diablo Moonwatch

Mount Diablo Astronomical Society

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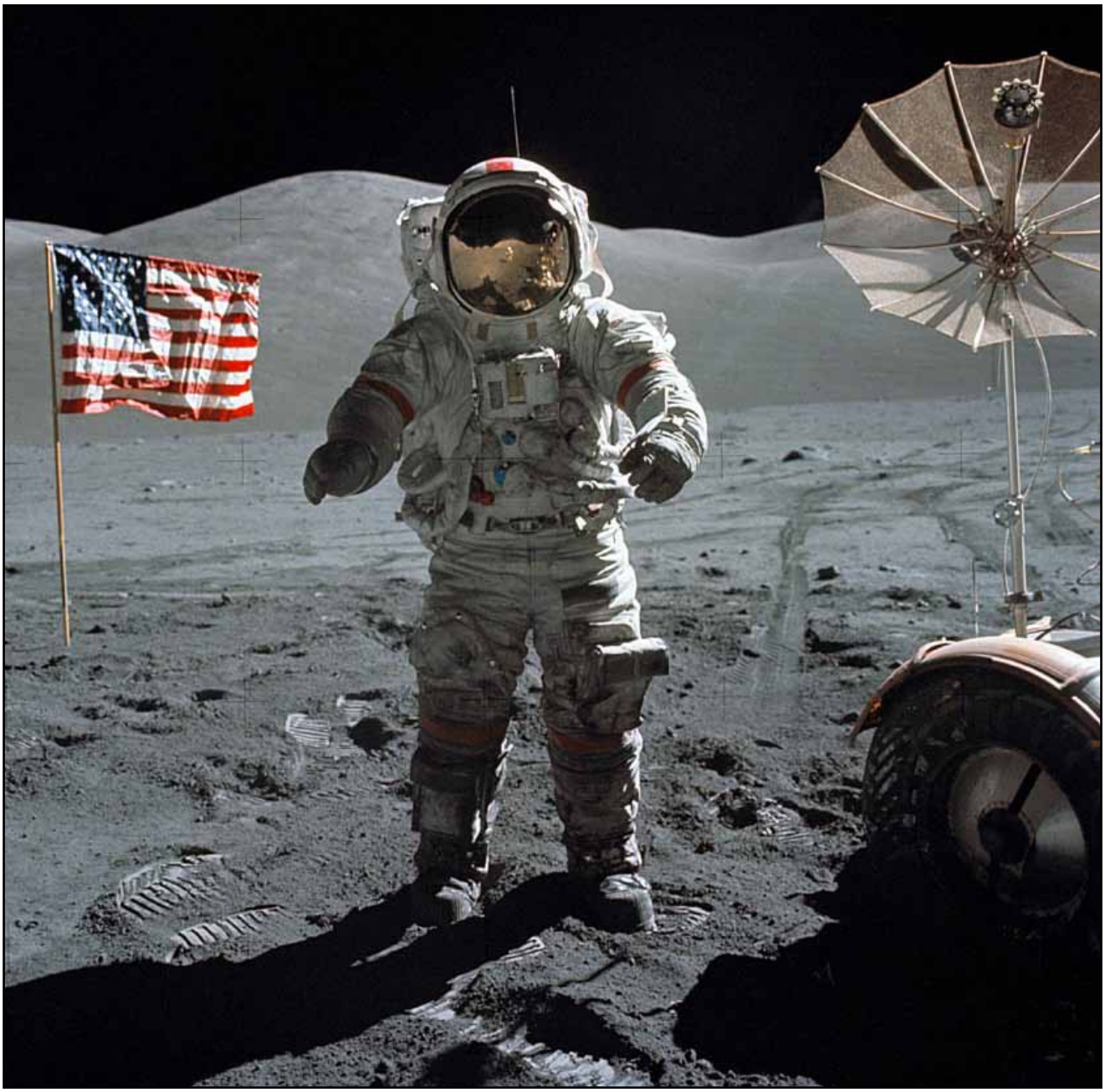


