



# SJAA EPHEMERIS

## SJAA Activities Calendar

Jim Van Nuland

### (late) February

- 20 Astronomy Class at Houge Park. 7:30 p.m. Jay Freeman discusses astronomy with binoculars.
- 20 Houge Park star party. Sunset 5:53 p.m., 12% moon rises 4:59 a.m. Star party hours: 7:00 until 10:00.
- 21 Dark Sky weekend. Sunset 5:54 p.m., 7% moon rises 5:32 a.m. Henry Coe Park's "Astronomy" lot has been reserved.

### March

- 6 Astronomy Class at Houge Park. 7:30 p.m. Topic is TBD
- 6 Houge Park star party. Sunset 6:07 p.m., 84% moon sets 4:20 a.m. Star party hours: 7:00 until 10:00.
- 7 General Meeting at Houge Park. 8 p.m. Our speaker is Dr. Kevin Zahnle of NASA Ames. Topic: Earth After the Moon-Forming Impact
- 8 DST begins. 2:00 a.m. Advance clocks 1 hour.
- 20 Spring begins at 4:44 a.m. PDT
- 20 Houge Park star party. Sunset 7:20 p.m., 25% moon rises 4:30 a.m. Star party hours: 8:30 until 10:30.
- 21 Dark Sky weekend. Sunset 7:21 p.m., 17% moon rises 5:01 a.m.
- 28 Dark Sky weekend. Sunset 7:27 p.m., 8% moon sets 10:12 p.m. Henry Coe Park's "Astronomy" lot has been reserved. Best weekend for the Messier Marathon.

### April

- 3 Houge Park star party. Sunset 7:32 p.m., 69% moon sets 3:57 a.m. Star party hours: 7:00 until 10:00.
- 4 Auction rehearsal, 6 p.m. until it all works.
- 5 Auction XXIX - Open at non, selling 1 p.m. to about 4 p.m.
- 17 Astronomy Class at Houge Park. 7:30 p.m. Topic is TBD
- 17 Houge Park star party. Sunset 7:45 p.m., 42% moon rises 3:00 a.m. Star party hours: 9:00 until midnight.
- 18 Dark Sky weekend. Sunset 7:46 p.m., 33% moon rises 3:28 a.m.
- 25 Dark Sky weekend. Sunset 7:52 p.m., 2% moon sets 9:07 p.m. Henry Coe Park's "Astronomy" lot has been reserved.

*The Board of Directors meets before each general meeting. Call the hotline for the exact time.*

