EPHEMERIS

February 2012

SJAA Activities Calendar

Jim Van Nuland

(late) January

21 Dark-Sky weekend. Sunset 5:20 p.m, No moon. Henry Coe Park's "Astronomy" lot has been reserved.

27 Houge Park star party. Sunset 5:26 p.m, 23% moon sets 10:14 p.m. Star party hours: 7:00 until 10:00 p.m.

February

4 General Meeting. Board meeting (*)at 6:30; General Meeting at 8:00. Our speaker is Dr. Lynn Rothschild, on Life at the Edge: Life in Extreme Environments on Earth and the Search for Life in the Universe.

17 Astronomy Class at Houge Park. 7:00 p.m. The topic: Types of telescopes, designs, utility, practicality.

17 Houge Park star party. Sunset 5:49 p.m, 15% moon rises 4:34 a.m. Star party hours: 7:00 until 10:00 p.m.

18 Dark-Sky weekend. Sunset 5:50 p.m, 8% moon rises 5:15 a.m.

25 Dark-Sky weekend. Sunset 5:57 p.m, 17% moon sets 9:57 p.m. Henry Coe Park's "Astronomy" lot has been reserved.

March

2 Astronomy Class at Houge Park. 7:00 p.m. The topic: The Moon.

2 Houge Park star party. Sunset 6:02 p.m, 61% moon sets 2:25 a.m. Star party hours: 7:00 until 10:00 p.m.

10 General Meeting. Board meeting (*) at 6:30; General Meeting at 8:00. Our speaker is Dr. Graeme Smith of Lick Observatory; his topic "Two Views Of The Moon".

11 Daylight Savings Time starts at 2 a.m. Move clocks ahead one hour.

16 Houge Park star party. Sunset 7:16 p.m, 28% moon rises 4:14 a.m. Star party hours: 8:15 until 11:15 p.m.

17 Dark-Sky weekend. Sunset 7:17 p.m, 18% moon rises 4:51 a.m.

24 Dark-Sky weekend. Sunset 7:24 p.m, 6% moon sets 9:44 p.m. Henry Coe Park's "Astronomy" lot has been reserved.

30 Houge Park star party. Sunset 7:29 p.m, 54% moon sets 2:46 a.m. Star party hours: 8:30 until 11:30 p.m

(*) The Board of Directors meets before each general meeting at 6:30 p.m. All are welcome to attend.

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

Breakthroughs in 2011

Paul Kohlmiller

Science magazine picks one scientific event to be the number 1 breakthrough of the year. In 1998 it was the discovery that the expansion of the universe is accelerating, the topic of Alex Filippenko's talk at January General meeting. For 2011, the breakthrough of the year was the unambiguous success of HIV antiretroviral drugs in the prevention. But astronomical events showed up in the runner-up list.

Science magazine picked 3 astronomical stories as breakthrough candidates for 2011.

First, the Japanese spacecraft called Hayabusa returned a few grains from asteroid Itokawa. That it managed to do so was a major accomplishment. Hayabusa lost 2 of 3 gyros, sprang a leak in its attitude-control thrusters, lost solar power, froze the batteries, and a very small rover was shot into deep space instead of landing on Itokawa. But it managed to prove that the most common meteorites, chondrites,

Continued on page 2

Breakthroughs
Continued from page 1

were indeed from the most common asteroids, the S class. That was a slight surprise because the colors of the meteorites didn't match the too-red asteroids. The difference was tracked down to tiny blobs of iron that scatter sunlight causing the asteroid to look redder (kind of like a sunset). This story was covered in the SJAA Ephemeris last October (http://ephemeris.sjaa.net/1110/g.html).

Second, exoplanets were a big item this year. Science focused on the "strange" exoplanets. There was the case of Kepler 11 with 5 giant planets in orbit closer than Mercury. This breaks two theories of planetary formation: if large planets are formed far from the star and then move inward why didn't some of these create a chaotic situation that kicked out some of these planets? If planets form where they are found, how was there so much stuff so close to the star? Another strange star known as HAT-P-6b is orbiting its star in a retrograde motion. This is more explainable. A planet or companion star could knock a planet into a new orbit and eventually it flips. Another odd exoplanet was the so-called Tatooine planet. This last story was in the November Ephemeris (http://ephemeris.sjaa.net/1111/g.html).

