

Rocks from Mars by Tom Giguere

We see a story coming together for NWA 7533, which is a meteorite from

Mars. The story is that the igneous rocks that make up meteorite NWA 7533 formed at 4428 million years (4.43 billion years), but that some isotopedisturbing event occurred at the younger intercept at 1712 million years (1.71 billion years). This may be the date of an impact event that assembled the NWA 7533 impact melt breccia. There is much more to the story of this and other martian meteorites located at (http://www.higp.hawaii.edu/psrd/ June14/Mars-meteorite-ages.html).



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Upcoming Events:

The next meeting is on Tuesday, May 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., May. 3rd 3:30 PM in POST building at UH.

President's Message May 2016

Get ready for Mars! We only get a short few weeks every two years or so when Mars is close enough to show much detail through a telescope's eyepiece. Even then the views vary dramatically from opposition to opposition because of the eccentricity of the orbit of Mars. Because it takes slightly longer than two years for Earth to "lap" Mars as we orbit the Sun, we encounter Mars at a different point in space each time. It takes 15 or 17 years to return to opposition in roughly the same part of our orbits. Many of us remember the 2003 opposition, the closest (by a little bit) in about 60,00 years! This vear's will be the best since 2005, and the next two will be better than this one with the closer of them coming in 2018.

Opposition will occur on May 22nd. However, as is the case when we are nearing but not at the closest opposition of a cycle, Mars is heading towards its perihelion faster than we are pulling ahead of it in our faster orbit around the Sun, and closest approach doesn't occur until May 30th. That is fortunate because it means that Mars will be higher in the sky in the early evening at closest approach than at opposition (when it rises at sunset). It will be more than 30 degrees above the horizon by 9:00 p.m. that night.

Mars began its retrograde motion on April 16th. Since it is the nearest of the outer planets to Earth, its retrograde motion is the most pronounced. Usually its rapid prograde progress through the sky makes the change in its rising time agonizingly slow. We seem to wait and wait for it to rise just a little earlier. Then as it begins its retrograde motion, it surges up quickly into good viewing position just as

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Observer's Notebook—May 2016 by Jay Wrathall

Planets Close To the Moon Times are Hawaii Standard Time

May 2, 01h, M 1.6° NNW of Neptune (61° from sun in morning sky) May 4, 18h, M 2.1° SSE of Uranus (23° from sun in morning sky) May 14, 22h, M 1.9° SSE of Jupiter

(108 ° from sun in evening sky)

May 21, 12h, M 5.9° N of Mars (175° from sun in midnight sky) May 22, 12h, M 3.2° N of Saturn (167° from sun in morning sky) May 29, 08h, M 1.4° NNW of Neptune (87° from sun in morning sky)

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

Other Events of Interest Times are Hawaii Standard Time

May 6, 09:30h, New Moon

May 9, 05h, Mercury at inferior conj. with sun (passes into morning sky) (transit of Mercury across the sun is in progress at sunrise.) May 14, Spring Astronomy Day May 21, 11:14h, Full Moon May22, 01h, Mars at Opposition (Diameter 18.4", Magnitude -2.1) May 30, 11h, Mars nearest to earth (Diameter 18.6", Magnitude -2.0)

| Planets in May | | | | | | |
|---|--|---|--|--|--|--|
| Mercury appears in the dawn | Venus is very close to the curr in the down slav | Mars reaches opposition late in the month so this is the | | | | |
| Transit of the sun visible as the sun rises on May 9. | sun m the dawn sky. | best viewing of the red planet until 2018. | | | | |
| Jupiter 24 is near the meridian at sunset and can be ob- served all evening. | Saturn is about 5° east of Mars in the morning sky. | Very close to the sun in the dawn sky. Will be easier to observe later in the year. | | | | |
| W Neptune is visible in the eastern sky an hour or two before sunrise. Will be better placed for view- ing in the fall. | 3-Juno (Asteroid)reached opposition on April 20, so is still in a good position to view, but is only magnitude +10.0. | Pluto (Dwarf Planet) Is near the meridian be- fore sunrise, but will be better placed for viewing later in the year. | | | | |

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Meeting Minutes

HAWAIIAN ASTRONOMICAL SOCIETY GENERAL MEMBERSHIP MEETING April 6, 2016

President Chris Peterson called the April 6, 2016 meeting of the Hawaiian Astronomical Society to order at 7:37 p.m. The meeting was held in Planetarium, on the grounds of the Bishop Museum, Honolulu, Hawaii. There were thirty-two members and four visitors in attendance.

<u>Hawaii Space Lecture Series</u> – This month the Hawaii Space Lecture Series presents a free lecture: *Results from the Dawn Mission to Dwarf Planet Ceres.* Dr. Norbert Schorghofer of the Institute for Astronomy, University of Hawaii will speak at the regularly scheduled 7:30 pm lecture. Regular lectures usually take place at the NASA Pacific Regional Planetary Data Center, room 544 in the Pacific Ocean 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 no first time visitors to the H.A.S. monthly meet-

ing.