**24 hour news and information hotline:**

**(408) 559-1221**

**<http://www.sjaa.net>**

## The Sky Shed

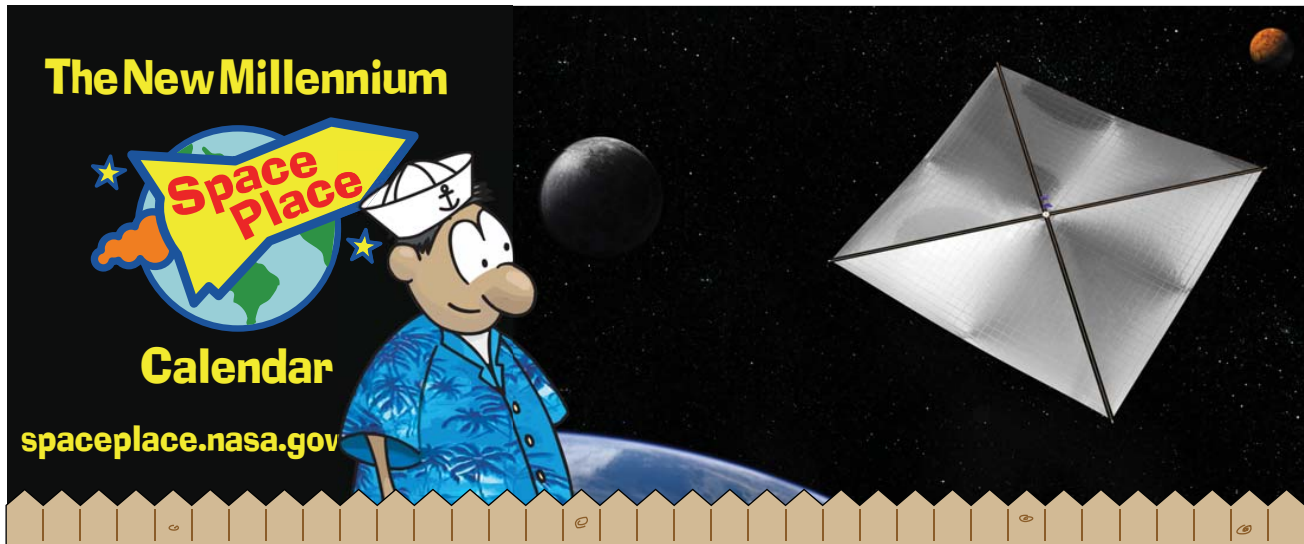
Paul Kohlmler

In 2004 I built a Sky Shed in my backyard. Not being possessed of the carpentry skills of Norm from This Old House, it was not a sure thing that I could do it. Just determining where to put it within my small backyard was not a sure thing. Most of the southern sky was going to be blocked by our house. Finally I decided that a particular location would give me a sliver of the southern sky so that I could see Sagittarius in June. The northern sky is blocked by a tree but those objects will spin overhead if I wait long enough.

The plans for the Sky Shed come from the Canadian company of the same name. Initially that was all they did, sell plans. If you're lucky you can find an affiliate of this company who will help build it for you but I'm not aware of anyone in the Bay Area who will do this. So I made many trips to Home Depot and Lowe's. I also had to find a garage door company that would sell me spare tracks. This is how the Sky Shed works, the roof rolls on garage door wheels and tracks.

Nearly all of the work on the shed was done on weekends and I didn't really get serious until May. I was pretty much finished by the end of August. A lot of the work shows creativity and ingenuity. Scratch that. A lot of the work shows improvisation based on the materials that I could find. For example, the Sky Shed plans assume that you can find a lumber company that will sell you 10" wide planks that are literally 10" wide. Very little lumber is sold that way, measure a 2x4 the next chance you get if you really think it is 2 inches by 4 inches. Also, Sky Shed recommends a steel roof but I thought that would make a lot of racket on rainy days and the shed is barely 6 feet from the family room window. I found some roof material made from tar which absolved me of the need to use tar paper on the roof. Rather than use wood planks for the exterior walls I used something called Hardie Panel which is a cement-based siding. I even made a door out of this material which was very unclever. But it does work.

The shed has worked well for more than 4 years. I think the folks at Sky Shed don't expect these sheds to last more than 10 years. You can find out more about the Sky Shed at <http://www.skyled.com>. A picture of my shed is on page 3.



Artist's idea of a solar sail for a spacecraft. Sunlight pushes on the sail the same way wind pushes on the sail of a boat. NASA's Space Technology 8 mission is developing and testing solar sail technology. See how toy slinky "technology" helps at [spaceplace.nasa.gov/en/kids/st8/sailmast](http://spaceplace.nasa.gov/en/kids/st8/sailmast).

# MARCH 2009

| SUNDAY                                                                                                                                              | MONDAY                                                                                                                                          | TUESDAY                        | WEDNESDAY              | THURSDAY                                                                                                                                                            | FRIDAY                                                                                                                                   | SATURDAY                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Peace Corps</b> 1<br>founded in 1961. Volunteers learn about Earth's ecology, as will you when you play Earthy word games.                       | <b>Dr. Seuss</b> 2<br>born this day in 1904. Like <i>Green Eggs and Ham</i> ? We think you'll like <i>Professor Starr's Dream Trip</i> too.     | FIRST QUARTER 3<br>            | 4                      | 5                                                                                                                                                                   | 6                                                                                                                                        | 7                                                                                                                                                          |
| 8<br><b>Daylight Saving Time</b> begins. How can a telescope look back in time?                                                                     | 9<br><b>Girl Scout Week.</b> Girl Scouts can earn badges at The Space Place!                                                                    | FULL MOON 10<br>               | 11                     | 12                                                                                                                                                                  | 13                                                                                                                                       | <b>International Ask a Question Day.</b> Maybe you've wondered about the same things others have asked Dr. Marc. Check out his clear, interesting answers. |
| <b>National Quilting Day.</b> 15<br>What does quilting have to do with being a space mission engineer? Listen to Linda Herrell on Space Place Live! | 16                                                                                                                                              | 17<br><b>St. Patrick's Day</b> | 18<br>LAST QUARTER<br> | <b>Absolutely Incredible Kid Day.</b> 19<br>Adults write letters to kids telling them how incredible they are. Every kid who visits The Space Place should get one! | <b>The first day of spring</b> 20<br>is a good time to learn why the sky is blue.<br><b>Vernal Equinox</b> (first day of spring)         | 21                                                                                                                                                         |
| 22<br><b>International Goof-off Day.</b> A great day to make a simple sound cone and go outside to eavesdrop on nature.                             | <b>World Meteorological Day.</b> 23<br>Meteorology is the study of weather. Did you know Earth weather takes place inside of the Sun's weather? | 24                             | 25                     | <b>NEW MOON</b> 26<br>                                                                                                                                              | <b>Kite Flying Day.</b> 27<br>Space engineers are working on a kite for space! They call it a solar sail, but it works in a similar way. | 28                                                                                                                                                         |
| 29                                                                                                                                                  | <b>Take a Walk in the Park Day.</b> Or, if you can't get out, take a virtual walk through the "Land of Magic Windows."                          | 31                             |                        |                                                                                                                                                                     |                                                                                                                                          | <b>International Listening Awareness Month.</b> Listening makes the world a better place. Practice with our Podcasts.                                      |