Third, some very low metallic regions of space were found. These areas have not seen a lot of star formation so some recently created stars consist of hydrogen and helium and almost nothing else. This means that supernovae did not seed the entire universe.

So what didn't even make the runner-up list? Perhaps the recent discovery of Earth-sized planets detected by Kepler occurred too late. The Higgs boson almost detection was listed as an area to watch. Mars Curiosity is another item listed as probably big for 2012.

The Shallow Sky

Bright planets and a faint glow

Akkana Peck

Early February evenings are full of bright planets. Venus and Jupiter are there all month, and near the end of February, Mercury joins them.

Venus remains high in the Western dusk sky during February.

On the 9th, it makes a close pass with Uranus, with less than half a degree between them. And they don't set until 9pm, giving you a good chance to observe this pair. Uranus might be a bit washed out by its brilliant companion, but it should still be bright enough to see.

If you miss the 9th, the pair will still be close (about a degree apart) for the Houge star party on the 10th, so you can still use Venus to guide you easily to the much dimmer Uranus.

Mercury reappears low in the evening sky late in the month.

The last week of February and the first week of March should be a good time for viewing Mercury, with the elusive inner planet relatively high in the sky and away from the sun.

Jupiter is visible for the first half of the evening, setting around 11.

That means it's still plenty high enough to see details of its bands and moons, though they won't be as easy as they were a few months ago.

Mars rises in mid-evening as it rapidly approaches its opposition, on March 3. Alas, it's also quite far from the sun this month: it hits aphelion (its farthest point from the sun) on Feb 15, so its angular size is only about 13 arcseconds. It won't get much bigger than that this year — its opposition size next month is only 13.8".

This is the most distant Mars opposition we've had since 1996.

Don't despair, though. Since this is a winter opposition, Mars will be high in the sky. So despite its small size it should be possible to pick out a lot of detail, especially from high star party sites with steady seeing. Don't write off Mars just because it's far away; if the air seems steady, crank the magnification way up (you wanted an excuse to use that Barlow anyway, didn't you?) and you might be surprised how much detail you can pick up on that tiny disk.

"This is the most distant Mars opposition we've had since 1996."

Winnowed all the detail you're going to get out of Mars? Saturn follows Mars by a few hours, rising right about the time Jupiter sets.

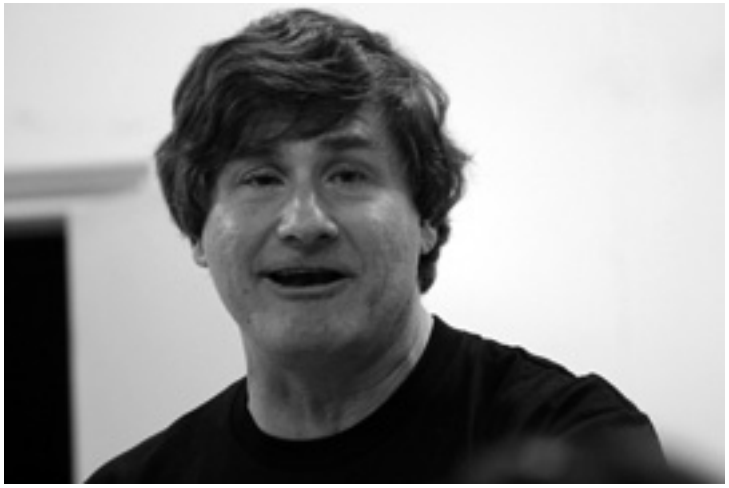
Its rings are tilted about 15 degrees to us, as they will be for most of 2012.

Neptune and Pluto are too close to the sun to be observable this month.

While you're out there during early evenings, looking at Venus, Mercury and Jupiter, don't forget the zodiacal light.

This is the best time of year to observe that faint phenomenon, since this is the season when the ecliptic stands nearly vertical around sunset. (In fall, you can see it again, but in the morning sky.)

