p>1-Ceres (Dwarf Planet)</p>  <p>reaches aphelion this month, so is near its dimmest at magnitude +9.3.</p>	<p>Pluto (Dwarf Planet)</p>  <p>reaches conjunction with the sun on Jan 5 and cannot be viewed this month.</p>

HAWAIIAN ASTRONOMICAL SOCIETY
GENERAL MEMBERSHIP MEETING
December 1, 2015

President Chris Peterson called the December 1, 2015 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-one members in attendance.

Elections – The slate of members for election to the 2016 Board of Directors for the Hawaiian Astronomical Society was as follows:

President – Chris Peterson
Vice-President – Peter Besenbruch
Treasurer – April Lew
Secretary – Gretchen West
ASTRONEWS Editor – Charles Rykken
At-Large members – Andy Stroble and Calvin Oliveria

The assembled members of the Hawaiian Astronomical Society unanimously elected the above listed slate of candidates.

Satellite Launch – Chris Peterson sadly reported that the launch of the University of Hawaii satellite was not successful.

Observing Calendar- The 2016 calendar of meetings and the observing schedule for Dillingham Airfield, Geiger Community Park and Kahala Community Field has been finalized. It was pointed out that the December 31, 2016 would probably not be well attended and as a result has been dropped from the schedule.

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combinations would not be used, but there should be enough possibilities to last for a while.

Using just names of Americans, it has been reported that there are over 150,000 different last names and over 5,000 first names in common use. That would yield over 750 million combinations, so I don't think the IAU will run out of possibilities soon. I think it's more likely that the number of exoplanets will increase faster than the IAU's capacity to name them.

Chris Peterson

Hawaiian Astronomical Society Event Calendar

January 2016

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
27	28	29	30	31	1	2 
					8:00 PM Globe at Night	8:00 PM Globe at Night 5:45 PM Public Star Party(D)
3	4	5	6	7	8	9 
8:00 PM Globe at Night sunset 18:03	8:00 PM Globe at Night	8:00 PM Globe at Night 7:30 PM Club Meeting	8:00 PM Globe at Night	8:00 PM Globe at Night	8:00 PM Globe at Night	8:00 PM Globe at Night 5:50 PM Club Star Party(D) (Private)
10	11	12	13	14	15	16 
8:00 PM Globe at Night sunset 18:07						5:55 PM Public Star Party(G) 5:55 PM Public Star Party (K)
17	18	19	20	21	22	23 
sunset 18:12						
24	25	26	27	28	29	30
sunset 18:16						
31						
sunset 18:21						

Upcoming Star Parties

Public Party-Dillingham Jan. 2 (Peter Besenbruch)

Public Party Geiger Jan. 16

Public Party Kahala Jan. 16

Upcoming School Star Parties

	No School Star Parties for January
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Park Use Permits – Barry Peckham and John Gallagher have graciously offered to obtain the 2016 park use permits for Kahala Community and Geiger Community Parks respectively. Mahalo, gentlemen!

Pot Luck- We would like to thank all members who participated in our Christmas potluck supper this evening. The food and the companionship were superb.

Changes at Bishop Museum – Just a reminder that those H.A.S. members who are not members of the Bishop Museum will need to pay \$5 for general parking and \$3 on meeting nights. Payment is to be made at the kiosk in front of the Museum Shop. Those H.A.S. members who are also members of the Bishop Museum will receive a placard to be displayed on the car dashboard, and will not have to pay the nightly parking fee.

Star Light Reserve – Discussions continue at the state level regarding lighting on streets and highways. The use of LED lighting and the controversy over the color temperature continues. President Chris Peterson will be contacting Jim Crissafuli to ask if there is anything we can do regarding the controversy and discussion.

December Meteor Shower – The Geminid meteor shower will be at its maximum December 14, 2015. Viewing should be very good this year as the moon will be three days from new moon at that time. Tom Giguere will be leading a group viewing the meteor shower out at Mouna Farms in Waianae.

December Speaker – This month Vice-President Peter Besenbruch and President Chris Peterson presented information for consideration.

Peter offered up a slide show on the Pathfinder mission; on extra-solar planets; information regarding compact observing telescope sold by Astronomers Without Borders; The James Webb Space Telescope; a volcanic caldera on Pluto; and Comet Catalina in northern Virgo.

Chris spoke to the membership about the websites that offer interesting and knowledgeable information regarding recent or ongoing missions.

Messenger mission - NASA.gov updates
Cassini Mission – NASA.gov -Saturn and solstice missions, and Cyclops
Mars Exploration Rovers – NASA.gov -Spirit and Opportunity
Mars Express – European Space Agency
Rosetta Missions – European Space Agency
Venus Express - European Space Agency
New Horizons- NASA.gov –
Lunar Reconnaissance Orbiter - NASA.gov

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How will we finally image the event horizon of a black hole ?