Month of March: [spaceplace.nasa.gov/en/educators/podcast](http://spaceplace.nasa.gov/en/educators/podcast)  
 Mar. 1: [spaceplace.nasa.gov/en/kids/earth/wordfind](http://spaceplace.nasa.gov/en/kids/earth/wordfind)  
 Mar. 2: [spaceplace.nasa.gov/en/kids/nmp/starr](http://spaceplace.nasa.gov/en/kids/nmp/starr)  
 Mar. 9: [spaceplace.nasa.gov/en/kids/girlscouts](http://spaceplace.nasa.gov/en/kids/girlscouts)  
 Mar. 14: [spaceplace.nasa.gov/en/kids/phonedrmarc](http://spaceplace.nasa.gov/en/kids/phonedrmarc)  
 Mar. 15: [spaceplace.nasa.gov/en/kids/live/herrell](http://spaceplace.nasa.gov/en/kids/live/herrell)

Mar. 19: [spaceplace.nasa.gov](http://spaceplace.nasa.gov)  
 Mar. 20: [spaceplace.nasa.gov/en/kids/misrsky/misr\\_sky.shtml](http://spaceplace.nasa.gov/en/kids/misrsky/misr_sky.shtml)  
 Mar. 22: [spaceplace.nasa.gov/en/kids/tmodact.shtml](http://spaceplace.nasa.gov/en/kids/tmodact.shtml)  
 Mar. 23: [spaceplace.nasa.gov/en/kids/goes/spaceweather](http://spaceplace.nasa.gov/en/kids/goes/spaceweather)  
 Mar. 27: [spaceplace.nasa.gov/en/kids/st8/sailmast](http://spaceplace.nasa.gov/en/kids/st8/sailmast)  
 Mar. 30: [spaceplace.nasa.gov/en/kids/chandra.shtml](http://spaceplace.nasa.gov/en/kids/chandra.shtml)

## Saturn at opposition, and a couple more transits

Akkana Peck

This month we're entering the best time of 2009 to see Saturn. The ringed planet, at opposition on March 8th, rises a bit before sunset and is visible all night. With its rings inclined at about 2.5 degrees to us, it climbs to nearly 60° up, plenty high enough for excellent views, weather permitting.

If you get tired of squinting at nearly edge-on rings, you can look at Saturn's moons!

If you missed the Titan transits last month, there's one more for the dedicated Titanophile, at 4 am on the morning of March 12, when Titan and its shadow will skim across Saturn's north pole. Since Saturn's poles are a bit dimmer than the rest of the planet, this might be a relatively easy transit to see ... if you can manage to be up at 4 am on a Thursday morning.

If you can't quite manage that, there's a much more convenient Rhea transit on March 21, a just-past-third-quarter

Saturday night, lasting from 8 to just past 11 p.m. Rhea isn't as big as Titan, but it's still a sizable moon, and its shadow follows it closely across the face of Saturn. This all happens at about 54° up, so it should be a nice event for anyone out observing on a Saturday night.

