



SJAA EPHEMERIS

SJAA Activities Calendar

Jim Van Nuland

(late) April

- 17 Astronomy Class at Houge Park. 7:30 p.m. Pete Santangeli will speak on imaging for beginners.
- 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.

May

- 1 Houge Park star party. Sunset 7:58 p.m., 56% moon sets 2:32 a.m. Star party hours: 9:00 until midnight. This is also SJAA's observation of Astronomy Day.
- 9 General Meeting. Our speaker is Dr. Christopher Mauche (LLNL), who will speak on The X-ray Universe.
- 15 Astronomy Class at Houge Park. 7:30 p.m. Topic is TBA
- 15 Houge Park star party. Sunset 8:10 p.m., 60% moon rises 1:28 a.m. Star party hours: 9:00 until midnight.
- 16 Dark Sky weekend. Sunset 8:11 p.m., 50% moon rises 1:55 a.m.
- 23 Dark Sky weekend. Sunset 8:16 p.m., 0% moon rises 5:40 a.m. Henry Coe Park's "Astronomy" lot has been reserved.
- 29 Houge Park star party. Sunset 8:21 p.m., 41% moon sets 1:05 a.m. Star party hours: 9:30 until midnight.

June

- 6 General Meeting. Our speaker is our own Rod Norden (SJAA) who will tell us about the Pioneer 10-11 missions.
- 12 Astronomy Class at Houge Park. 7:30 p.m. Topic is TBA
- 12 Houge Park star party. Sunset 8:29 p.m., 75% moon rises 11:56 a.m. Star party hours: 9:30 until midnight.
- 20 Dark Sky weekend. Sunset 8:31 p.m., 3% moon rises 4:19 a.m. Henry Coe Park's "Astronomy" lot has been reserved.
- 20 Summer begins at 10:45 p.m.
- 26 Houge Park star party. Sunset 8:32 p.m., 26% moon sets 11:35 p.m. Star party hours: 9:30 until midnight.

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

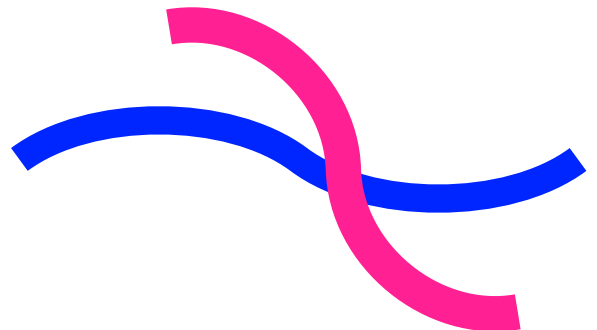
<http://www.sjaa.net>

We Had a Great Time at the Auction!

The annual SJAA Auction, held April 5, was a tremendous success. Jay Reynolds Freeman did his usual outstanding job as auctioneer. The auction was aided by a number of items donated by Orion. Bidding was very active. The gross sales were higher than last year. The SJAA put virtually nothing up for auction. Rich Neuschaefer, Lee Hoglan and Greg Claytor kept things moving along and the sales system developed by Mark Wagner worked very well.

From Akkana Peck: "I don't know what it felt like behind the scenes (probably pretty hectic) but I wanted to comment that this is the first SJAA auction where I've seen the computer crew keep up with the auction and never seem flustered or confused. I've certainly never before seen one where the auctioneer could ask for info on an item and get an immediate and correct answer, every time. The rest of the crew also looked very organized and in control. Whatever you guys did, it worked! Good job!"

Items sold at the auction include nearly 20 binoculars, more than a dozen telescopes, several eyepieces, various parts, and some vials of glow in the dark powder. There is already some excitement for a possible swap meet in the fall and for next spring's auction.





Mira is a red giant star near the end of its life. It is moving so fast it leaves a trail of gas and dust 13 light-years long! The Galaxy Evolution Explorer spacecraft made this image in ultraviolet light. What else does this Explorer see? Go to spaceplace.nasa.gov/en/kids/galex/art.2.shtml.