Apollo 17: Last on the Moon

Credit: Apollo 17, NASA

In December of 1972, Apollo 17 astronauts Eugene Cernan and Harrison Schmitt spent about 75 hours on the Moon, in the Taurus-Littrow valley, while colleague Ronald Evans orbited overhead. Near the beginning of their third and final excursion across the lunar surface, Schmitt took this picture of Cernan flanked by an American flag and their lunar rover's umbrella-shaped high-gain antenna. The prominent Sculptured Hills lie in the background while Schmitt's reflection can just be made out in Cernan's helmet. The Apollo 17 crew returned with 110 kilograms of rock and soil samples, more than from any of the other lunar landing sites. And after thirty years, Cernan and Schmitt are still the last to walk on the Moon.

Animal Astronomy

President's Corner

Liede-Marie Haitsma

While we bring out our telescopes and latest gizmos to gaze upon the heavens the natural world has its own devices. I found an interesting article in Universe-today.com July 3rd, 2010, dealing with animal astronomy.

A study took place in the 1950s with the Sauer Research Team taking some birds into the Olbers Planetarium in Bremen, Germany… ("Experiments with migrating birds in planetariums have shown that birds are not only aware of star patterns but also respond appropriately to changes in these patterns"). When birds fly, and during cloudless nights, they navigate by constantly referring to constellations in the night sky above them. It was significant that Polaris and Betelgeuse played a major role in their migration; it is thought that it because Betelgeuse is one of the "brighter stars in the northern hemisphere and just to the north of the celestial equator".

E.G. Franz Sauer at the University of Freiburg and the Olbers Planetarium in Bremen, West Germany took hand raised old-world warblers, who were never allowed to see the natural night sky, placed them outside for the first time and they immediately wanted to migrate in a direction consistent with their species "it seemed probable that the birds had "innate stellar recognition abilities". He placed these birds in the Olbers Planetarium and they displayed the same recognition; he adjusted the night sky to see it from lower latitudes and the birds adjusted their flight paths accordingly. Experiments in the United States showed the same results.

"In September 10th, 2009, a swallow from Europe was monitored flying south to the tip of Africa. She crosses at night over the Serengeti. She senses she is not quite on course so she glances up at the canopy of stars above her. Polaris, the North Star, is far behind her on the northern horizon. She notes the position and angle of the Constellations of Orion the Hunter and Taurus the Bull. A slight course adjustment is called for so she makes it. She is back on course, streaking south ward through the night. It is now six minutes past midnight. Her journey continues. The swallow has been flying for several more hours. The southern border of the Serengeti is ahead. In the east to her left the faint glimmer of dawn appears and then the huge red, African sun. The Constellations are now invisible. The swallow checks her direction by the angle of the sun, the time and the pull of the earth's magnetic field. She makes a slight flight path correction and continues due south. She is on time and on course for the southern tip of Africa. Another feat of amazing navigation has begun, this time during the day." (John Bartels, How Migrating Birds Navigate at Night, October 21, 2009)

Continued studies have shown that birds learned to orientate themselves with the rotating night sky; the position of the Sun as well as the Earth's magnetic field. Both sunrise and sunset play roles in migratory birds. "It's thought that many migratory birds closely monitor sunrise and sunset – allegedly when you see a line of birds on a power line, most will be facing east in the morning and west in the evening, recalibrating their internal compasses. Checking for a north-south plane of polarized light at sunrise and sunset may help them determine their latitude – by indicating how far off due east or west the Sun is when it's at the horizon."

The use of magnetoreception is the ability to detect a magnetic field to perceive direction, altitude or location. This sense plays a role in the navigational abilities of several animal species and has been postulated as a method for animals to develop regional maps. Magnetoception is most commonly observed in birds, where sensing of the Earth's magnetic field is important to the navigational abilities during migration; it has also been observed in many other animals including fruit flies, honeybees, turtles, bacteria, fungi, salamanders, salmon, turtles, mole rats, bats, lobsters, sharks and stingrays.

