



EPHEMERIS

October 2012

SJAA Activities Calendar

Jim Van Nuland

Messier Half-Marathon

Teruo Utsumi

October

- 5 Astronomy Class at Houge Park. 7:30 p.m. The topic: Fall Constellations / Highlight Objects. (outdoors)
- 5 Houge Park star party. Sunset 6:44 p.m, 70% moon rises 10:18 p.m. Star party hours: 7:45 until 10:45 p.m.
- 6 Imaging SIG. 7:30-9:30 p.m. CCD Imaging for beginners Special Interest Group meets on the basketball courts at Houge Park. Open to all.
- 7 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.
- 13 Dark-Sky weekend. Sunset 6:33 p.m, no moon. Henry Coe Park's "Astronomy" lot has been reserved. See article on Messier Half-Marathon on page 1.
- 19 Houge Park star party. Sunset 6:25 p.m, 28% moon sets 10:14 p.m. Star party hours: 7:15 until 10:15 p.m.
- 26 Houge Park star party. Sunset 6:16 p.m, 93% moon sets 5:30 a.m. Star party hours: 7:00 until 10:00 p.m.

- 27 **General Meeting.** Board meeting at 6:00; Social Time at 7:30; General Meeting at 8:00. Our speaker is Dr. Dana Backman, NASA, SOFIA. Specific topic to be announced.

November

- 4 DST ends at 2 a.m. Set clocks back one hour.
- 4 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.
- 9 Astronomy Class at Houge Park. 7:00 p.m. The topic: Amateur telescope making, why, how and where.
- 9 Houge Park star party. Sunset 5:02 p.m, 19% moon rises 2:58 a.m. Star party hours: 7:00 until 10:00 p.m.
- 10 Dark-Sky weekend. Sunset 5:01 p.m, 10% moon rises 4:07 a.m.
- 17 Dark-Sky weekend. Sunset 4:56 p.m, 24% moon sets 9:12 p.m. Henry Coe Park's "Astronomy" lot has been reserved.
- 23 Houge Park star party. Sunset 4:53 p.m, 83% moon sets 3:22 a.m. Star party hours: 7:00 until 10:00 p.m.
- 25 **Astronomical Swap Meet.** Noon to late afternoon.

Many astronomy enthusiasts have thought and dreamed about the Messier Marathon, seeing and bagging the 100+ objects over the course of one night. But the prospect is so daunting that only the most daring, hardy (and crazy?) people actually attempt it.

For the rest of us, the SJAA is presenting an opportunity to save yourself from the after-effects of such an all-nighter. Try your hand at star-hopping your way to half of the M objects in the inaugural SJAA Messier Half Marathon.

The event takes place at Henry Coe State Park's overflow lot on the evening of 13 October 2012. This is a social, newbie friendly event open to beginners (with basic skills) through advanced observers. The goal is to find roughly 50 Messier Objects in four hours. Running shoes and the 13.1 mile run are optional.

Detailed guidelines, including an object/target list, are under development and will be posted soon. To sign up, please go to the sign up form, then mark your calendars!

<http://tinyurl.com/sjaa-marathon-2012-10>

And please direct your questions to: messier.sjaa@gmail.com

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

Where are they now?

Akkana Peck

Jupiter rises a few hours after dark throughout October. It doesn't transit until the wee hours of the morning ... but it's far enough north that you should be able to get some nice previews of this fall's Jupiter opposition.

Mercury and Mars are low in the western evening sky. Mercury stays low in the twilight all month. Mars is a bit higher, but it's low and distant, so if you're hoping to see lots of Mars surface detail, you'll be better off scanning the latest downloads from the Mars Curiosity rover, which pulled off its tricky landing a few months ago with flying colors and is now sending lots of great high-resolution images back to Earth.

Did you know that the people who drive the Mars Rovers live on Mars time, not Earth? Their schedules follow the Martian day, called a "sol" — 39-1/2 minutes longer than an Earth day — so that every couple of weeks, they're working all night, sleeping in the daytime.

Apparently NASA has found that's easier for workers than to try to sleep on Earth time but work during the Martian day.

For naked eye observers bound to normal Earth schedules, keep an eye on Mars around the third weekend of October, when it passes a few degrees away from Antares: offering a nice opportunity to compare Mars to the "Rival of Mars", the anti-Ares.

Uranus and Neptune are well placed for observing all night. Uranus may be a bit more challenging than usual, located off in the middle of nowhere, the dark depths between Pisces, Cetus and Aquarius. If you're not familiar with that area, try using the two "rump" stars of the Great Square of Pegasus as pointers — Uranus is bright enough that a binocular sweep in the right direction should be able to pick it up.

Neptune, too, is tricky, off the left horn of Capricornus. It's not bright enough that it will stand out as you're sweeping with binoculars or a finderscope, so use a star chart: there are a couple of 4th and 5th magnitude stars in the area that you can use as guides.

Pluto joins Mercury and Mars as an early evening object. It's higher than the other two, setting a little before 11pm, but it never gets very high in the sky. So it'll be a tough hunt down there in the Milky Way horizon spurge.

Venus is in the morning sky, making a close double with Regulus on the morning of October 3. And a few weeks later, early risers with a good dark eastern horizon have a good chance at the zodiacal light, a faint band of light stretching up along the ecliptic.