<u>Star Party Report</u> – Calvin Oliveria reported on the March school star parties. They were as follows:

Iolani School- Appreciative Third Grade students wrote fun and appreciative thank-you notes to the astronomers who Wowed them at the February 26 "Space Night".

During the month of April, H.A.S. will present the night skies to the following schools:

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it passes its closest point to us. Retrograde motion is always fastest for any outer planet when it's at opposition.

Once past opposition, Mars lingers high in the evening sky for a long time as its motion returns to prograde, though imagers can take better advantage of a shrinking target than can visual observers. By then, though, we'll have Saturn to take our minds off the two-year wait for the next Mars opposition.

Chris Peterson

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Hawaiian Astronomical Society Event Calendar

| May 2016 | | | | | | |
|--|------------------------|--|------------------------|------------------------|------------------------|--|
| SUNDAY | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | SATURDAY |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8:00 PM Globe at Night sunset 18:57 | 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 6:45 PM Public Star Party(D) |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 8:00 PM Globe at Night sunset 19:00 | | | | | | 6:45 PM Public Star Party(G) 6:45 PM Public Star Party(K) |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| sunset 19:03 | | | | | | |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| sunset 19:06 | | | | | | 6:45 PM Club Star Party(D)(Private) |
| 29 | 30 | 31 | 1 | 2 | 3 | 4 |
| 8:00 PM Globe at Night sunset 19:09 | 8:00 PM Globe at Night | 8:00 PM Globe at Night | | | | |
| | | | | | | |

Upcoming Star Parties Public Party-Dillingham May 7 (Charlie Rykken) Public Party Geiger May 14 Public Party Kahala May 14

Upcoming School Star Parties

| No School Parties Scheduled at "Press Time" |
|--|
|--|



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April 2 – Waialae Fun Fair – A Saturday daytime display booth needs manning. Call Calvin if you are interested.

April 6 – Punahou School Astronomy Night - Wednesday – Punahou Academy's Astronomy Club.

April 15 – Wahiawa -Ka'ala Elementary School star party.

May 6 – Wednesday night 8th Graders at Hawaii Baptist Academy.

<u>Help Bishop Museum</u> – Tuesday, March 8th saw cloudy skies and a partial solar eclipse that was seen here in Hawaii. Bishop Museum hosted a viewing opportunity, which started around 4:30 pm on the back lawn. We had about a 20-minute window for viewing. The 5:37 pm time of deepest darkness was unfortunately a miss. John Sandor, Gretchen West and Chris Peterson set up for the event but were unable to break through the clouds. It is understood that "Ort" Vanapruks had more luck with his viewing out in West O`ahu.

<u>I.F.A. Open House</u> – The Institute for Astronomy's yearly Open House will take place Sunday, April 17th. We will man a table and provide an activity for kids. Help is gratefully accepted

<u>Hawaii State Science and Engineering Fair</u> – The 2016 Hawaii State Science and Engineering Fair took place March 27, 28, and 29, 2016 at the Hawaii Convention Center. Charlie Rykken and Gretchen West served as the H.A.S. Special Interest judges for this year's fair. The winner of the H.A.S. Senior Research Award was Celeste M. Jongeneelen, whose research was titled "Runaway Stars". The winner of the H.A.S. Junior Research Award was Rachel M Gorham, whose research was titled "Measuring Hydrogen in the Milky Galaxy with a Small Radio Telescope".

<u>Astronomy Day 2016 Day 2016</u> – This year International Astronomy Day will occur on May 14, 2016. We will be looking into utilizing the area directly in front of Ross' (formerly Barnes and Noble) at the Ewa end of Kahala Mall, upper level. Gretchen West is working to obtain permission from Kahala Mall Management and Ross' to use the parking area for daytime observations, as we have done in years past.

Lacy Veach Day of Discovery – We will again be participating in the Lacy Veach Day of Discovery, at Punahou School, on October 29th 2016. Gretchen West will be signing people up to help with the sun spotting activity and manning the club table.

<u>Lunar Planetary Science Conference</u> – Chris Peterson and Tom Giguere traveled to Houston again for this year's conference. Chris presented a power point presentation overview of the events and the size and breadth of the exhibits and discussions at such an event. Tom related of the more esoteric themes (Ziggy Stardust) at the exhibit that paid tribute to the recently

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The Astroneus



The farther away you look in the distant universe, the harder it is to see what's out there. This isn't simply because more distant objects appear fainter, although that's true. It isn't because the universe is expanding, and so the light has farther to go before it reaches you, although that's true, too. The reality is that if you built the largest optical telescope you could imagine -- even one that was the size of an entire planet -- you still wouldn't see the new cosmic record-holder that Hubble just discovered: galaxy GN-z11, whose light traveled for 13.4 billion years, or 97% the age of the universe, before finally reaching our eyes.