A bird that is looked upon with great disdain, the pigeon, has a very "well developed magnetoreception that they can use as an alternative to solar navigation. For example, they can 'home' even with a heavily overcast sky – but get them to wear a little magnetized helmet that screws up their perception of the Earth's magnetic field and they get lost. On the other hand, if it's a clear day with the Sun visible they can find home just fine – even with a little magnetized helmet on."

On a smaller scale is the magnetotactic bacteria who creates its own magnetite crystals – they build chains of crystals that mimic a compass needle. They use it to determine which way is down – "a straight line to magnetic north will pass through the Earth's surface".

Humans have traces of magnetite in their brains…
but we also now have GPS.

For more information:

Magnetoception
http://en.wikipedia.org/wiki/Magnetoception

Bats Use Sun to Calibrate Geomagnetic Compass
Cockroaches Use Earth's Magnetic Field to Steer
Reverse-Engineering the Quantum Compass of Birds
http://www.wired.com/wiredscience/tag/magnetoreception/

Magnetite-based magnetoreception
http://www.gps.caltech.edu/~jkirschvink/pdfs/COINS.pdf

Dobsonian Telescopes

MDAS August Meeting - What's Up?

Rick Linden

In the sixties John Dobson designed and built large aperture Newtonian based telescopes with an emphasis on portability and simplified construction techniques. This presentation will include a brief history of Dobsonian telescopes with a focus on the latest transportable telescopes from both the commercial and Amateur Telescope Making communities.

Advancements in faster mirrors, clever building techniques and lighter weight materials have yielded a variety of choices for amateurs to take large aperture scopes to remote dark sites for observing. This presentation will include descriptions and pictures of Dobsonian scopes and the latest from Golden State, Oregon and Texas Star Parties.

Greg Babcock's 24 and 10 inch Dobs

New Views of the Sun

MDAS August Meeting - Main Speaker: Dr. Thomas Berger

Marni Berendsen

MEETING DATE NOTE:
The meeting is on the FOURTH Tuesday and NOT the last Tuesday in August.

Dr. Thomas Berger
Lockheed Martin Solar and Astrophysics Laboratory

Living near a star has its benefits, but also its dangers. In July, scientists from around the world met in Germany to discuss an international concern: solar storms.

The Solar Dynamics Observatory (SDO) launched in February 2010. With a wide array of instruments and telescopes monitoring the sun, it is providing data to better understand the origins of solar storms, and potentially to predict them.

At our August 24th meeting, Dr. Thomas Berger of Lockheed Martin Solar and Astrophysics Laboratory will tell us about the design of the instruments built at Lockheed Martin and share some of the early scientific data that have been obtained.

The Atmospheric Imaging Assembly (AIA) in particular has returned fantastic images and movies of sunspot active regions, large-scale filament and prominence eruptions, and solar flares that are challenging our current understanding of these phenomenon. Dr. Berger will focus on his research in solar prominences, and share findings that have major implications for understanding how prominences and the associated coronal cavity structures evolve and erupt in the form of coronal mass ejections (CMEs). Also known as solar storms!

You may remember Dr. Berger from last year. He spoke eloquently on findings from the Hinode solar satellite and shared some eye-popping images and videos of the sun.

The Lockheed Martin Solar and Astrophysics Laboratory is in Palo Alto, California. Dr. Thomas Berger is a solar physicist and earned his Ph.D. in Applied Physics from Stanford University in 1997.

See you on August 24th for a closer look at our nearest star.

For more information:

Solar Dynamics Observatory
http://sdo.gsfc.nasa.gov/

First Light For The Solar Dynamics Observatory
http://science.nasa.gov/science-news/science-at-nasa/2010/21apr_firstlight/

UPCOMING PROGRAMS:
Sept 28: Dr. Edna DeVore of the SETI Institute, Chasing Shadows: NASA's Kepler Mission
October 26: Dr. Robert Piccioni, "Einstein for Everyone"

Free Go StarGaze iPhone App!

Marni Berendsen

NEW! Go StarGaze, a free iPhone app that helps people find astronomy events & clubs within seconds. You can search for events near your current location or find out what public astronomy events are happening across the U.S.A.