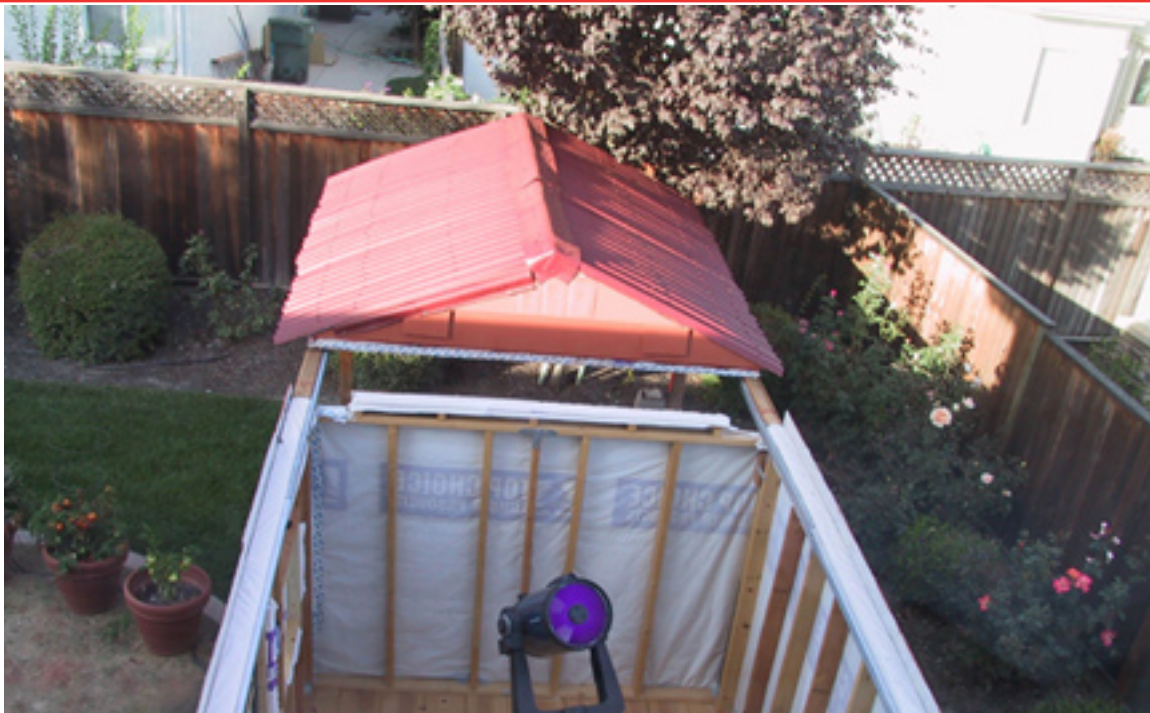
Venus is at inferior conjunction on the 27th. Since it's 8 degrees north of the sun, it may be possible, though difficult, to see it both at sunset and sunrise. Of course, it's also possible to catch its very thin crescent during the day: make sure you set up in the shade of a building, so there's no chance you might accidentally catch a magnified view of the sun, and sweep with binoculars if you don't have a "goto" scope or one with setting circles.

Mercury, Mars and Jupiter are all in the morning sky, making a nice lineup for anyone who's up early.

The asteroid 1 Ceres is still unusually

bright this month— magnitude 6.9, just barely out of naked-eye reach for most people and most skies. It's high in the sky, not too far from Saturn, floating above the back of Leo, moving through a corner of Leo Minor and moving fairly fast — it'll move 5° west throughout March, so use a planetarium program or other reliable chart to figure out which point of light it is.

NASA had a little scare last month, when the Mars rover Spirit stopped moving and gave erratic responses regarding its position. The Rover team ran it through a series of diagnostic tests and although the cause of the problem is still unknown, Spirit seems to be back up and running again. We should all be prepared for this sort of thing, considering the rovers were designed for less than a two-month mission — but still, after five years of watching rover reports, I've gotten a bit attached to those little gals and I sure hope the NASA folks can keep them rolling. You go, Spirit and Opportunity!



