



EPHEMERIS

December 2012

SJAA Activities Calendar

Jim Van Nuland

Early Report from Curiosity

Paul Kohlmeier

December

- 1 **General Meeting.** Board meeting at 6:00; Social Time at 7:30; General Meeting at 8:00. Our speaker is Ms. Reka Kovacs from NASA discussing ArduSat.
- 2 Observing H-alpha flares and sunspots at Houge Park. Also our Telescope Tune-up Time. Sun party and tune-up hours: 2:00 until 4:00 p.m.
- 2 The Annual Fall Swap Meet. Doors open at noon.
- 7 Astronomy Class at Houge Park. 7:00 p.m. The topic: The Sun, planets and minor solar system objects.
- 7 Houge Park star party. Sunset 4:50 p.m, 34% moon rises 1:46 a.m. Star party hours: 7:00 until 10:00 p.m.
- 8 Dark-Sky weekend. Sunset 4:50 p.m, 24% moon rises 2:53 a.m.
- 15 Dark-Sky weekend. Sunset 4:52 p.m, 11% moon sets 7:59 p.m. Henry Coe Park's "Astronomy" lot has been reserved.
- 21 Houge Park star party. Sunset 4:54 p.m, 69% moon sets 2:12 a.m. Star party hours: 7:00 until 10:00 p.m.
- 29 No meeting. Moved to Dec. 1.

January

- 4 Astronomy Class at Houge Park. 7:00 p.m. The topic: Winter Constellations / Highlight Objects. (outdoors)
- 4 Houge Park star party. Sunset 5:04 p.m, 50% moon rises 12:39 a.m. Star party hours: 7:00 until 9:00 p.m.
- 5 Dark-Sky weekend. Sunset 5:05 p.m, 36% moon rises 1:45 a.m.
- 6 Observing H-alpha flares and sunspots at Houge Park. Also our Telescope Tune-up Time. Sun party and tune-up hours: 2:00 until 4:00 p.m.
- 12 Dark-Sky weekend. Sunset 5:11 p.m, 3% moon sets 6:43 p.m. Henry Coe Park's "Astronomy" lot has been reserved.
- 18 Houge Park star party. Sunset 5:18 p.m, 52% moon sets 1:00 a.m. Star party hours: 7:00 until 10:00 p.m.
- 26 **General Meeting.** Board meeting at 6:00; Social Time at 7:30; General Meeting at 8:00. Our speaker is Dr. Mark Showalter from the SETI Institute discussing the newly discovered moons of Pluto.

Board Elections coming soon.
See page 5.

The Mars rover Curiosity is helping scientists understand why Mars lost its atmosphere. The carbon found in the carbon dioxide on the planet has a higher ratio of heavy isotopes (i.e. the carbon atoms have extra neutrons more often than expected). The increase in heavy isotopes is found in argon. This suggests that the top of the atmosphere was lost into space. The next Mars spacecraft, MAVEN (Mars Atmosphere and Volatile Evolution) will study the upper atmosphere starting in 2014.

Curiosity has also been looking for methane, a gas that would possibly suggest extant life forms. So far Gale Crater seems to be methane-free. But scientists are thrilled just to be able to do this kind of research. "We ... can see the power of having a complex chemical laboratory like SAM (Sample Analysis at Mars instruments) on the surface of Mars" says SAM Principal Investigator Paul Mahaffy (NASA Goddard).

Curiosity will make its first analysis of solid material in the next few weeks, looking for organics, water-bearing minerals, and carbonates. For more information on the Curiosity mission see <http://www.nasa.gov/msl>

24 hour news and information hotline:
(408) 559-1221
<http://www.sjaa.net>

A month of subtle challenges

Akkana Peck

Jupiter hits opposition on the 2nd of December. It's in Taurus, about three degrees away from globular cluster NGC 1657 as December opens. That's probably too far away to get them both in the same field in most telescopes, but give it a try in binoculars if you have a good dark sky. If you manage to see both of them, watch over the course of several nights — it's impressive how fast Jupiter moves during the opening week of December relative to the cluster and the stars of the Hyades.

While you're watching Jupiter, don't forget its moons. Transits of the four large Galilean moons across Jupiter's disk are always entertaining. But for a greater challenge, try looking at the moons themselves. See if you can tell them apart. Ganymede is relatively easy: it's so much larger than the others, resolving easily into a disk where the other three may not. Io you can often tell by its color, redder than the other three. Europa and Callisto can be much harder to tell apart, at least when they're close to Jupiter — Callisto gets much farther away from the planet than Europa does, so that can be a clue. What other clues can you find to distinguish the moons?