Get Go StarGaze on iTunes: http://itunes.apple.com/us/app/go-stargaze/id380833895?mt=8

Our club gets publicity, for free, for all our public events listed on the Night Sky Network Events Calendar. Any event listed on the NSN Events Calendar (http://nightsky.jpl.nasa.gov/event-calendar.cfm) is automatically listed in Go StarGaze.

Help MDAS publicize our events! Install the app on your iPhone, iPad, or iPod Touch now. Take a minute to rate Go StarGaze and write a review, and then tell your friends about the app. Even if you don't have an iPhone, you can spread the word. Thanks for helping promote our club.

Get Go StarGaze: http://itunes.apple.com/us/app/go-stargaze/id380833895?mt=8

One Word... Plastics!

Two Japanese LEGOsmiths used a whopping 65,000 bricks and 1,590 man hours to complete this stunning diorama, which even simulates a launch with flashing lights under the boosters and a vocal countdown. The only thing it doesn't do is lift off.

Part of the "Nasu Space Center," it appeared as a scene in Nasu Highland Park, an amusement park in Japan.

Fermi's Paradox 60th Anniversary. Where Are They?

Jim Scala

In the late'40s and into the mid 50s, frequent flying saucer reports catalyzed many discussions about life among the stars. Enrico Fermi, a Nobel Prize winning physicist and his colleagues at Los Alamos National Labs had similar discussions-usually over lunch-and their consensus was that there were probably many technological societies out there among the stars. Walking back from lunch that day in 1950 with this discussion swirling in his mind, Fermi simply asked his friends, "Where are they?" His question, later published in Physics Today, became known as Fermi's Paradox.

Logic had led these world class scientists to conclude that our galaxy, over 10 billion years old was probably abundant with planets. Furthermore, there should be other technological societies; many well ahead of ours. They knew that any society a thousand let alone a million years ahead-just instants in astronomical time-should have solved space exploration's mind boggling challenges. In that context, Fermi's question cut right to the quick. Would he ask the same question today? Let's see.

Frank Drake puts the question into an active research format.
A decade after Fermi's Paradox, Dr. Frank Drake developed his now famous equation that aimed at quantifying the issue of intelligent life and shortly after started the first serious radio search. He dealt with pertinent parameters; the rate of star formation; how many stars have planets; how many of those planets can support life; on how many does life start; how often does intelligent life emerge; what fraction reaches technology and then broadcasts their presence; how long do they send signals? Drake emphasized radio signals, but we've widened the concept to include lasers.

Drake began the search for extraterrestrial intelligence (SETI) with a single antenna, but radio astronomers soon piggybacked it on projects that could accumulate data in the correct wavelengths. Information accumulated at a prodigious rate. So, to sort through it SETI @ Home was begun in '99. It uses a screen saver program that allows anyone's idle computer- now well over 5 million worldwide- to reduce data and automatically send the results to home base at UC Berkeley.

The Allen Telescope Array (Hat Creek CA.) when complete will include 340 Small Dishes" designed to be highly effective for SETI and conventional radio astronomy.

Recently, the first 25 radio telescopes of the Allan Array were built with the primary mission of detecting intelligent signals from space. It will slowly be expanded to about 350 dishes. Hence SETI has been seriously underway for over 50 years and is growing. "Where are the alien's signals?" The silence is deafening.