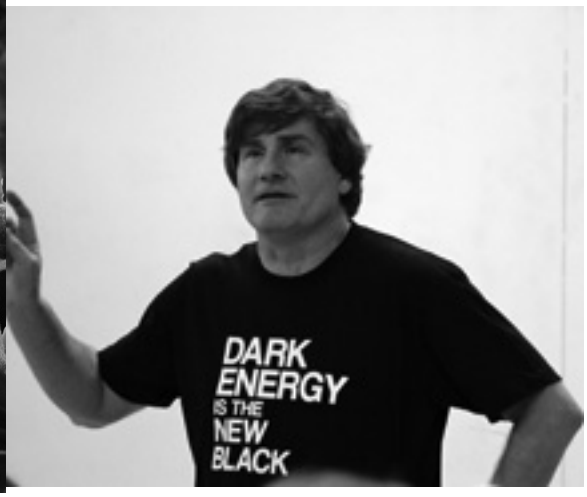
Start looking in early evening as soon as the sky is fully dark. You're looking for a faint band lighter than the rest of the sky, stretching from the glow of sunset up through Venus along the ecliptic. You're seeing reflections from dust particles left over from the formation of the solar system — the glow of ancient stardust.



Alex Filippenko was the guest speaker January 7th, 2012. The crowd at the meeting was probably a SJAA record with estimates north of 150. And Dr. Filippenko did not disappoint at all. Despite going long the crowd was attentive and asked many excellent questions after his talk. Always a class act, Alex asked if there was a young member of the audience that had a question. The question was a heavy one. Alex, with a tip of the hat to Richard Feynman, said that if you can't answer a question simply you probably don't understand it well enough. So that's how this memorable evening came to a close.

Dr. Filippenko last talked to the SJAA on February 7, 2004. At that time the audience count of 106 was considered the record and it hasn't been broken since until this year.

All photos taken by the editor except for the background in the picture below. Photo credit for that image of the Large Magellanic Cloud goes to ESA/NASA/JPL-Caltech/STSci. It is a combination of images from the Herschel and Spitzer space telescopes.



NASA Space Place

The Nerdiest Video Game Ever

Dr. Tony Phillips

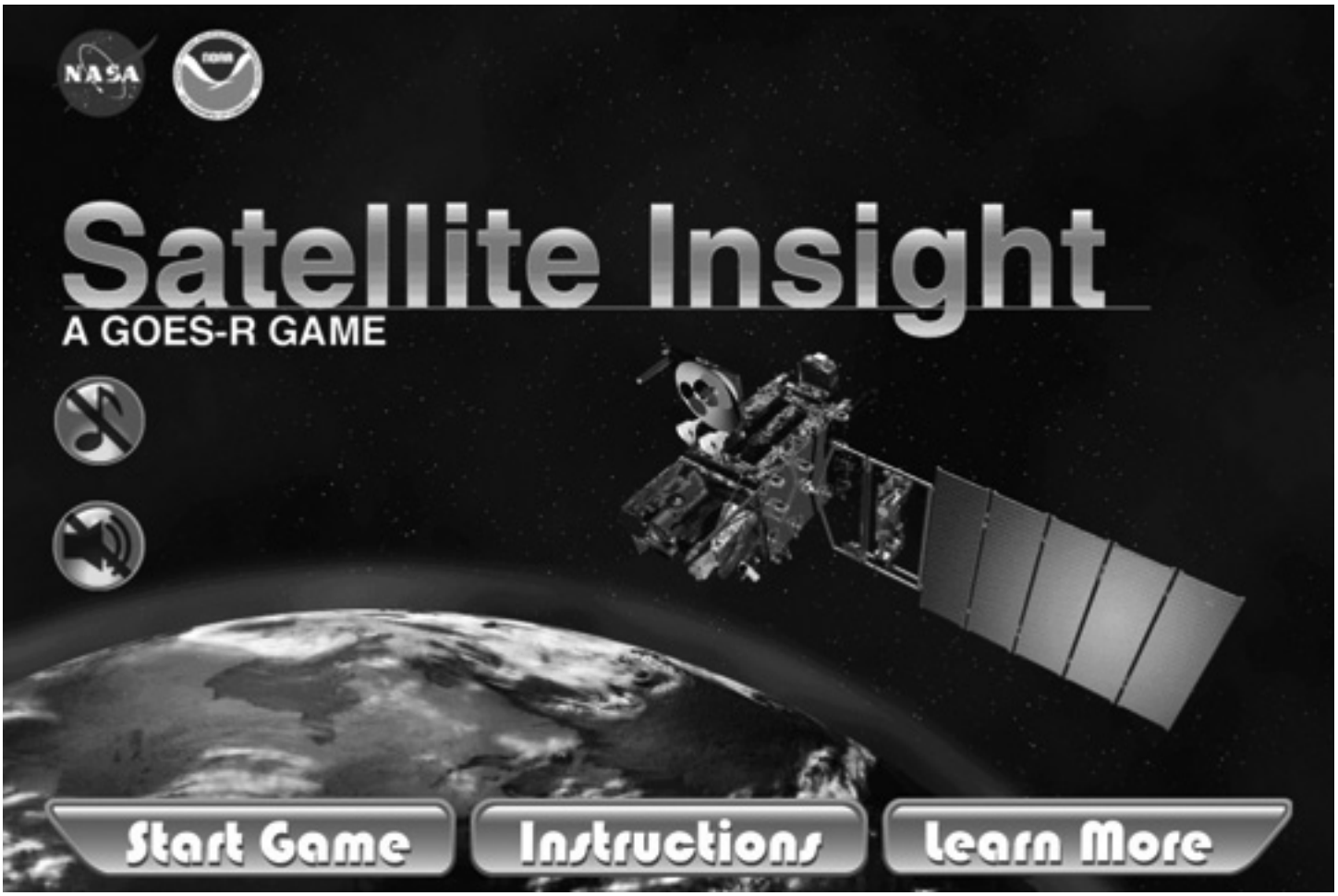
NASA has a job opening. Wanted: People of all ages to sort, stack, and catalogue terabytes of simulated data from a satellite that launches in 2015. Agile thumbs required.