MAY 2009

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Ultraviolet Awareness Month. Huh? No, it's not just for getting sun-burned. Find out what this invisible kind of light is really good for.					FIRST QUARTER 1	Astronomy Day. 2 Decorate your room with colorful pictures of stars and galaxies from our poster download page.
3	4	National Teacher's Day. 5 Check out the interesting classroom activity articles and images on the teacher's page of The Space Place.	6	7	FULL MOON 8	9
Mother's Day. 10 Make Mom a Galactic Mobile. She will love how its sparkling spiral galaxies turn in the breeze.	11	12	13	14	15	16
LAST QUARTER Pack Rat Day. 17 You may be a pack rat on Earth, but you'd have to change your ways if you took a trip to Mars!	18	19	20	21	22	23
NEW MOON 	Pres. Kennedy announced 25 in 1961 that the U.S. would land a person on the Moon by the end of the decade. We did it! See pictures.	26	27	28	29	FIRST QUARTER Krypton discovered, 30 1898. Superman may be allergic to it, but not Super Space Place Girl. See her in action.
31						

Month of May:
spaceplace.nasa.gov/en/educators/teachers_page2.shtml#timemachine
 May 2: spaceplace.nasa.gov/en/educators/posters/#stars
 May 4: spaceplace.nasa.gov/en/kids/goes/hurricanes
 May 5: spaceplace.nasa.gov/en/educators
 May 10: spaceplace.nasa.gov/en/kids/galex_make1.shtml
 May 15: spaceplace.nasa.gov/en/kids/x2000.shtml

May 17: spaceplace.nasa.gov/en/kids/mars_rocket.shtml
 May 18: spaceplace.nasa.gov/en/educators/teachers_earth_volcano_images.shtml
 May 20: spaceplace.nasa.gov/en/educators/teachers_page2.shtml#cloudcontent
 May 23: spaceplace.nasa.gov/en/kids/urbie_action.shtml
 May 25: spaceplace.nasa.gov/en/educators/teachers_moon_images.shtml
 May 30: spaceplace.nasa.gov/en/kids/dsn_fact1.shtml

THE SPACE PLACE CALENDAR IS FOR EDUCATIONAL PURPOSES ONLY AND IS NOT TO BE SOLD

Spotless

Akkana Peck

Saturn is high in the sky as the sun sets, reaching its highest elevation of about 60 degrees a bit after dark. The rings are wide open — well, for this year, anyway — at slightly over 4 degrees; as the month ends they'll begin closing again, though we'll miss them at their most edge on. They'll start opening up again around November.

Pluto — still not overhead, but certainly visible this month — rises in early evening and transits a few hours after midnight. It's not very high, though, only 35°.

All the other planets are in the morning sky. Venus, Mars, Uranus and Neptune all share the dawn, while Jupiter rises just after midnight. On the morning of the 17th (a new moon Saturday night) at a bit after 1pm, Jupiter will show a double shadow transit of Callisto and Io. We've had an amazing lack of those multiple Jovian moon transits, so it's nice to see one that's during halfway reasonable observing hours.

The RASC Handbook says there's an occultation of Antares on the 10th visible in parts of North America — but nobody on the web lists it as being visible here, and XWphem shows the full moon skimming past Antares with a separation of a few arcseconds at about 2pm, when they'll be well below the horizon. Not to knock the RASC — they do an amazing job of predicting interesting events more than a year ahead of time, so it's fun to catch them in a rare error — but it looks like this one will be a non-event.

There's one other shallow object to talk about this month — the really bright one that's up during the daytime. Even veteran solar observers haven't been observing the sun much lately ... because there's nothing to see. It's not too surprising, since we're just a little past the "solar minimum". That's the time when the sun, a variable star,

typically shows the least activity: the fewest sunspots to observers with white-light filters, and the fewest flares and prominences to people with H-alpha filters. The typical solar cycle lasts 11 years.

But the end of that 11-year cycle was last year, and still solar observers are seeing no activity. There's so little that it made the news last month, when there were 15 days without a single observable sunspot. Last year had 266 days without a sunspot, as well as over 85% of days without a smudge so far in 2009 — quieter than it's been for a hundred years.

What are sunspots, anyway? Basically, they're slightly cooler areas on the sun's surface, caused by regions of high magnetic activity. They're tied to other solar activity like prominences (those lovely loops you can see with an H-alpha filter), and they also cause interference with radios and other devices like GPS receivers here on earth.