As long as we were talking about seeing Ganymede's disk: a few months back, amateur astronomer and photographer Emmanuel Kardasis, from Athens, Greece, did a lot more than just see a disk. Stacking CCD images he made with an 11" telescope (looks like a C11 on his website, though he doesn't say explicitly), he made and published an albedo map of Ganymede. It's not highly detailed ... about like what you might see on Mars in anything but an especially good opposition. Kardasis has other astrophotography worth seeing, including an albedo map of Mars and some great Jupiter images, on his website at <http://kardasis.weebly.com>.

Not up to making albedo maps, but still want a challenge? Ceres is also at

opposition this month. Like Jupiter, it's in Taurus; but it's at the other end of the constellation, out near the right horn of the bull. It's roughly magnitude 6.7, and it's located roughly halfway between two fifth magnitude stars, Tau 125 and double star Tau 132A. There's another 6.7th-magnitude star right nearby, and it and Ceres make a distinctive pattern between the two fifth magnitude stars that might help in finding it.

Mars is visible early on December evening, but it's so low and small that it'll be tough to see much detail. If you want to see Martian detail this month, you're best off checking the Curiosity rover's website. As I write this, Curiosity has been looking for evidence of methane in Gale crater, with disappointing results. You may remember the Mars methane mystery from last year. The media got all excited over evidence that there was significant methane in Mars' atmosphere, fluctuating on a seasonal basis, or perhaps even faster. That would mean new methane was being generated somehow — perhaps by processes involving life, since here on Earth, most methane is generated by living organisms.

But methane is tough to measure, especially from a distance through two atmospheres. So hopes have been pinned on Curiosity's on-the-spot measurements. So far, sad to say, the rover hasn't found any.

Of course, the Curiosity team will keep looking, and could still find something ... but it's looking a little less likely.

Uranus and Neptune are both well placed for early evening observation.

Catch them fairly early, since Neptune sets before 11pm (Uranus lasts a few hours longer). Pluto isn't visible this month.

Early risers get a nice naked eye show in the December morning sky. Venus is there all month, and Mercury shows well in the first half of December. On the morning of the 11th, the two planets make a nice triangle with the crescent moon.

Saturn, too, is best positioned for early risers. The ringed planet has been in the news a lot lately, not for its rings but for its storms. Alas, the showiest parts of the recent Saturnian storms are only visible in infrared, so you probably won't see much with your telescope. But if you have a CCD rig that's sensitive to IR, this is a good time to get it out and see what you can do.

Directions to Houge Park

Houge (rhymes with "Yogi") Park is in San Jose, near Campbell and Los Gatos. From Hwy. 17, take the Camden Avenue exit. Go east 0.4 miles, and turn right at the light, onto Bascom Avenue. At the next light, turn left onto Woodard Road. At the first stop sign, turn right onto Twilight Drive. Go three blocks, cross Sunrise Drive, then turn left into the park.

From Hwy. 85, take the Bascom Avenue exit. Go north, and turn right at the first traffic light, onto White Oaks Road. At the first stop sign, turn left onto Twilight Drive. You will now be passing the park. Turn right at the first driveway, into the parking lot.