Sorting terabytes of data? It's more fun than it sounds.

In fact it's a game: Satellite Insight. The Space Place Team at the Jet Propulsion Laboratory created the entertaining app for iPhones to get the word out about GOES-R, an advanced Earth science satellite built by NOAA and NASA.

Described by the Los Angeles Times as possibly "the nerdiest game ever," Satellite Insight may be downloaded for free from Apple's app store. Be careful, though, once you start playing it's hard to stop. Some reviewers have likened it to Tetris, one of the most popular video games of all time.

GOES, short for "Geostationary Operational Environmental Satellite," is the workhorse spacecraft for weather forecasters. NOAA operates two (at a time) in geosynchronous orbit, one



New iPhone game is first NOAA app and only the second NASA game app. Just as with the real GOES-R, the challenge with Satellite Insight is to keep up with the massive influx of weather and other environmental data.

above the west coast of N. America and one above the east coast. They monitor clouds, wind, rain, hurricanes, tornadoes and even solar flares. The GOES program has been in action since 1975.

GOES-R is the next-generation satellite with advanced technologies far beyond those of the older GOES satellites. It has sensors for lightning detection, wildfire mapping, storm tracking, search and rescue, solar imaging, and more. Many of the sensors are trailblazers. For example, the Advanced Baseline Imager has 60 times the capability of the current imager—16 channels instead of 5. It has twice the spatial resolution and five times the temporal refresh rate, including the 30-second imaging of weather systems over a region of 1000 km x 1000 km. Also, the Geostationary Lightning Mapper can count and pinpoint lightning bolts over the Americas 24/7. It's the first such detector to fly on a geosynchronous satellite, and it could lead to transformative advances in severe storm warning capability.

All in all, GOES-R represents a "huge technological leap from the current GOES." We know this because Satellite Insight tells us so. The app has an informative "Learn More" feature where players can find out about the satellite and the data they have been sorting.

Which brings us back to sorting data. It's a bit like eating Cheerios; just don't tell the kids it's nutritious, and they love it. Helping GOES-R gather and stash data from all those advanced sensors is just as satisfying, too—a dose of Earth science wrapped in thumb-flying fun.

More information about Satellite Insight may be found on the web at http://itunes.apple.com/us/app/satellite-insight/id463588902?mt=8. The game also available in web form (flying thumbs optional) at http://spaceplace.nasa.gov/satellite-insight.