Sunspots may even affect the earth's weather. Paradoxically, when a lot of sunspots are present, even though the spots themselves are cooler, total solar radiation increases. Some sources say that's because the halo around a sunspot is hotter than the average solar surface, while others blame it on particles ejected because of the intense magnetic activity (or perhaps these two reasons are related). Whatever the reason, when there are no sunspots, our weather often gets a little cooler. The "little ice age" of the 17th century corresponded with a long period of no observed sunspots, called the "Maunder Minimum". But not everyone is convinced of the correlation, and there have been other periods of extremely low activity (in the early 1900s) without any obvious weather correlation.

The sun is definitely cooler now than at the last solar minimum in 1996. It's only .02% dimmer in visible light, but it's lost 6% of its UV radiation since 1996. Don't put away that sunscreen just yet, though — 6% isn't that big a difference.

Of course, if you have an axe to grind you can draw all kinds of conclusions about global warming from the dearth of sunspots. Global warming is worse than we think, because the low solar activity is masking the warming effects! No, it's not as bad as they say, because the sun is now entering a cooling phase and we'll see more cooling over the next few years! Truth is, nobody knows for sure what the sun's going to do, and global warming probably doesn't have anything to do with the sun.

But however you look at it, solar observing is going to be boring for a little while. So put your solar filters in storage for a little while and find something else to observe during the day. Maybe even something that won't affect the climate. Me, I think I'm going to leave the car in the garage for a day, dust off that bicycle and go for a ride. But wait — first let me put on some sunscreen.

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.

The flight computer onboard the Lunar Excursion Module, which landed on the Moon during the Apollo program, had a whopping 4 kilobytes of RAM and a 74-kilobyte “hard drive.” In places, the craft’s outer skin was as thin as two sheets of aluminum foil.

It worked well enough for Apollo. Back then, astronauts needed to stay on the Moon for only a few days at a time. But when NASA once again sends people to the Moon starting around 2020, the plan will be much more ambitious—and the hardware is going to need a major upgrade.

“Doing all the things we want to do using systems from Apollo would be very risky and perhaps not even possible,” says Frank Peri, director of NASA’s Exploration Technology Development Program.

So the program is designing new, more capable hardware and software to meet the demands of NASA’s plan to return humans to the moon. Instead of staying for just a few days, astronauts will be living on the Moon’s surface for months on end. Protecting astronauts from harsh radiation at the Moon’s surface for such a long time will require much better radiation shielding than just a few layers of foil. And rather than relying on food and water brought from Earth and jettisoning urine and other wastes, new life support systems will be needed that can recycle as much water as possible, scrub carbon dioxide from the air without depending on disposable filters, and perhaps grow a steady supply of food—far more than Apollo life-support systems could handle.

Next-generation lunar explorers will perform a much wider variety of scientific research, so they’ll need vehicles that can carry

them farther across the lunar surface. ETDP is building a new lunar rover that outclasses the Apollo-era moon buggy by carrying two astronauts in a pressurized cabin. “This vehicle is like our SUV for the Moon,” Peri says.

The Exploration Technology Development Program is also designing robots to help astronauts maintain their lunar outpost and perform science reconnaissance. Making the robots smart enough to take simple verbal orders from the astronauts and carry out their tasks semi-autonomously requires vastly more powerful computer brains than those on Apollo; four kilobytes of RAM just won’t cut it.

The list goes on: New rockets to carry a larger lunar lander, spacesuits that can cope with abrasive moon dust, techniques for converting lunar soil into building materials or breathable oxygen.

NASA’s ambitions for the Moon have been upgraded. By tapping into 21st century technology, this program will ensure that astronauts have the tools they need to turn those ambitions into reality.

Learn more about the Exploration Technology Development Program at http://www.nasa.gov/directorates/esmd/aboutesmd/acd/technology_dev.html. Kids can build their own Moon habitat at <http://spaceplace.nasa.gov/en/kids/exploration/habitat>.

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



The Chariot Lunar Truck is one idea for a vehicle equal to the lunar terrain. Each of the six wheels pivot in any direction, and two turrets allow the astronauts to rotate 360°.

Webcams

Paul Kohlmler

In the last few years, a very low cost imager called a webcam has made an impact. Be it ever so humble, it has transformed astrophotography. These cameras usually use CCD (charge-coupled devices) technology although some low cost devices use CMOS (complementary metal oxide semiconductor). The original use for webcams is to show live images. This means they are essentially video cameras.