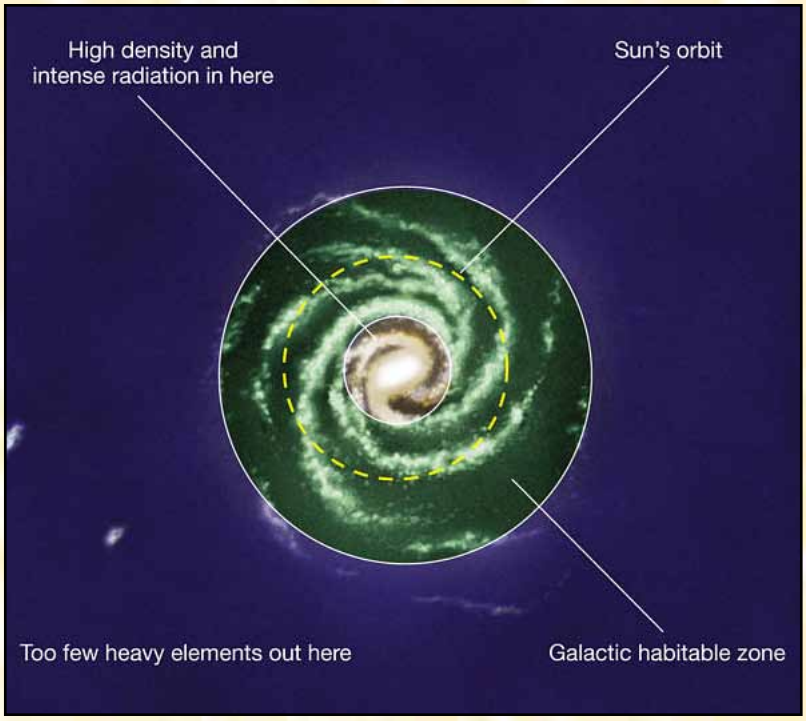
John von Neumann puts space travel back into Fermi's question?
In 1970s John von Neumann, a computer scientist-mathematician extrapolated our emerging computer abilities into space exploration. He envisioned an interstellar probe with human-level intelligence that would be launched toward a neighboring stellar system. Upon arrival it would seek out raw materials from local resources such as asteroids, make copies of itself and then launch them to other neighboring stars. This process would be repeated, over and over again. Carl Sagan calculated that using von Neumann probes a society could explore our Galaxy in about 500 million years. That's not long in astronomical time even if it sounds long to us. Indeed, our forefathers only climbed down from the trees about 3 million years ago.

Having dispatched its copies, a von Neumann probe would explore the star system and transmit its findings back to the parent star system. If appropriate it could then implant synthesized life on the correct planetary environment. In 1970 van Neumann's extrapolations seemed far fetched, but scientists have recently almost synthesized a living cell. Furthermore, we are making incredible strides toward artificial intelligence and even robotic life that von Neumann didn't envision. For example we have already begun making biots. "Where are the alien probes?"

Does the Galactic Habitable Zone add emphasis to the question?

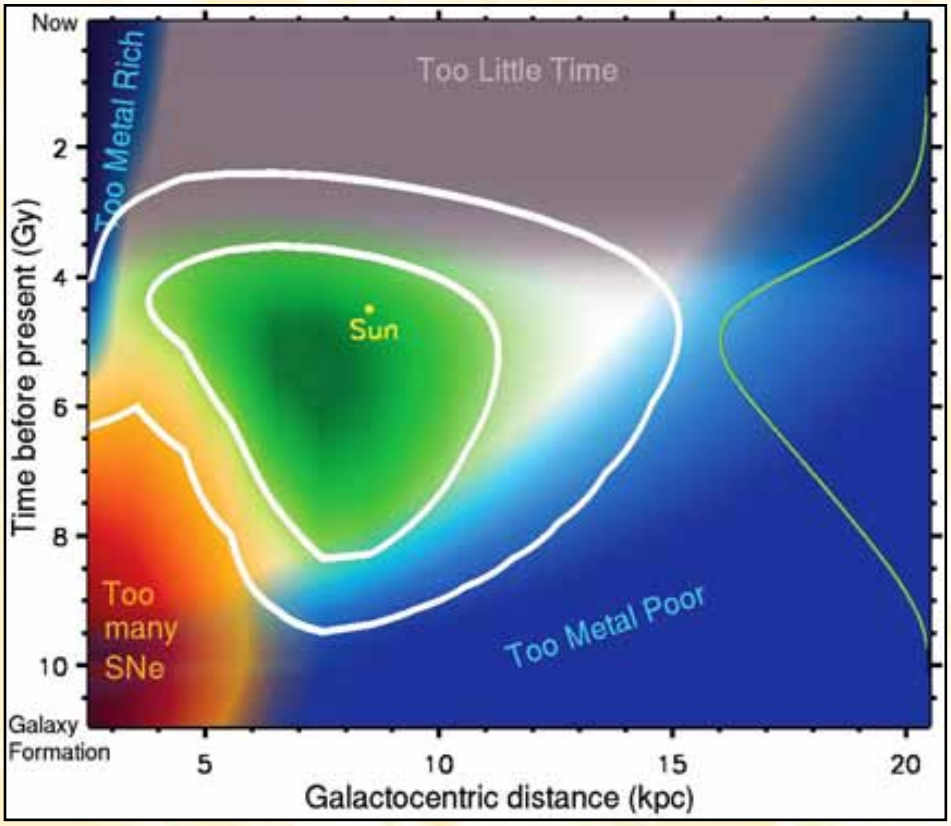
What Fermi couldn't have known in 1950 was that about 100 billion stars inhabit a volume of space in our galaxy called the Galactic Habitable Zone (GHZ). The GHZ is a stable volume in which suns with rocky-earth like-planets could exist for billions of years. Indeed, Fermi thought our galaxy was about 10 billion years old, but more precise estimates place it at 13.2 billion years. In this stable zone, life similar to ours would have had abundant time-30% more than Fermi envisioned to evolve.