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

Early Mars Missions

The earliest missions to Mars fit into a common theme: failure. In the table below is a list the earliest missions to Mars launched by the US or the USSR. This information is on a NASA website. You can check it out at http://marsprogram.jpl.nasa.gov/programmissions/missions/log/

Year Launched	Name	Country	Result	Reason
1960	Korabl 4	USSR (flyby)	Failure	Didn't reach Earth orbit
1960	Korabl 5	USSR (flyby)	Failure	Didn't reach Earth orbit
1962	Korabl 11	USSR (flyby)	Failure	Earth orbit only; spacecraft broke apart
1962	Mars 1	USSR (flyby)	Failure	Radio Failed
1962	Korabl 13	USSR (flyby)	Failure	Earth orbit only; spacecraft broke apart
1964	Mariner 3	US (flyby)	Failure	Shroud failed to jettison
1964	Mariner 4	US (flyby)	Success	Returned 21 images
1964	Zond 2	USSR (flyby)	Failure	Radio failed
1969	Mars 1969A	USSR	Failure	Launch vehicle failure
1969	Mars 1969B	USSR	Failure	Launch vehicle failure
1969	Mariner 6	US (flyby)	Success	Returned 75 images
1969	Mariner 7	US (flyby)	Success	Returned 126 images
1971	Mariner 8	US	Failure	Launch failure
1971	Kosmos 419	USSR	Failure	Achieved Earth orbit only
1971	Mars 2 Orbiter/ Lander	USSR	Failure	Orbiter arrived, but no useful data and Lander destroyed
1971	Mars 3 Orbiter/ Lander	USSR	Success	Orbiter obtained 8 months of data and lander landed safely, but only 20 seconds of data
1971	Mariner 9	US	Success	Returned 7,329 images
1973	Mars 4	USSR	Failure	Flew past Mars
1973	Mars 5	USSR	Success	Returned 60 images; only lasted 9 days
1973	Mars 6 Orbiter/ Lander	USSR	Success/ Failure	Occultation experiment produced data and Lander failure on descent
1973	Mars 7 Lander	USSR	Failure	Missed planet; now in solar orbit.
1975	Viking 1 Orbiter/ Lander	US	Success	Located landing site for Lander and first successful landing on Mars
1975	Viking 2 Orbiter/ Lander	US	Success	Returned 16,000 images and extensive atmospheric data and soil experiments

The Last Month In Astronomy

JAN-12-2012 ***Favoring Double Degenerates*** There are two hypothetical ways that a Type 1a supernova can occur. One is the single degenerate method where a star, a white dwarf, sucks up material from a companion star until it reaches the critical mass needed for a supernova. The other way is called the double degenerate method and it requires two white dwarfs that merge to create the supernova progenitor. Note that the single degenerate method leaves the remains of the companion star behind. The other method does not. Astronomers using the Hubble Space Telescope looked long and hard at SNR 0509-67.5 and no remainder star could be found. This supernova took place 400 years ago. http://www.universetoday.com/92543/hubble-provides-evidence-for-double-degenerate-progenitor-supernova/#more-92543

JAN-11-2012 ***Microlensing Finds Many Planets*** Microlensing is another method for finding exoplanets. Basically the planets bend distant star light because of their gravity. This method has been used to find how many stars have planets. Basically it comes out to 1-2 planets per every star in the galaxy. That means 100 billion planets in the Milky Way galaxy, conservatively. But this might just be the start. According to UC-Irvine's Virginia Trimble "I have a list of 17 different ways to find exoplanets and only five have been used so far". http://www.universetoday.com/92531/microlensing-study-says-every-star-in-the-milky-way-has-planets/

JAN-11-2012 ***VLA's new name*** The Very Large Array is an array of radio telescope dishes located in New Mexico. It has been given a new name "The Karl G. Jansky Very Large Array". Karl Jansky was the father of radio astronomy. The new name will be used when the telescope is rededicated on March 31, 2012. The VLA has been upgraded, increasing its sensitivity by a factor of 10. Jansky died at age 45 but he was the first to discover radio transmissions coming from the center of the Milky Way. http://www.universetoday.com/92520/iconic-telescope-array-gets-a-new-name/

JAN-11-2012 ***Planetary system HO scal***e The Lionel company helped popularize the O gauge for model railroads (that's O as in zero except that it is pronouced "oh" in the U.S.). Later, a smaller gauge HO was created - H for Half the size of O gauge. Kepler has found the HO gauge of exoplanetary systems. Three planets all smaller than Earth have been found orbiting a red dwarf star called KOI-961. It's located in Cygnus and is 120 light-years distant. According to principal investigator John Johnson at Caltech "It's actually more similar to Jupiter and its moons in scale than any other planetary system." http://www.msnbc.msn.com/id/45960890/ns/technology_and_science-space/