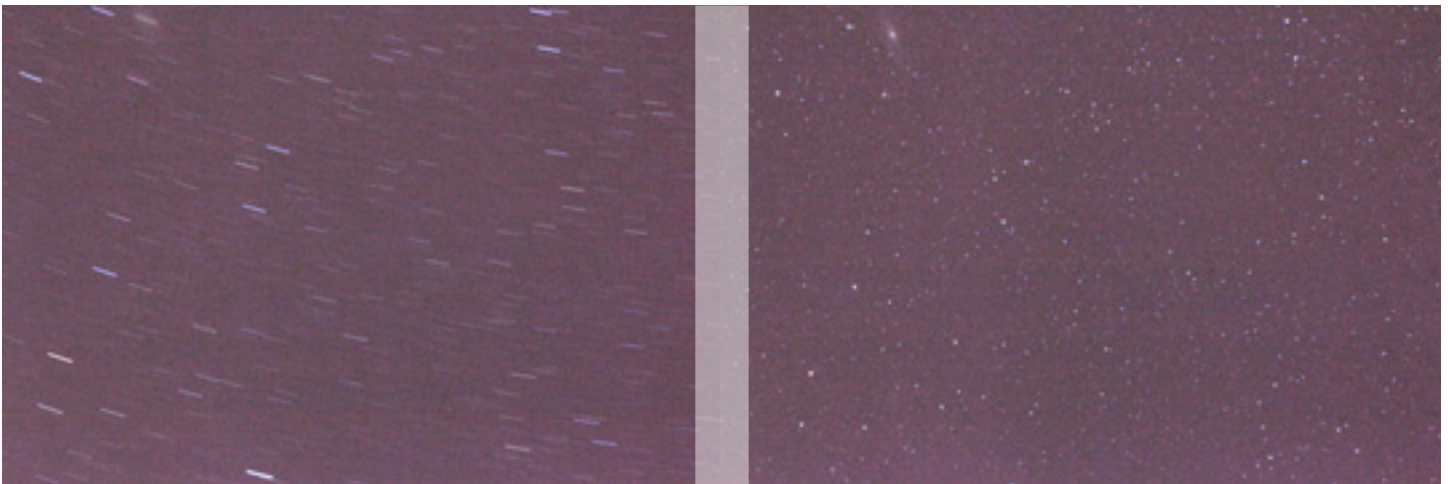
Quick Look at the Vixen Polarie

Paul Kohlmler

A few years ago I started to make some star trail photos. These photos are easy to make: you point the camera up at the sky and leave the shutter open as the sky goes through its nightly rotation leaving trails on the film or electronic detector. There were two problems that I ran into. First, if you are using film you would like to have the old mechanical shutters because the electronic shutter kills your battery after a couple 30 minute exposures. Second, it's boring! I mean once you have done this a few times (and I do encourage you to try) it's a little dull unless you can go to some interesting site.

To increase the fun factor, I started to take pictures of the night sky with my Canon T2i just getting pictures of constellations or large items like the Pleiades. The problem is that if I used a telescopic lens or an exposure larger than 30 seconds I was back to making star trail pictures again. Enter the Vixen Polarie, a motorized mount that goes on your tripod and that you mount your camera to. The effect of using this mount is shown below. Both pictures are 210 seconds long and the setups are the same. In the picture on the left the Polarie motor was turned off. On the right, the same part of the sky with the motor turned on. The difference is obvious. Note Andromeda in the upper left in both images.

The Polarie drive costs \$429. But this might not be the last of your expenditures. First, you need to put this drive on a tripod. Of course, you have a tripod already but hopefully it is solid enough. Second, you need a ball mount that connects your camera to the drive. You may have a ball mount but does it really hold your camera? You can get on Amazon and look at the reviews of ball mounts and everyone says their ball mount doesn't hold as much weight as they hoped. This is critical if you are going to take long exposures. You can purchase the Polarie and a tripod and the ball mounts (one to connect the drive to the tripod and the other between the drive and your camera) for \$649. That sounds like a deal particularly if your tripod is a little sketchy. Third, you might want a polar scope to make it easier to align the drive. That's another \$249 and I think it's unnecessary but your mileage may differ.



The Last Month In Astronomy

NOV-3-2012 **A FOXSI launch** A sounding rocket carrying a next-generation X-Ray telescope was successfully launched from White Sands New Mexico. The suborbital flight was a success although almost all of the backup instruments had to be used and they only get about 6 minutes to take images. The detector is said to be 50 times more sensitive than previous spacecraft. <http://foxsilady.blogspot.com/>

NOV-2-2012 **Comet Breaking Up** According to Rachel Stevenson, a post-doc at JPL, Comet 168P/Hergenrother is breaking apart and "we have resolved that the nucleus of the comet has separated into at least four distinct pieces resulting in a large increase in dust material in its coma." That added material in the coma means the comet is brighter. <http://www.jpl.nasa.gov/news/news.php?release=2012-349>