*A personal observatory is not a big deal. Some wood, some time, a lot of sweat, hammer-damaged thumbs, disbelieving spouse, curious neighbors and a damaged windshield from trying to put a 10 foot board into your 9 foot long van will get you at least halfway there. The result looks like it was done by an amateur but, hey, that's what we are. For better inspiration see [www.skyshed.com](http://www.skyshed.com). Photo courtesy of Paul Kohlmler.*



Did you know a solar flare can make your toilet stop working?

That's the surprising conclusion of a NASA-funded study by the National Academy of Sciences entitled *Severe Space Weather Events—Understanding Societal and Economic Impacts*. In the 132-page report, experts detailed what might happen to our modern, high-tech society in the event of a "super solar flare" followed by an extreme geomagnetic storm. They found that almost nothing is immune from space weather—not even the water in your bathroom.

The problem begins with the electric power grid. Ground currents induced during an extreme geomagnetic storm can melt the copper windings of huge, multi-ton transformers at the heart of power distribution systems. Because modern power grids are interconnected, a cascade of failures could sweep across the country, rapidly cutting power to tens or even hundreds of millions of people. According to the report, this loss of electricity would have a ripple effect with "water distribution affected within several hours; perishable foods and medications lost in 12-24 hours; loss of heating/air conditioning, sewage disposal, phone service, fuel re-supply and so on."

"The concept of interdependency," the report notes, "is evident in the unavailability of water due to long-term outage of electric power—and the inability to restart an electric generator without water on site."

It takes a very strong geomagnetic storm to cause problems on this scale—the type of storm that comes along only every century or so. A point of reference is the "Carrington Event" of August-September 1859, named after British amateur astronomer Richard Carrington who witnessed the instigating solar flare with his

unaided eye while he was projecting an image of the Sun on a white screen. Geomagnetic storms triggered by the flare electrified telegraph lines, shocking technicians and setting their telegraph papers on fire; Northern Lights spread as far south as Cuba and Hawaii; auroras over the Rocky Mountains were so bright, the glow woke campers who began preparing breakfast because they thought it was morning!

"A contemporary repetition of the Carrington Event would cause ... extensive social and economic disruptions," the report warns. Widespread failures could include telecommunications, GPS navigation, banking and finance, and transportation. The total economic impact in the first year alone could reach \$2 trillion (some 20 times greater than the costs of Hurricane Katrina).

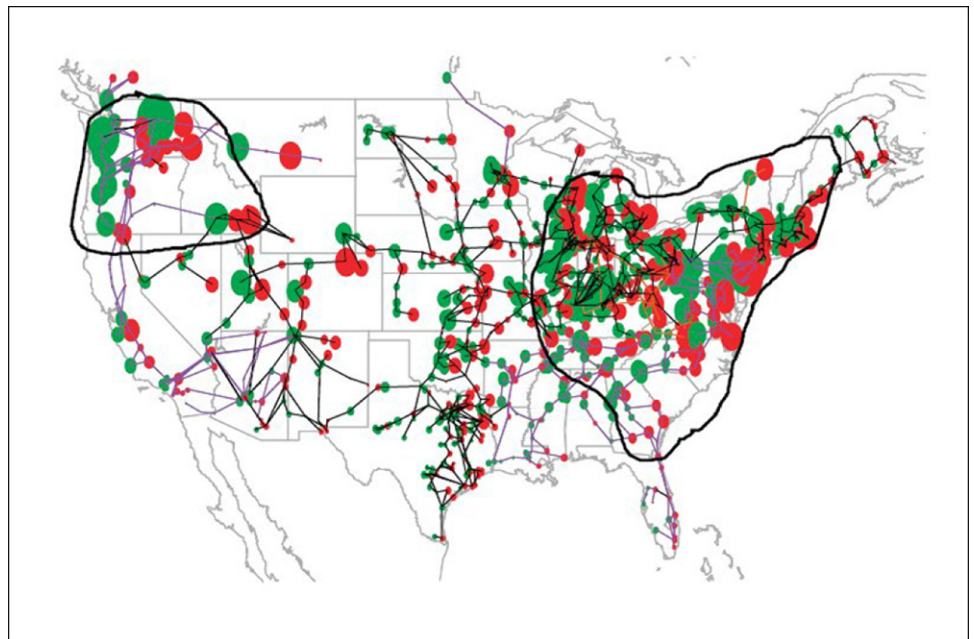
The report concluded with a call for infrastructure designed to better withstand geomagnetic disturbances and improvements in space weather

forecasting. Indeed, no one knows when the next super solar storm will erupt. It could be 100 years away or just 100 days. It's something to think about ... the next time you flush.