JAN-07-2012 ***100 Year Starship Crew*** The Pentagon's think tank has selected the group to manage what it calls the 100 Year Starship. The leader will be Mae Jemison, the first black female astronaut. Dr. Jemison has a long list of accomplishments including as a physician and as a Peace Corps volunteer. There is of course one detail that needs to be mentioned, an interstellar spaceship does not exist. In 2014 a design of an interstellar, fusion-propelled spacecraft is expected. The defense department is funding the 100 Year Starship effort with a half-million dollar DARPA grant. http://cosmiclog.msnbc.msn.com/_news/2012/01/07/10035158-skipper-chosen-for-starship-effort

JAN-01-2012 ***Grail enters orbit*** The lunar spacecraft Grail entered orbit and is now set to start the scientific part of its mission. The two parts will orbit the moon in tandem and it will carefully map gravity inconsistencies to get a better understanding of the moon's makeup. The spacecraft are in a near polar orbit with each revolution taking 11.5 hours. A number of burns will be done to drop the orbital period to 2 hours. http://www.jpl.nasa.gov/news/news.cfm?release=2012-001

DEC-21-2011 ***Brightest Distant Galaxy*** Astronomers using the Spitzer and Hubble space telescopes have found a galaxy that is 12.9 billion light-years distant in lookback time. The galaxy designation is GN-108036. This galaxy produces 100 new stars a year. By comparison the Milky Way galaxy makes about 3 stars per year. Yet, the Milky Way is 100 times more massive. http://www.jpl.nasa.gov/news/news.cfm?release=2011-392

DEC-20-2011 ***Kepler finds Earth-sized planets*** The Kepler mission has discovered the first Earth-sized planet orbiting a sun-like star outside of our solar system. The planets are called Kepler-20e and Kepler-20f. As implied by the names, 3 other planets (b, c and d) have already been discovered around Kepler-20. Those previously discovered planets are closer to Neptune size. The two new planets are much too close to the star to be habitable. Kepler-20e completes one orbit in 6.1 days and it is 87% the size of Earth. Kepler-20f takes 19.6 days and it is 103% the size of Earth. The 3 larger planets have orbits of 3.7, 10.9 and 77.6 days. That means all 5 of these planets are closer to their star as Mercury is to the sun. Still, in 16 years we have gone from not having any evidence of extrasolar planets to finding Earth-sized planets around a sun-like star. The next anticipated milestone is obvious: finding an Earth-sized planet around a sun-like star in an Earth-like orbit. http://www.nasa.gov/mission_pages/kepler/news/kepler-20-system.html

It Must Be Astronomical ...

Upcoming Election

During the February General Meeting the SJAA membership will be asked to elect board members for the 4 positions that are up for election. The incumbents will be running for reelection. They are: Greg Claytor, Rob Jaworski, Robert Armstrong, and Kevin Roberts. After the new board is elected in February the board selects officers at the March board meeting.

Nominations for the board can be made at the February General meeting but those wishing to be nominated are advised to make themselves known to the club president, Mark Wagner.

"Education has failed in a very serious way to convey the most important lesson science can teach: skepticism"

— David Suzuki

Loaners

The loaner program offers members a means to try scopes of various sizes and technologies before you buy. For more information please see the loaner program web page: http://www.sjaa.net/loaners.shtml

School Star Parties

Completed Events					
	Total Sched.	Good Sky	Partial Success	Cloudy Fail	Cancel at noon
Jul	0				
Aug	1	1			
Sep	1	1			
Oct	6	3			3
Nov	13	9		1	3
Dec	4	4			
Total	*24*	*17*		*1*	*6*
Scheduled					
Jan	5				
Feb	11				
Mar	6				
Apr	1				
May	1				
Jun	1				
Total	*27*				

As of January 5, 2012

School Star Party Link

For information on school star parties including how to schedule one see http://www.sjaa.net/school.shtml. For more detailed information on upcoming star parties go to http://www.sjaa.net/current.shtml

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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)

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

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