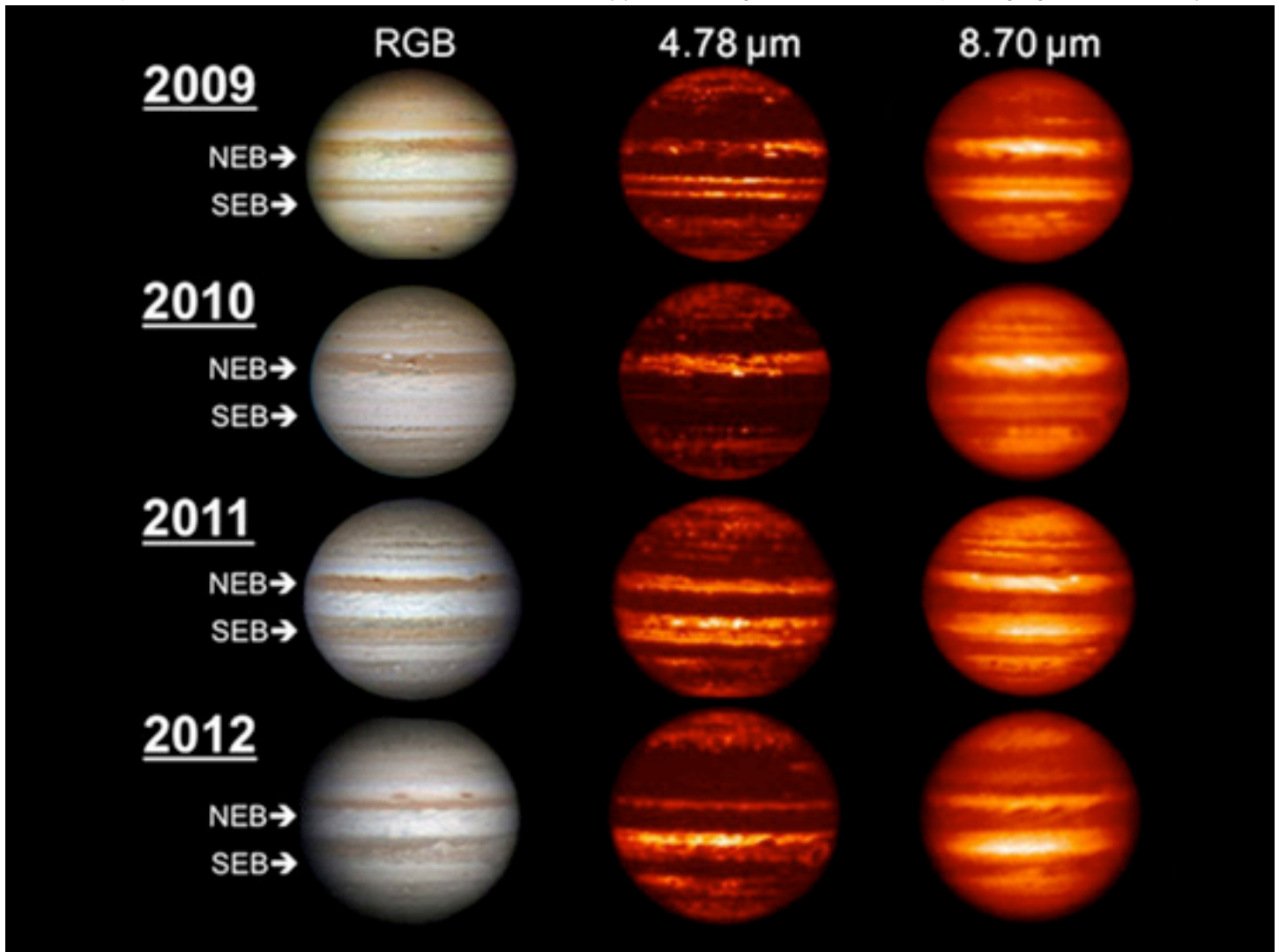
OCT-25-2012 **The Return of Fomalhaut b** It was 4 years ago that Hubble captured an image of an exoplanet around the star Fomalhaut. This was the first time that a direct image of an exoplanet was performed. Later studies suggested that it was not an exoplanet at all and so the existence of Fomalhaut b was considered dubious. Now its existence has been reaffirmed.