One of the jobs of the Geostationary Operational Environmental Satellites (GOES) and the Polar-orbiting Operational Environmental Satellites (POES) operated by NOAA is to keep an eye on space weather and provide early warning of solar events that could cause trouble for Earth.

You can keep an eye on space weather yourself at the National Weather Service's Space Weather Prediction Center, <http://www.swpc.noaa.gov>. And for young people, space weather is explained and illustrated simply and clearly at the Scijinks Weather Laboratory, <http://scijinks.gov/weather/howwhy/spaceweather>.

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



*On this power-grid map of the United States, the black-circled areas are regions especially vulnerable to collapse during an extreme geomagnetic storm. Inside those boundaries are more than 130 million people. Credit: National Academy of Sciences report on severe space weather.*

## Barnard's Star

Paul Kohlmiller

All stars are in motion. It is difficult for us to see this movement, called a star's proper motion, for two reasons. First, all of the stars close enough to detect the motion are moving in the same direction that we are. Second, even nearby stars are so far away that motion is hard to see. But we do have Barnard's star. This star is not only not moving toward it us, at its current relative speed (67 miles/second) in a few thousand years (11,800 CE) it will actually be the closest star coming within 3.85 light years. Currently it is less than 6 light years away. The biggest problem in detecting the motion of this star is that it is relatively dim. It's an M class dwarf with a magnitude of 9.6.

As the name suggests, this star was discovered by Edward Barnard in 1916. Barnard worked at Lick Observatory shortly after it started operations. It was at Lick that Barnard discovered the Jovian moon Amalthea - the first Jovian moon discovered after Galileo. Later Barnard moved to the Yerkes Observatory which is where he discovered this star.

But for the detection of proper motion, the important thing is how quickly does the star move against the background of other stars. The proper motion of Barnard's star is 10.4 arc-seconds per year. This works out to one lunar diameter every 180 years. You may not have 180 years to spare but lets be optimistic and say 5 years. The picture shows that Barnard's star will be in a clearly different position 5 years from now.

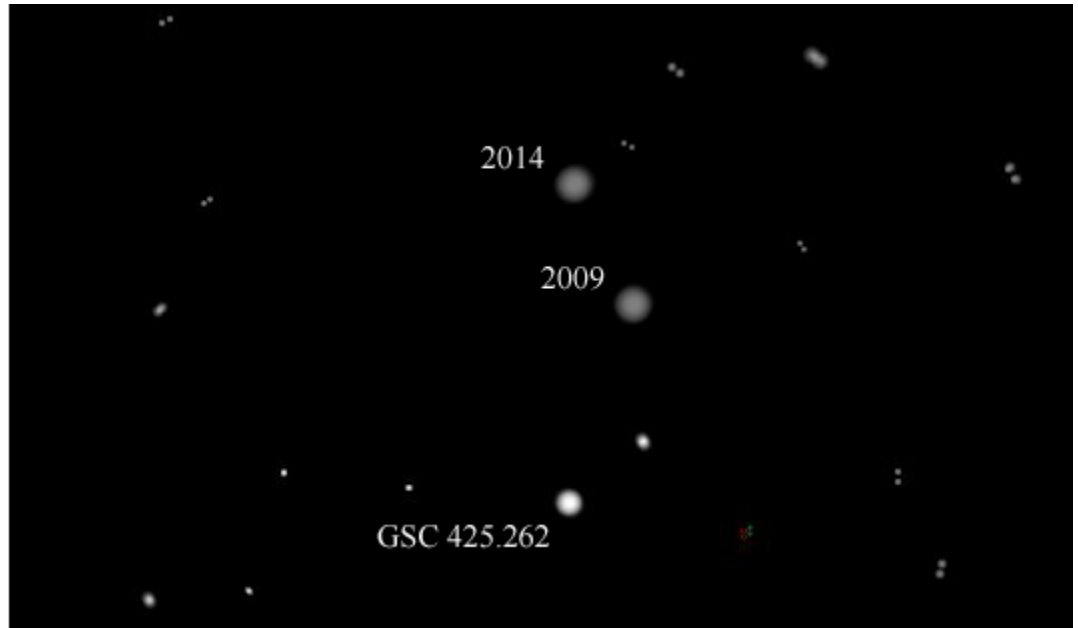
Only the Alpha Centauri star system

is closer than Barnard's star. It is has the designation V2500 Ophiuchi which tells you that this star is also variable. The variability is apparently due to magnetic effects which cause occasional flares. For an earth-size planet to get the same amount of energy from Barnard's star as it does the sun, the planet would have to be 0.06 astronomical units away resulting in a 13 day "year". But hey, winter would only be 3 days long. But then those flares would incinerate

everything.