An artist's concept of our Milky Way Galaxy showing the GHZ. Our Sun's orbit is shown as a dotted yellow line. The inner unsuitable area is shown in B&W.



In the comfortable GHZ life destroying radiation from supernovas is unlikely, and stars have sufficient metals to form rocky planets. Stars in this zone would also have essential stable, near circular orbits about the galactic center and rotate in sync with the galactic mass. It took about 4.6 billion years for us to get where we are now, so the question is, how much time is generally available? Are we a special case?

In 2004 an Australian Astrophysics-Astrobiology group headed by Charles Lineweaver modeled our galactic evolution tracing its stellar distribution in space and time using complex life's four basic prerequisites. These basics are, a host star with sufficient heavy elements to form terrestrial planets, adequate time for biological evolution, safe distance from life-extinguishing supernovas and be generally in the galactic plane. Their conclusions are shown graphically on Image Two.



A graphic view of the GHZ showing our relatively young Sun. An area analysis indicates that over 75% of GHZ stars (shades of green) are older than ours. Does this suggest there are many technological civilizations advanced beyond ours?

The Australian group showed that the GHZ is region between 7 and 9 kilo parsecs from the Galactic center and most stars in the zone were formed between 8 and 4 billion years ago. This provides a broad age distribution for complex life to emerge and achieve technology. Careful analyses indicate that about 75% of GHZ stars are considerably older than our Sun! So, the 4.6 billion we required is in the short time group. Indeed, time is on our side and supports Fermi more than he could have hoped.

Ward and Brownlee shake things with the Rare Earth concept.

Although we still don't know with certainty how life started, we do have a fairly good grasp. Also we can confidently conclude that if conditions are favorable, it's likely to get going elsewhere. However, for higher life forms to emerge and occupy a planet's surface, it appears that planetary stability is critically important. In that context our Earth Moon system is really a rare double planet with uncanny stability. Our polar stability, constantly slowing rotation, tidal decline and abundant, but not excessive liquid water are among the top five

parameters favoring surface life, intelligence and subsequent emergence of technology. In papers and more importantly their book Rare Earth, Ward and Brownlee made these and other points very clear. Indeed, when published in 2000, it was like someone saying, "A 600 pound gorilla is sitting there."

Our Earth Moon system as imaged from space. Although we don't know how rare or common our double planetary system is, most scientists think it's very rare. Everything we know about complex life tells us it's very important.