By Dr. Ethan Siegel



One hundred years ago, Albert Einstein first put forth his theory of General Relativity, which laid out the relationship between spacetime and the matter and energy present within it. While it successfully recovered Newtonian gravity and predicted the additional precession of Mercury's orbit, the only exact solution that Einstein himself discovered was the trivial one: that for completely empty space. Less than two months after releasing his theory, however, the German scientist Karl Schwarzschild provided a true exact solution, that of a massive, infinitely dense object, *a black hole*.

One of the curious things that popped out of Schwarzschild's solution was the existence of an event horizon, or a region of space that was so severely curved that nothing, not even light, could escape from it. The size of this event horizon would be directly proportional to the mass of the black hole. A black hole the mass of Earth would have an event horizon less than a centimeter in radius; a black hole the mass of the sun would have an event horizon just a few kilometers in radius; and a supermassive black hole would have an event horizon the size of a planetary orbit.

Our galaxy has since been discovered to house a black hole about four million solar masses in size, with an event horizon about 23.6 million kilometers across, or about 40 percent the size of Mercury's orbit around the sun. At a distance of 26,000 light years, it's the largest event horizon in angular size visible from Earth, but at just 19 micro-arc-seconds, it would take a telescope the size of Earth to resolve it – a practical impossibility.

But all hope isn't lost! If instead of a single telescope, we built an *array* of telescopes located all over Earth, we could simultaneously image the galactic center, and use the technique of VLBI (very long-baseline interferometry) to resolve the black hole's event horizon. The array would only have the light-gathering power of the individual telescopes, meaning the black hole (in the radio) will appear very faint, but they can obtain the resolution of a telescope that's the distance between the farthest telescopes in the array! The planned Event Horizon Telescope, spanning four different continents (including Antarctica), should be able to resolve under 10 micro-arc-seconds, imaging a black hole directly for the first time and answering the question of whether or not they truly contain an event horizon. What began as a mere mathematical solution is now just a few years away from being observed and known for certain!

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The big show this month, besides Christmas, was the Geminid meteor shower! Two groups made the effort to observe this reliable shower. The first hint that the Geminids would be strong came from a report from our club president. Chris mentioned that six meteors were spotted at the star party Saturday night, which is about 36 hours before the shower's maximum. Although, some of the meteors were sporadic, this was still a positive omen.

Observing group one headed out to Mouna Farm on the Waianae side of the island. The group was made up of Sue Giraud, Ort and Susan Vanapruks, Mike Morrow and myself. As always, we were joined by 8-10 interested folks from the farm. The farm is always as busy as a beehive, with new people each time we return. In just this one night, one guy was flying out to Washington state, he visits a few times a year; another fellow had just arrived a few hours before from Georgia. Always good to have new observers!

We observed from just after dark until about midnight. Clouds were a problem for the first few hours, with clouds coming and going, but then the temperature cooled enough that the remaining clouds dissipated. We did have some general haze in the air, probably vog since the winds were from the south, which limited the faintest magnitude to five. Despite these impediments we attained a group count of 112. Some meteors were a faint magnitude 4 or 5 and a few were nearly as bright as Venus. Ort attempted to capture the shower with his camera, but I haven't heard if he was able to capture any.

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First Quarter	Full Moon	Last Quarter	New Moon
January 16	January 24	January 2	January 10

Shower	Activity	Maximum		Radiant		V _∞	r	ZHR
		Date	λ☉	α	δ			
Quadrantids (QUA)	12/28→ 01/12	Jan 3	283.16°	230°	+49°	41	2.1	120

A new year brings new opportunities to see meteors! Tom Giguere, 808-782-1408, Thomas.giguere@yahoo.com; Mike Morrow, PO Box 6692, Ocean View, HI 96737.

HAS Financial Report November 16 –December 15 2015			
Beginning Balance	1507.54		
Income:			
	Dues Received	166.00	
	Astronomy Magazine	68.00	
	Sky & Telescope subscription		
	Donations	188.00	
Total Income			422.00
Expenses:			
	November Astronews printing & mailing		
	Post Office Box rental	132.00	
	Astronomy Magazine	68.00	
	Sky & Telescope magazine subscriptions	65.90	
Total Expenses			265.90
Ending Balance			1663.64

We welcome two new members this month. They are **Tom and Lynn Simpson**.

Many thanks to those renewing their membership (Susan Girard, Leighton and Aurora Hasegawa, Clarice Levin, James MacDonald, Albert J. and Diane Miriani, John Sandor, and Gary Shimazu and Anne Lo-Shimazu).

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

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Observing group two, Rob and Tom Lancaster, viewed from the windward side. Certainly an unlikely place to observe from for most of the year, but due to the southerly winds, Haiku had “textbook” clear weather. With the streetlights put to bed, the duo began their observing session and didn’t quit until 4:45am! Some unusual meteors were seen, including some that were very bright and colorful, some meteors bounced around a bit and some did the curve shot thing, and they saw one that actually broke into two on the way in ... wild!! The final count for this site is 311.