The earliest webcam is purportedly a camera that was pointed at a coffee machine at Cambridge University starting in 1991. The first mention of webcams in the NASA ADS literature search site is 2001. Today a search on that site shows about 40 articles with the word "webcam" in the abstract. The webcam has many uses including some that are unique.

Autoguiding

A low cost camera, perhaps a step up from a true webcam, can be used as an autoguider. An example is the Orion Star Shoot Autoguider. This camera uses CMOS technology.

"Lucky" Images

One solution for poor seeing is to take many pictures and hope to capture a few that are clear. The Lucky Imaging Group at the University of Cambridge hopes to get images 5 times better than the Hubble Space Telescope using ground based telescopes and the lucky imaging technique enhanced with some adaptive optics. This technique can be used with either astronomical CCDs or webcams. But since webcams are essentially video cameras a user can capture up to 30 frames a second. The webcam has a better 'hit rate' of frames during decent seeing as well as nearly instant results. This started as a planetary imaging technique but some new low light CCDs can do deep sky imaging while capturing

frames at a rate of 20 fps (<http://www.astropix.com/wp/2007/09/04/lucky-high-resolution-imaging/>).

Stacking video images

Both astronomical CCDs and webcams can capture multiple images and then use software like CCDSoft, Maxim or Registax to stack the images. This improves the signal-to-noise ratio and improves the brightness of an image. Since a webcam is like a video camera, a user can create many images in a short period of time.

Double Star Measurements

A German astronomer reported a study of 48 double star measurements using a standard webcam with an 8" reflector. To do this, a 10-30 second video is taken of each double star. This video is then treated as a collection of individual frames and the best 30-100 frames are used. This is probably the most scientific use of webcams so far with at least 3 different authors writing articles.

Planetary Imaging

It is normally difficult to image planets like Jupiter with an astronomical CCD because at the shortest available exposure times the picture is over exposed. But that's not a problem with webcams because the exposure time per frame is always a fraction of a second. Some have used webcams to take pictures of Mercury during daylight. Deep-sky imaging is also possible.

Sky Watching

One thing that is necessary to run an automated observatory is a way to look at the sky to see if it is cloudy or not (<http://www.cloudwatch.net/hardware>). Also a number of webcams are used to automate the 32 inch scope at the Dark Sky Observatory. A radio astronomy observatory is managed with the use of webcams to keep an eye on the big dish

from a remote location. And there are other webcam uses for astronomy that might not be obvious such as watching the aurora (<http://www.aurorawebcam.com/>).

Other Webcam Advantages

There are some other advantages to using a webcam rather than as astronomical CCD.

- Most beginners will appreciate the fact that most webcams produce color images instead of monochrome – no need for filters.
- The lower cost of webcams makes some astrophotography available in academic situations that could not afford to do so otherwise.
- Since each frame taken by a CCD camera is short, noise is less of a problem.
- A webcam can be a cheaper, easier way to do photometry on variable stars (<http://www.aavso.org/observing/programs/ccd/ccdfaq.shtml>).
- Videos can be created of phenomena such as Jovian storms, lunar occultations or the Galilean moons. One such video shows how the atmosphere affects seeing of Saturn and it also shows how occasionally a very clear picture is seen (<http://www.webcam-astrophotography.com/saturn/11-september-2003.html>).

Discussion

The low cost and ease of use of webcams means that they are going to be used for a wide range of imaging experiments. Some of these new techniques will be used with more expensive cameras but enough of them will stick with webcams. The result will be that there are more "eyes on the skies" than ever before.

The Last Month In Astronomy

APR-12-2009 **JHJ and What's Up** Jane Houston Jones, a long time friend of the SJAA, has a monthly podcast where she talks about what is up in the sky that astronomers might want to see. This month she talks about viewing M51 in various parts of the electromagnetic spectrum. If you have problems getting the video to play on your computer, try pausing it just as it begins and then hit the play button after it has downloaded most of the 3 minute video. <http://www.jpl.nasa.gov/video/index.cfm?id=824>

APR-12-2009 **New Info from the Trapezium** One of my favorite objects to show during a star party is the trapezium, the trapezoid shape formed from the bright stars in the Orion Nebula. A new high resolution image of the brightest of these stars, Theta1 Ori C, is about to be published. The information from the image has been used to get more information about the tightly bound double star that is Theta1 Ori C. The two components are 38 and 9 solar masses and the period is 11 years. The double star is so tight that the second star was not detected until 1999. <http://www.sciencedaily.com/releases/2009/04/090402104724.htm>