In the 500 million years since complex life began on Earth, intelligence has appeared several times. It's just that ocean based intelligence doesn't evolve into a technological society; it's a cul-de-sac. In addition, about 70K years ago we humans had declined to under 5,000 beings that you'd never recognize as relatives. Hence, in 4.6 billion years, intelligence that counts so far has occurred only once on Earth's surface and came damned close to failing. Suppose we had failed; how long it would the second try have taken? In 3 million years, chimps are still chimps.

How many intelligent societies? Does Kepler raise more questions?

Frank Drake at 80, applied these concepts and concluded that there could be about 10,000 intelligent societies in our GHZ. At the same time the Kepler spacecraft, examining 156,000 stars found over 400 candidates and on July 26, 2010 confirmed over 140 of them actually fit the Earth like profile and more come close. Though Kepler isn't looking at the GHZ, it's results suggest Drake's conclusion is conservative. Indeed, Drake's estimate could be low by a factor of ten. Are there 100,000 technological societies? In that context, our youthful society is about 150 years from making von Neumann probes and a radio beacon transmitting from on the far side of the moon.

Would Fermi, armed with our knowledge pose the same question he did in 1950? Wouldn't the brilliant, insightful man who made the atomic bomb possible ask "Why haven't we heard or seen anything? Would he press on with, "Could it be that our little blue dot in this great cosmos is that rare?

For more information:

Frank Drake
http://en.wikipedia.org/wiki/Frank_Drake

John von Neumann
http://en.wikipedia.org/wiki/John_von_Neumann

Allen Telescope Array Fact Sheet
http://www.seti-inst.edu/ata/fact.php

Rare Earth Hypothesis
http://en.wikipedia.org/wiki/Rare_Earth_hypothesis

Easter Island 2010 Eclipse

Bob Minor

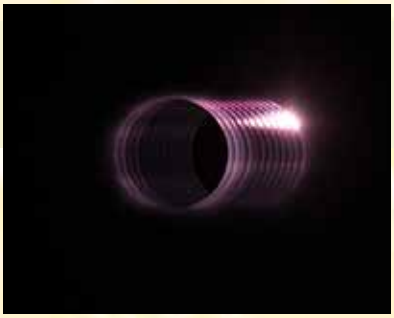
Jeanie and I took the "crazy trip" to Easter Island for the Eclipse in July. We flew to Tahiti for a few days and then flew out the evening before the eclipse to Easter Island. After a five and 1/2 hour flight we landed at 2:30 AM to find it still raining after a torrential downpour earlier that day. We got a very quick but informative tour of the island after dawn and arrived at our observing site near noon. The big question was always the weather. Odds were only about 50% that we would have clear skies.

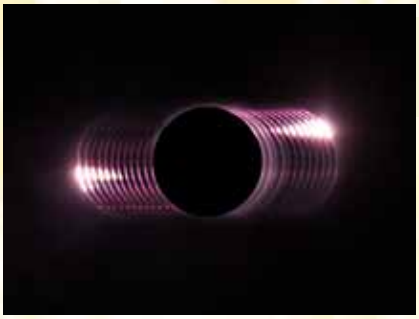
After a morning of clouds and rainbows we had partly cloudy skies at the beginning of the eclipse with fast moving clouds passing by during the entire eclipse. Totality was almost totally cloud free with one small cloud about 3/4 of the way thru and a cloud adding drama to the end of totality at third contact.

At 5:00 PM the same day we were back on the plane to Tahiti! A brief but memorable trip to Easter Island.

Third contact: a single frame from HD video on Olympus pen with Nikon 200mm f4 which provided the dramatic diffraction spikes!

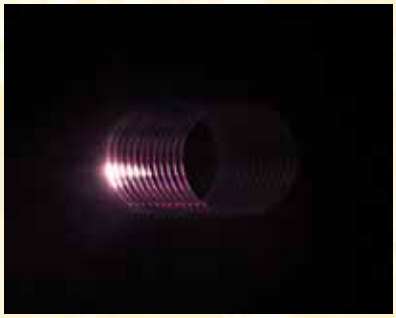
Composite at second contact: (modified Canon T1i with 4 inch f4 reflector)





Composite of second and third contact: (modified Canon T1i with 4 inch f4 reflector)

Composite at third contact: (modified Canon T1i with 4 inch f4 reflector)



Prominence detail: (modified Canon T1i with 4 inch f4 reflector)

Composite of 11 shots combined with Photomatix to show the visual impression of totality (Nikon D300 on Borg 60mm ed)

2010 Yosemite Star Party

LeRoy Wiens

The MDAS date for the annual Yosemite Star Party extravaganza is August 6-7th.