All in all, the Geminids put on an excellent show this year. Put this shower on your list to observe next December.

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Note: This month's article describes a project that is not related to NASA and does not suggest any relationship or endorsement. Its coverage is for general interest and educational purposes.

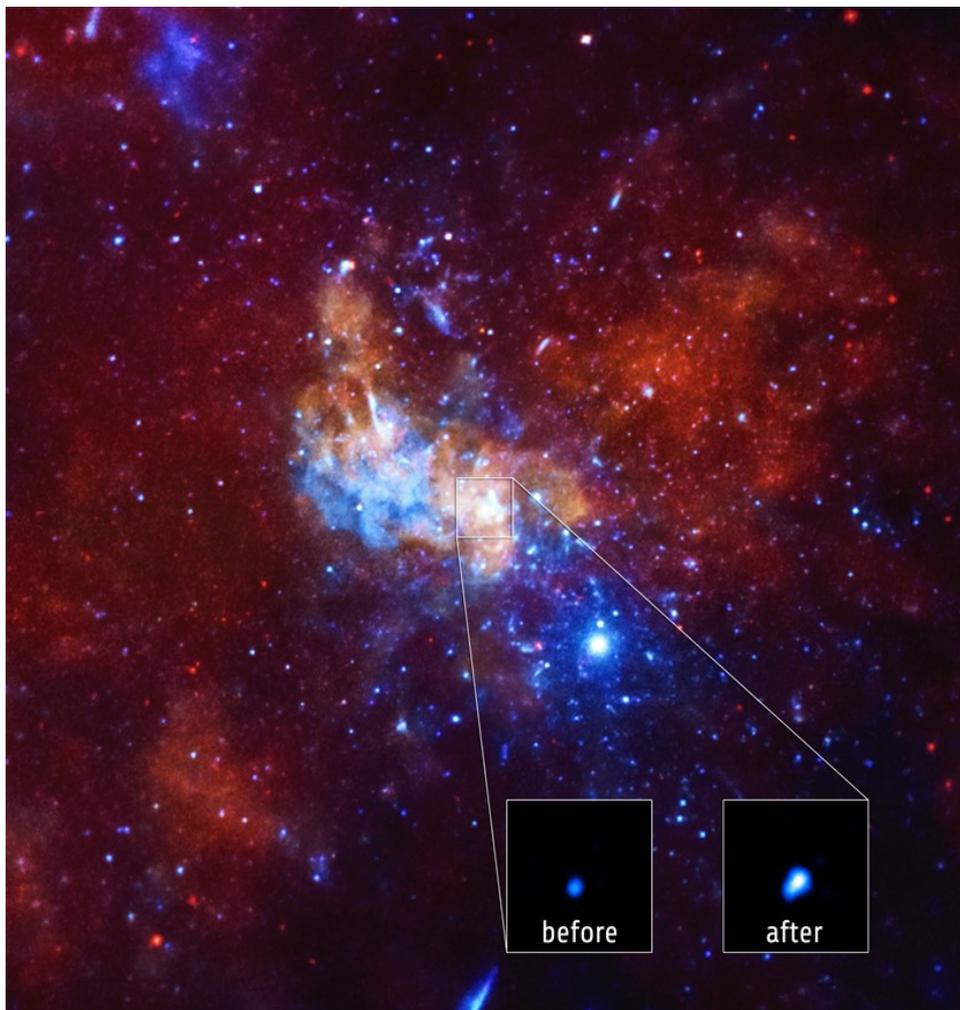


Image credit: NASA/CXC/Amherst College/D.Haggard et al., of the galactic center in X-rays. Sagittarius A is the supermassive black hole at our Milky Way's center, which normally emits X-ray light of a particular brightness. However, 2013 saw a flare increase its luminosity by a factor of many hundreds, as the black hole devoured matter. The event horizon has yet to be revealed.*



Spectacular picture of the Geminid shower. I don't have the attribution for the photo, however I do have a guess as to where it was taken. There are some clues. Do you have an idea?

Coming up in early January are the **Quadrantids (QUA)** which often put on a good show. The Moon will rise at 2:30am, so a good bit of observing can be done before moonrise

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Dawn Mission - NASA.gov

Mars Science Rover - NASA.gov – Curiosity

Chandrayan – Indian Space Agency

Kepler - NASA.gov

Juno - NASA.gov

John Gallagher provided us with a short offering from a recent teleconference regarding adaptive optics and radio astronomy.

The Planetarium – Joanne treated us to a portion of the Christmas laser show. What fun!

Mahalo – As there was no further business, the meeting was adjourned at 8:59 p.m. Merry Christmas and a Happy New Year!

Respectfully Submitted

Gretchen West

H.A.S. Secretary

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A/JPL-C: Cassini will complete its final close flyby of Saturn's active moon Enceladus on Dec. 19.

<http://www.nasa.gov/feature/jpl/cassini-closes-in-on-enceladus-one-last-time>