The actual speed of Barnard's star is not unusual. But the low metallicity of the star shows that it belongs to the halo of the galaxy and not to the disk. It is just passing through.

The actual speed of the star is not so unusual. For a star that is really moving see Mira in Cetus - a star that is moving so fast it leaves a trail.



*A pair of screen shots taken from Software Bisque's The Sky 6 program were used to show how Barnard's Star will move over the next 5 years. The two images were overlaid using GSC 425:262 as an alignment point. The alignment star has a magnitude of 11.2 while Barnard's Star has a magnitude of 9.6. You see a small amount of movement from other, dimmer stars in the area. If you can't wait 5 years then check out the short animation at <http://cseligman.com/text/stars/propermotion.htm>*

### 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.

### Board Elections

At the February General Meeting the membership of the SJAA elected the following people to the board of directors.

Rich Neuschaefer  
Mark Wagner  
Gordon Reade  
Mark Johnston  
Rod Norden

Rob Norden is new to the board and the others were incumbents. This slate of directors was nominated by the board and there were no additional nominations from the floor. At the March board meeting, officers will be selected.

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## The Last Month In Astronomy

FEB-11-2009 **Moon flip/flop** So you think the same side of the moon has always faced the Earth? Maybe not. Recent research suggests that the current Earth-facing side may have been the far side long ago. The flip/flop occurred due to a collision with another object. This would have occurred 3.8 billion years ago when the moon was much closer. <http://www.skyandtelescope.com/news/39430092.html>

FEB-11-2009 **Discover NET 2/22** The shuttle Discovery is currently scheduled to launch no earlier than Feb. 22. [http://www.nasa.gov/mission\\_pages/shuttle/main/](http://www.nasa.gov/mission_pages/shuttle/main/)

FEB-07-2009 **Methane on Mars? Really?** A lot has been made of the discovery of methane on Mars. Now, there is a lot about Mars that we don't understand but we do know that methane is volatile. Also, there's no reason to believe that it doesn't get mixed up in the Martian atmosphere so a concentration of it is big news. But Christopher McKay of NASA was giving a talk at the February SJAA meeting and he is at least skeptical about the measurements. If you buy the measurements, that doesn't mean you should buy into every inference you hear in the media. See what Phil Plait, the "bad" astronomer, has to say at <http://blogs.discovermagazine.com/badastronomy/2009/01/19/mars-methane-media-mess/>. And for information on ancient Martian hot springs see <http://www.liebertpub.com/products/product.aspx?pid=99>

FEB-05-2009 **Local boys make good** Steve Mandel from nearby Soquel has received the Chambliss Award for Amateur Achievement. He was honored for his work on the Mandel-Wilson Unexplored Nebulae Project, a survey of dim interstellar clouds in the Milky Way. <http://www.skyandtelescope.com/news/39135422.html>. And the SJAA's own Gordon Reade has an article in the March issue of Sky & Telescope.

FEB-03-2009 **Smallest exoplanet** The smallest exoplanet found so far is about 1.7 Earth diameters. It was discovered by the COROT spacecraft. This may just be the teaser story for a raft of discoveries that arrive after the Kepler spacecraft is launched in March. <http://www.skyandtelescope.com/news/38820797.html>

JAN-29-2009 **No drought on Titan** Apparently a significant amount of "rain" has fallen on Titan recently and we can see the increase in one of the hydrocarbon-filled lakes. <http://jpl.nasa.gov/news/features.cfm?feature=2014>

JAN-12-2009 **New visualizaationof Cas A** Astronomers at the University of Minnesota have developed a new method for visualizing the supernova that resulted in Cassiopeia A. [http://it.umn.edu/news/archives/09\\_01\\_explodestar.html](http://it.umn.edu/news/archives/09_01_explodestar.html)