This is a third-quarter moon weekend with moonrise after midnight. The public star parties are scheduled for both Friday and Saturday evenings. The public usually thins out after about 10 or 11pm., so you can enjoy the dark skies as you wish after that.

You can pick up a flier at the MDAS meetings, and I hope that you will take advantage of this opportunity to visit Yosemite with free entry to the park and free camping at Bridalveil Campground. It is a spectacular place for a Star Party, as you can see from this photo taken during set-up a couple of years ago.

Contact me at 925-689-9924 or email LDWiens@pacbell.net if you need more information.

Cool Astro Links

Night Sky Network: Club Member Login
http://nightsky.jpl.nasa.gov/login.cfm

Night Sky Network: Astronomy Clubs
http://nightsky.jpl.nasa.gov/

Astronomy Picture of the Day
http://antwrp.gsfc.nasa.gov/apod/

NASA - Home
http://www.nasa.gov/

Jet Propulsion Laboratory
http://www.jpl.nasa.gov/

ESA Portal
http://www.esa.int/esaCP/index.html

JAXA | Japan Aerospace Exploration Agency
http://www.jaxa.jp/index_e.html

Main Hubble Page
http://hubble.nasa.gov/

HubbleSite:
Out of the ordinary...out of this world
http://hubblesite.org/

Universe Today
http://www.universetoday.com/

Bad Astronomy
http://blogs.discovermagazine.com/badastronomy/

SpaceWeather.com: News and information about the Sun-Earth environment
http://www.spaceweather.com/

Cloudy Nights
http://www.cloudynights.com/

Astromart
http://www.astromart.com/

The Planetary Society
http://www.planetary.org/home/

Astronomical Society of the Pacific
http://www.astrosociety.org/

AANC: Astronomical Association of Northern California
http://www.aanc-astronomy.org/

Mount Diablo Astronomical Society
http://www.mdas.net/

Astro Classifieds

I have a **Konusmotor 114** (4.5", 900mm, f/8) equatorial reflector telescope with tripod available for sale. I got it in August 2008, but have never set it up or used it.

After attending some star parties, I realized rather quickly that I was more interested in stargazing with the naked eye.

I wonder if anyone might be interested in purchasing it.

Thanks for your help.

Nancy Brown - ndowdsbrown@hotmail.com

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Meetings are held:
Fourth Tuesday every month,
except on the third Tuesday in November and December.
Refreshments and conversations are at 6:45pm.
Meetings begin at 7:15pm.
Where:
Concord Police Association Facility
5060 Avila Road, top of the hill.
Take Avila Road from Willow Pass Road.
Directions to facility:
http://nightsky.jpl.nasa.gov/club-view-directions.cfm?Address_ID=18

MDAS Meetings and Viewing Events in August 2010

< August 2010 >

Sunday	Monday	Tuesday	Wednesday	Thursday
1	2	3	4	5
8	9 7:30 PM Board Meeting	10 7:00 PM MDAS Imaging SIG	11	12
15 SETICon	16	17	18	19
22	23	24 7:15 PM GenMtg: Closeup of Sun	25	26
29	30	31	1	2

Friday	Saturday
6	7 Society Observing Sunset: 8:13 PM
13 7:30 PM Lick Obs Summer Prog SETICon	14 4 events: Click here to view Sunset: 8:04 PM
20 7:00 PM UOP MOVE event	21 Sunset: 7:55 PM
27 7:00 PM Lick Obs Summer Prog	28 7:00 PM Lick Obs Summer Music Sunset: 7:45 PM
3	4

2010 Yosemite Star Party

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