The new study used some old Hubble images (2004 and 2006) and a new image taken in the ultraviolet. This showed that the planet was relatively consistent in its orbit. http://www.nasa.gov/mission_pages/hubble/science/fomalhaut-exo.html

OCT-24-2012 **Lonely Stars** There is a mysterious glow of infrared light seen across the sky. It is not the background from the Big Bang, that's far lower down the electromagnetic spectrum. One theory is that the infrared glow comes from the first stars and galaxies. The stars are far too dim to be observed but their collective light is still seen. Now a new study gives an alternative view. The glow might come from a large number of stars that have become unmoored from their galaxies as a result of galactic mergers or at least near encounters where tidal surfaces stripped stars into intergalactic space. This theory better fits the data from Spitzer observations because the glow is too bright to be from early galaxies which are thought to be smaller than modern galaxies. <http://www.jpl.nasa.gov/news/news.php?release=2012-334&rn=news.xml&rst=3562>

OCT-22-2012 **Elliptical Spiral?** As we were taught on our mother's knee, galaxies are either elliptical, spiral or irregular if we really can't tell which. But there is no such thing as an elliptical with spiral arms, right? Ahem, Centaurus A is an elliptical galaxy with a spiral galaxy embedded inside. It can be seen by studying data from the submillimeter wavelengths. In fact, we may find similar galaxies like this using the new Atacama Large Millimeter/submillimeter Array (ALMA). In the case of Centaurus A, the spiral galaxy was swallowed up about 300 million years ago and the spiral arms may last that long again. <http://www.cfa.harvard.edu/news/2012/pr201229.html>

OCT-19-2012 **Evolution Evolves** A study of galaxy images using the Keck telescopes and the Hubble Space Telescope has changed the way astronomers think about galactic evolution. The prevailing notion is that galaxies were different in the early universe but the current galactic scene has been fairly steady for 8 billion years. But Susan Kassin from NASA Goddard says "The trend we've observed instead shows the opposite, that galaxies were steadily changing over this time period."



<http://www.nasa.gov/topics/universe/features/galaxy-evol.html>

OCT-17-2012 **Jupiter Study** NASA has put together a set of Earth-based Jovian images that show how weather is changing on that planet. Note (on the facing page) how the Southern Equatorial Band disappears in 2010 and returns in 2011. The visible-light images in the left column were taken by amateur astronomers. The middle and right columns are infrared images taken by NASA's Infrared Telescope Facility or the Subaru Telescope both in Hawaii. The Northern Equatorial Band (NEB) thinned out but it is making a comeback. Image credit: NASA/IRTF/JPL-Caltech/NAOJ/A. Wesley/A. Kazemoto/C. Go <http://www.nasa.gov/topics/solarsystem/features/pia16168.html>

OCT-17-2012 **Alpha Centauri B b** For years it has been an open question. Surely we must have looked at our closest star system looking for exoplanets but we haven't found any. Well, first, don't call me Shirley. Second, it turns out it does have a planet after all. The planet found is Earth sized but very close to its K-type star. It has an orbital period of just over 3 days and is probably not habitable. But since it is Earth-sized rather than Neptunian or larger, it may have rocky planets further away from the star. <http://www.nature.com/nature/journal/vaop/ncurrent/full/nature11572.html>

OCT-15-2012 **A 4 Star Planet** An exoplanet has been found in a stellar system with 4 stars. The planet orbits a pair of stars so that makes it a circumbinary, i.e. it goes around ("circum") two ("binary") stars. But this system has two other stars that orbit the two inner stars at some distance. This makes it the 7th circumbinary planet but the first in quadruple system. The planet, designated PH1, is around the size of Neptune. The two distance stars are 1000 AU from the central stars. The designation PH1 is in honor of the Planet Hunters website. The planet was discovered largely through the efforts of citizen scientists ("amateur astronomers in my book") who joined others at the [planethunters.org](http://blog.planethunters.org/2012/10/15/ph1-a-planet-in-a-four-star-system/) website to characterize light charts that expose transiting planets. <http://blog.planethunters.org/2012/10/15/ph1-a-planet-in-a-four-star-system/>



Board Elections at 2013 Annual Meeting

Mark Wagner

As we leave 2012 behind, I have to say, SJAA has had a great year! We've added several new programs, enjoyed outstanding speakers, seen membership participation surging, and have increased membership to over 300 for the first time in... I can't remember. The SJAA is truly a club by and for its members. Your Board of Directors welcomes any and all members participation - it is truly the "Mother's Milk" (the Via Lactea) that nourishes and grows our organization. Thank you all, for the great year we've had in 2012. Let's make 2013 even more fun and fulfilling!

On to a little business - Board Elections.

As you may know, the SJAA's Annual Meeting is when elections are held for seats on the Board of Directors. The 2013 Annual Meeting is February 23rd, 2013, 8PM, in the hall at Houge Park. I am writing the membership to ask for nominations. We want those who the membership feels would best contribute, enthusiastically, energetically, and creatively.