FEB-10-2009 **M101 oh my** The Hubble Space Telescope, the Chandra X-ray Observatory and the Spitzer Space Telescope have combined to create an awesome picture of the spiral galaxy M101. The collaboration resulted in a picture 9 square foot image that is being displayed around the country to help celebrate the International Year of Astronomy, 2009. Among the places displaying this work of art and science is the San Jose Tech. The unveiling coincides with Galileo's birthday which was February 15. "The amazing scientific discoveries Galileo made four centuries ago are continued today by scientists using NASA's space observatories," said Denise Smith. She is the unveiling's project manager at the Space Telescope Science Institute. "NASA's Great Observatories are distributing huge prints of spectacular images so the public can share in the exploration and wonder of the universe." This image as shown here is 100,000 light years across. The HST contribution came from 5 different images taken between 1994 and 2003. The Spitzer data comes from 2 images made in 2004. Chandra's data comes from multiple images between 2000 and 2005. <http://hubblesite.org/newscenter/archive/releases/2009/07>





# It Must Be Astronomical ...

## Loaners

The loaner program offers members a means to try scopes of various sizes and technologies before you buy. It is one of the real jewels of being a member of the club. Scopes are available for all experience levels. The inventory is constantly changing. The following list is a sample. For more information please see the loaner program web page: <http://www.sjaa.net/loaners>

## Hot Dates

March 4 - Steven Beckwith on "The Dawn of Creation: The First Two Billion Years" at 7 p.m. Foothill College, Free, \$2 parking.

March 16 - Sandra Faber will tour the Universe using the most beautiful images from the Hubble Space Telescope - California Academy of Sciences, \$10, <http://www.calacademy.org/events>

March 21 - Dan Werthimer on "Is Anybody Out There? Searching for ET with Help from 8 Million Volunteers" - in Genetics and Plant Biology Building, Room 100, <http://astro.berkeley.edu/iya>

June 20-24 - Golden State Star Party - <http://www.goldenstatestarparty.blogspot.com/>

## Deep Sky Objects

Here are three recommendations for deep sky objects in March. For more information see <http://www.resource-intl.com/Observing.Lists/Deep.Sky.Mar.09.html>

| Difficulty                                           | Name     | RA          | Dec          |
|------------------------------------------------------|----------|-------------|--------------|
| Easy                                                 | NGC 2683 | 08h 52m 41s | 33° 25' 03"  |
| Very bright nearly edge-on galaxy in Lx. Mag. 10.6   |          |             |              |
| Medium                                               | NGC 2509 | 08h 00m 48s | -19° 03' 00" |
| Beautiful open cluster in Puppis >80 stars. Mag. 9.3 |          |             |              |
| Difficult                                            | N 2525   | 08h 05m 38s | -11° 25' 41" |
| Slightly elongated galaxy in Puppis. Mag. 12.3       |          |             |              |

*"Study as if you were going to live forever; live as if you were going to die tomorrow." - Maria Mitchell, first American woman professional astronomer.*

### Officers and Board of Directors

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**Dir** Gordon Reade  
**Dir** Greg Claytor  
**Dir** Mark Wagner  
**Dir** Rod Norden

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 Telescope Loaners [loaner@sjaa.net](mailto:loaner@sjaa.net)  
 Members Email Lists:  
<http://www.sjaa.net/majordomo.html>

### Publication Statement

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Articles for publication should be submitted by the 10<sup>th</sup> of the previous month. The PDF version is generally available by the 24<sup>th</sup> 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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## San Jose Astronomical Association Membership Form

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

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

**I'll get the Ephemeris newsletter online**

<http://ephemeris.sjaa.net> Questions?

Send e-mail to [membership@sjaa.net](mailto:membership@sjaa.net)

### Membership Type:

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

Bring this form to any SJAA Meeting  
or send to the club address (above).

Please make checks payable to "SJAA".

Subscribing to Sky & Telescope magazine through the SJAA  
saves you \$10 off the regular rate. (S&T will not accept multi-year  
subscriptions through the club program. Allow 2 months lead time.)

You can join or renew online:

<http://www.sjaa.net/SJAAmembership.html>

**Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**City/ST/Zip:** \_\_\_\_\_

**Phone:** \_\_\_\_\_

**E-mail address:** \_\_\_\_\_