There were two special coincidences that had to line up for Hubble to find this: one was a remarkable technical achievement, while the other was pure luck. By extending Hubble's vision away from the ultraviolet and optical and into the infrared, past 800 nanometers all the way out to 1.6 microns, Hubble became sensitive to light that was severely stretched and redshifted by the expansion of the universe. The most energetic light that hot, young, newly forming stars produce is the Lyman- α line, which is produced at an ultraviolet wavelength of just 121.567 nanometers. But at high redshifts, that line passed not just into the visible but all the way through to the infrared, and for the newly discovered galaxy, GN-z11, its whopping redshift of **11.1** pushed that line all the way out to 1471 nanometers, more than double the limit of visible light!

Hubble itself did the follow-up spectroscopic observations to confirm the existence of this galaxy, but it also got lucky: the only reason this light was visible is because the region of space between this galaxy and our eyes is mostly ionized, which *isn't true* of most locations in the universe at this early time! A redshift of 11.1 corresponds to just 400 million years after the Big Bang, and the hot radiation from young stars doesn't ionize the majority of the universe until 550 million years have passed. In most directions, this galaxy would be invisible, as the neutral gas would block this light, the same way the light from the center of our galaxy is blocked by the dust lanes in the galactic plane. To see farther back, to the universe's first true galaxies, it will take the James Webb Space Telescope. Webb's infrared eyes are much less sensitive to the light-extinction caused by neutral gas than instruments like *(Continued on page 10)*



Meteor Log—May 2016

by Tom Giguere

We touched on radiometric dating concepts at last month's meeting while Chris Peterson and I were providing a summary of the Lunar and Planetary Science Conference (LPSC) 2016. The discussion revolved around the general question of "how do we know how old a given rock is". Radiometric dating may be used to date material that is thousands of years old (e.g. wood or carbon), on up to material that is billions of years old, such as the age of the Earth, Moon, Solar System or even older (e.g. rocks, meteorites). The technique dates materials in which trace radioactive impurities were selectively incorporated when they formed. The technique compares the abun-*(Continued on page 11)*

| Parent nu | clide Daughter nu | clide Decay constant (y | r ⁻¹) Half-life |
|-------------------|---------------------|----------------------------|-----------------------------|
| ¹⁹⁰ Pt | ¹⁸⁶ Os | 1.477 ×10 ⁻¹² | 469.3 Gyr * |
| ¹⁴⁷ Sm | ¹⁴³ Nd | 6.54 ×10 ⁻¹² | 106 Gyr |
| ⁸⁷ Rb | ⁸⁷ Sr | 1.402 ×10 ⁻¹¹ | 49.44 Gyr |
| ¹⁸⁷ Re | ¹⁸⁷ Os | 1.666 ×10 ⁻¹¹ | 41.6 Gyr |
| ¹⁷⁶ Lu | ¹⁷⁶ Hf | 1.867 ×10 ⁻¹¹ | 37.1 Gyr |
| ²³² Th | ²⁰⁸ Pb** | 4.9475 ×10 ⁻¹¹ | 14.01 Gyr |
| ⁴⁰ K | ⁴⁰ Ar | 5.81 ×10 ⁻¹¹ | 11.93 Gyr. |
| 238U | ²⁰⁶ Pb** | 1.55125 ×10 ⁻¹⁰ | 4.468 Gyr |
| ⁴⁰ K | ⁴⁰ Ca | 4.962 ×10 ⁻¹⁰ | 1.397 Gyr |
| ²³⁵ U | ²⁰⁷ Pb** | 9.8485 ×10 ⁻¹⁰ | 0.7038 Gyr |

Figure 1 - Radiometric data nuclides with half-life. I left the shorter pairs off of this table.

| First Quarter | | Full Moon | | Last Quarter | | New Moon | | n |
|-------------------------------|-----------------|-----------|---------------|--------------|-------|----------------|-----|-----|
| May 13 | | May 2 | 1 | May 29 | | May | 5 | |
| Shower | Activi- ty | Maximum | | Rad | liant | V _∞ | r | ZHR |
| | | Date | λΟ | a | δ | km/s | | |
| η- Aquar- iids (ETA) | 04/19→ 05/28 | May 06 | 45.5 ° | 338 ° | -01° | 66 | 2.4 | 40 |
| η - Lyrids (ELY) | 05/03→ 05/14 | May 08 | 48.0 ° | 287 ° | +44° | 43 | 3.0 | 3 |

If you see a bright meteor, Martian or otherwise, please report it. Tom Giguere, 808-782-1408, <u>Thomas.giguere@yahoo.com</u>; Mike Morrow, PO Box 6692, Ocean View, HI 96737.