How can you nominate someone? Simply e-mail the name of the person you are nominating (ask them first!) to our nominating committee:

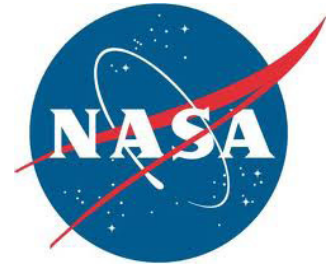
Kevin Robert (Director and Nominating Committee Chair)
Mina Wagner (Director)
Greg Claytor (VP, Director)

We've created this e-mail address for nominations: sjaa.nominate@gmail.com

Keep in mind the qualification requirements: Candidates for the Board of Directors shall be current members of the SJAA. To be qualified candidates shall have been SJAA members for one year or more immediately prior to election or appointment or have previously been an SJAA member for at least one year, or have attended six monthly board meetings.

I can assure you, our board meetings are fun, interesting and productive. It is a great way to become more involved, and to help keep the club a wonderfully inclusive and expansive place. Know someone good? Nominate them!

SJAA holds eleven board meetings each year, skipping only April (taxes and our annual auction intervene), at 6 PM on full moon weekends, preceding our General Meetings. Board meetings are open for anyone to attend and participate.



Doing Science with a Spacecraft's Signals

David Doody

Mariner 2 to Venus, the first interplanetary flight, was launched August 27 fifty years ago. This was a time when scientists were first learning that Venus might not harbor jungles under its thick atmosphere after all. A Russian scientist had discovered that atmosphere during the rare Venus transit of 1761, because of the effects of sunlight from behind.

Mariner 2 proved interplanetary flight was possible, and our ability to take close-up images of other planets would be richly rewarding in scientific return. But it also meant we could use the spacecraft itself as a "light" source, planting it behind an object of our choosing and making direct measurements.

Mariner 4 did the first occultation experiment of this sort when it passed behind Mars as seen from Earth in July 1965. But, instead of visible light from the Sun, this occultation experiment used the spacecraft's approximately 2-GHz radio signal.

The Mariner 4 experiment revealed Mars' thin atmosphere. Since then, successful radio science occultation experiments have been conducted at every planet and many large moons. And another one is on schedule to investigate Pluto and its companion Charon, when the New Horizons spacecraft flies by in July 2015. Also, during that flyby, a different kind of radio science occultation experiment will investigate the gravitational field.

The most recent radio science occultation experiment took place

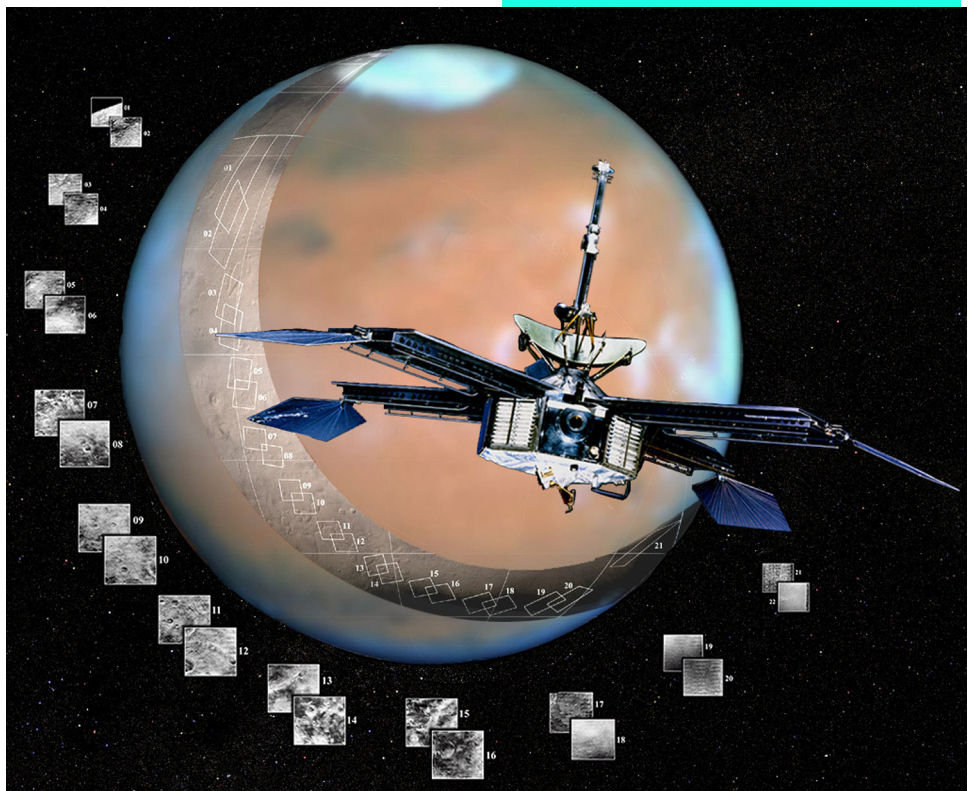
September 2, 2012, when the Cassini spacecraft carried its three transmitters behind Saturn. These three different frequencies are all kept precisely "in tune" with one another, based on a reference frequency sent from Earth. Compared to observations of the free space for calibration just before ingress to occultation, the experiment makes it possible to tease out a wide variety of components in Saturn's ionosphere and atmosphere.