APR-07-2009 **Kepler blows its lid** The cover that has been protecting the Kepler spacecraft has been successfully jettisoned. The 42 CCDs on board Kepler are now measuring star light as part of the calibration being performed before the real scientific start of the mission. Kepler will spend 3 and half years staring at a spot in the sky between Deneb and Vega looking for planets that transit their star. <http://www.jpl.nasa.gov/news/news.cfm?release=2009-065>

APR-07-2009 **Low on Hydrogen Cyanide** Astronomers are using the Spitzer Infrared Space Telescope to look for hydrogen cyanide in the planet-forming material around different types of stars. They found the molecule around sun-like stars but not around cooler stars such as the dwarfs in the M class. The importance of this molecule is that it forms part of adenine, the A in the GATC that forms DNA. <http://www.jpl.nasa.gov/news/news.cfm?release=2009-064>

MAR-18-2009 **Asteroid Close to Earth** An asteroid named 2009 FH (the name tells you that it was only recently discovered) based close to Earth. How close? About one-fifth of the distance between the Earth and the moon. It is only 50 feet wide and it apparently will not hit Earth in the foreseeable future. <http://www.jpl.nasa.gov/news/features.cfm?feature=2085>

MAR-16-2009 **Arp 261** The ESO's aptly named VLT (Very Large Telescope) has taken the best image yet of a strange pair of colliding galaxies called Arp 261. Halton Arp created the catalog Peculiar Galaxies in the 1960's. This object is 70 million light-years away and appears in the constellation Libra. In a collision of this sort, stars are unlikely to collide but the gas and dust in each galaxy will smash together at very high speeds and create clusters of new, hot stars. The original stars start to travel in different patterns and create the swirls seen in this image. The image contains the remnant of a core collapse supernova, SN 1995N. It is unusual for a remnant to still be viewable so long after the event. It is also one of the few supernovae that has been seen to emit x-rays. That might be an effect caused by having a supernova in such a dense region of space.

This image is inverted (like a film negative) in the print edition. In the PDF version, the image is in the original color. In the color image a couple of objects near the top and to the left show up as streaks that appear to change colors. These are asteroids and the color change is due to the changing of the color filters while this picture was taken.

<http://www.astronomy.com/asy/default.aspx?c=a&id=8017>



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

May 12 - Scheduled launch date of STS-125, the shuttle mission to repair the HST.

May 16 - SETI Celebrating Science Day. <http://www.seti.org/Page.aspx?pid=830&cid=6&ceid=112&cerid=0&cdt=5%2f16%2f2009>

May 20 - Patricia Burchat speaks at Foothill College. Her topic is "Dark Matter and Dark Energy". For more info see <http://www.foothill.edu/ast/SVL.htm>

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

[Looking for a quick way to increase your astronomy knowledge. Check out the One Minute Astronomer at <http://www.oneminuteastronomer.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.Apr.09.html>

Difficulty	Name	RA	Dec
Easy	M83	13h 37m 00s	-29° 53' 04"
Great barred spiral galaxy in Hydra. Mag 8.2			
Medium	N5084	13h 20m 16s	-21° 49' 39"
Elongated galaxy with bright nucleus - in Virgo. Mag 11.6.			
Difficult	N5134	13h 25m 18s	-21° 08' 04"
Fairly large oval galaxy with mottled halo - Vir. Mag. 12.1			

Q: What is the very best day for a meteor shower in 2009?
 A: It's not certain but the shower with the best Zenithal Hourly Rate and the least moon light appears to be during the Geminids on the night of Dec. 14. (RASC 2009, pg. 258)

“Yes, you can have it all ... try to ignore gender biased counseling, and do whatever it is you love to do.” – Jill Tartar, Director of the SETI Institute’s Center for SETI Research

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Publication Statement

SJAA *Ephemeris*, newsletter of the San Jose Astronomical Association, is published monthly.

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

The SJAA *Ephemeris* is published in three formats: hardcopy, Adobe Acrobat PDF, and HTML. The PDF and HTML versions are found at <http://ephemeris.sjaa.net>.

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.

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