The Astroneus

Treasurer's Report

by April Lew

| H | AS Financial Report February 16 – March | 15 2016 | |
|-------------------|---|---------|----|
| Beginning Balance | | 1868.5 | 55 |
| Income: | | | |
| | Dues Received | 40.00 | |
| | Astronomy Magazine | 34.00 | |
| | Sky and Telescope Magazine | 32.95 | |
| Total Income | | 106.9 |)5 |
| | | | |
| Expenses: | | | |
| | Science Fair Winner Prize | 34.00 | |
| | March meeting snacks | 24.64 | |
| | Astronomy Magazine | 34.00 | |
| | Stamps | 9.80 | |
| | Sky and Telescope Magazine | 98.85 | |
| Total Expenses | | 135.3 | ;9 |
| Ending Balance | | 1840.1 | 1 |

We welcome a new member this month. He is **Robert Hughes.**

Many thanks to those renewing their membership (Larry Wiss).

NOTICE!

HAS will publish a complete listing of Club members in the **June** issue of the *Astronews*. This publication is required by Club by-laws, Article III, Section 2 Para C(e) and Article VIII, Section 1B. Unless notified otherwise, this list will include all member's names, addresses, and phone numbers. If you wish to have some or all of your data excluded, please notify the Club Treasurer, April Lew before **May 15, 2016** by sending her an e-mail at star-dustlounge@hotmail.com or by written notice to the Club's post office box listed on the back page of this newsletter. Please be advised that this listing is intended for Club members' personal use only in contacting one another. It is not to be used for any commercial or solicita-tion purposes. With the exception of membership in the Astronomical League, HAS does not make this list available to, nor do we sell its contents to anyone for any purpose. Please respect our member's right to privacy.



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deceased David Bowie.

<u>POST Building Event</u> – Chris Peterson spoke briefly about the recent explosion in the basement laboratory of the POST building, which blew out walls and injured a researcher.

<u>Telescope Rentals</u> – Barry Peckham and Peter Besenbruch report that of the two rental scope telrads; one is missing, while one is broken. The members in attendance voted unanimously to purchase a Rigel Quickfinder and two telrads for the rental scopes.

<u>Donation</u> – The donation of a 16mm Tasco telescope was turned around and sold to Bryson Tabios, a new member.

<u>In the News</u> – Peter Besenbruch narrated a variety of astronomy related news items in the spotlight this month. His first item touched on the Hubble Space Telescope's image of AGC 198691, a blue galaxy with low metallicity. Peter also touched on efforts to map exoplanets in near galaxies. Another item in his report spoke of efforts to measure distances of galaxies by measuring the redshift, helping astronomers to *see back to before the start of our own galaxy*. Peter's discourse touched on energy and the star formations around Orion's Siaph. Moving on, Peter spoke of the new information on Saturn's moons, their formation and orbits. Other items of notice were the first known planet in a triple -star system. On the lighter side, Peter pulled out an April fool's joke (astronomer style). Another item from the lighter side was the suggestion that Earth could use lasers to mask us from bad aliens (his words) and a totally off-the-wall admonition from Laura Magdalene Eisenhower (*BAZINGA*)!

<u>From the Planetarium</u> – Joanne Bogan transported the assemble H.A.S. meeting audience out into the beyond by flying us out to Alberio and back home again. Thank you Joanne!

<u>Mahalo</u> – As there was no further business, the meeting was adjourned at 9:07 p.m. Post meeting goodies were available in the rotunda.

Respectfully Submitted

Gretchen West

H.A.S. Secretary



The Astroneus



Images credit: (top); NASA, ESA, P. Oesch (Yale University), G. Brammer (STScI), P. van Dokkum (Yale University), and G. Illingworth (University of California, Santa Cruz) (bottom), of the galaxy GN-z11, the most distant and highest-redshifted galaxy ever discovered and spectroscopically confirmed thus far.

dance of a naturally occurring radioactive isotope within the material to the abundance of its decay products, which form at a known constant rate of decay.

As you see in the table above, the half-life varies dramatically between the various parent/daughter nuclides. Researchers use the decay pair that most closely matches the time scale that is being measured and the minerals present in the rock.

We typically see Uranium-lead (U/Pb), Rubidium-strontium (Rb-Sr), and Samarium-neodymium (Sm-Nd) used for geologic dating. The uranium-lead methods were used to date a meteorite found in north-west Africa named: NWA 7533 (Fig 2). Actually, the radiometric dating technique is more than just finding out the year, but is part of the larger picture which involves understand the origin and history of the rock in question.

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Image Credit: NASA/JPL-Caltech http://www.nasa.gov/image-feature/ light-echoes-used-to-study-protoplanetary-disks