Occultation experiments comprise only one of many categories of radio science experiments. Others include tests of General Relativity, studying the

solar corona, mapping gravity fields, determining mass, and more. They all rely on NASA's Deep Space Network to capture the signals, which are then archived and studied.

Find out more about spacecraft science experiments in "Basics of Space Flight," a website and book by this author, <http://jpl2.nasa.gov/basics>. Kids can learn all about NASA's Deep Space Network by playing the "Uplink-Downlink" game at <http://spaceplace.nasa.gov/dsn-game>.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



In this poster art of Mariner 4, you can see the parabolic reflector atop the spacecraft bus. Like the reflector inside a flashlight, it sends a beam of electromagnetic energy in a particular direction. Credit: NASA/JPL/Corby Waste.

It Must Be Astronomical ...

Upcoming Elections

The annual elections for the SJAA Board of Directors will take place at the February General meeting. It is not a requirement but those wishing to be nominated are recommended to contact Mark Wagner, head of the nominating committee. (see page 5)

“The saddest aspect of life right now is that science gathers knowledge faster than society gathers wisdom.” - Isaac Asimov

Loaners

The telescope loaner program has been revamped. The program now includes QuickSTART, program geared to those new to astronomy. Please check it out at <http://www.sjaa.net/loaners.shtml>.

School Star Parties

Completed Events					
	Total Sched.	Good Sky	Partial Success	Cloudy Fail	Cancel at noon
Jul	2	2			
Aug	1	1			
Sep	1	0	1		
Oct	7	3			4
Nov	-	-			
Dec	-	-			
Total	11	6	1		4
Scheduled - for the 2012/2013 school year					
	Total	Firm	Working		
Oct	1	1	0		
Nov	13	10	3		
Dec	9	5	4		
Jan	6	5	1		
Feb	4	3	1		
Mar	2	1	1		
Total	35	25	10		

As of October 25, 2012

School Star Party Link

For information on school star parties including how to schedule one see <http://www.sjaa.net/school.shtml>.

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Dir Rod Norden
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Dir Mina Reyes-Wagner

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Members Email Lists:
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<http://sanjoseastronomy.blogspot.com/>
 twitter: [sj_astronomy](https://twitter.com/sj_astronomy)
<http://www.meetup.com/A-A-N-C/>

Publication Statement

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Articles for publication should be submitted by the 10th of the previous month. The PDF version is generally available by the 24th of the previous month and the HTML version by the last day of the previous month.

San Jose Astronomical Association
P.O. Box 28243
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ADDRESS SERVICE REQUESTED

San Jose Astronomical Association Membership Form

P.O. Box 28243 San Jose, CA 95159-8243

New **Renewal** (Name only if no corrections)

Membership Type:

- Regular — \$20
 Regular with Sky & Telescope — \$53
 Junior (under 18) — \$10
 Junior with Sky & Telescope — \$43

Subscribing to Sky & Telescope magazine through the SJAA saves you \$5 off the regular rate. (S&T will not accept multi-year subscriptions through the club program. Allow 2 months lead time.)

I prefer to get the Ephemeris newsletter in print form (Add \$10 to the dues listed on the left). The newsletter is always available online at <http://ephemeris.sjaa.net>
Questions?

Send e-mail to membership@sjaa.net

Bring this form to any SJAA Meeting or send to the club address (above). Please make checks payable to "SJAA".

You can join or renew online:

<http://www.sjaa.net/membership.shtml>

Name: _____

Address: _____

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E-mail address: _____