Aside from Mars Curiosity, another spacecraft was in the news recently. Voyager 1, originally launched in 1972, is preparing to leave the solar system. It's already in the heliosheath — the "shock wave" region where the particles of the solar wind crowds up against the interstellar wind. NASA expects it to cross the heliopause soon, the outer edge of the sheath, where the solar wind become undetectable against the background interstellar wind. Astrophysicists debate the exact location of the heliopause, so the data beaming back to us should be interesting. (see: <http://www.jpl.nasa.gov/news/news.php?release=2012-249>)

Of course, what it actually means to leave the solar system is open to debate. Voyager 1 is now about 122 AU (about 11 billion miles) from the sun. That's far outside the Kuiper belt asteroids, which extend from about 30 to 50 AU — but surely the Oort cloud, at a staggering distance of 50,000 AU, nearly a light year, is also part of our solar system? The comets and smaller particles comprising the cloud are held there by the sun's

gravity so they sure seem like part of the solar system.

But enough about distance — as a stargazer, I found myself curious where Voyager 1 is in the sky. Not that there's a chance of seeing such a tiny, distant object ... but isn't it fun to know where to look, even if you can't see it? Look for Voyager in Ophiuchus, about midway between Kappa Ophiuchi and Alpha Herculis (Rasalgethi), and about 45 arcminutes southeast of the 5th magnitude star 60 Herculis.

In a bit over 40,000 years, Voyager will pass relatively close to a red dwarf star called Gliese 445. That star is in Camelopardalis, just a tad west of the midway point between Polaris and Giasar, the last star in Draco's tail. It's magnitude 10.8.

Hey, wait a minute. Voyager 1 is in Ophiuchus, but it's heading toward a star in Camelopardalis? That's about 75 degrees away. Wouldn't you think that the spacecraft and the star it's heading toward would be pretty much lined up by now?

Ah ... but that assumes Gliese 445 is standing still, and it isn't. It's moving fairly fast, as stars go, and 40,000 years gives it plenty of time to move somewhere else. I tried to verify that Gliese 445's proper motion will bring it into Ophiuchus by the year 40,272 AD, but I haven't found any reliable way to check that.

Even getting the sky locations of Voyager and Gliese 445 wasn't as easy as I expected. You can get accurate coordinates from JPL's online HORIZONS simulator, or general coordinates from the "Spacecraft escaping the solar system" table on Heavens Above. Then I could look those coordinates up in a planetarium program or on a star chart. But curiously, the only site I found that would display an actual

labeled star chart was Wolfram Alpha. (<http://www.wolframalpha.com/input/?i=where+is+voyager+1>) Just type in “where is voyager 1” or “where is gliese 445”. The star charts aren’t great, but they’re better than anything I found on the various astronomy sites and in planetarium programs. Keep Wolfram Alpha in mind for your difficult astronomy queries.

Curious about the rest of our long-distance spacecraft? Pioneer 10, our second most distant spacecraft at 106 AU from the sun, is in Taurus, a few degrees SW of Alnath, the southernmost star in Auriga. Pioneer 10 launched five and a half years earlier than Voyager 1, but Voyager got a speed boost from a gravity slingshot around Saturn and Titan that boosted it to 17.26 km/s (about 38,600 miles per hour), the fastest spacecraft in history, even faster

than the speedy 15 km/s New Horizons Pluto probe.

Voyager 2, third most distant, is in the southern constellation of Telescopium, too far south for us to see it in San Jose. Pioneer 11, fourth at a measly 86 AU, is in Scutum, a few degrees south of M11. New Horizons, still only 23.9 AU out, lies in the most interesting observing location: it’s in Sagittarius, just a tad east of the midway point between M22 and M25 — pretty much right where Pluto is.

Finally, coming back to Voyager 1: did you know that the music and other sounds of Earth sent on the golden record on the Voyager spacecraft isn’t easily available to people still here on Earth?

We have our crazy copyright laws to thank for that. When Carl Sagan

originally got the rights to put each piece on the Voyager record, those rights didn’t cover anything except the records that launched with the two Voyagers ... not reprints for humans to listen to.

Later, Warner Multimedia bought the rights to the collection, publishing “Murmurs of Earth” as a CD in 1992. But it’s long since gone out of print, and used copies are rare and start at around \$85.

You might think that a collection compiled in 1972, based mostly on much older works, would be in the public domain by now ... but that’s not how copyright works these days. So if you want to hear the sounds of Earth as collected by Sagan and the Voyager team ... you’d have better luck as an alien.

Letter to San Jose City Council

Dear Councilmember Rocha,

My name is Mark Wagner. I am president of the San Jose Astronomical Association, an educational non-profit in your district, and primary user of Houge Park through the Department of Parks and Recreation. We were recently supporting the Celebrate Cambrian Festival, where you were, and last year were awarded a wonderful \$1,000 grant from the City by your predecessor for our service. We are very proud of our association with City of San Jose, and pleased to be passionate supporters of our City and its fine programs. I believe our organization, now serving San Jose for almost 60 years, has been at Houge Park for 18 happy years.

With that background, I want to commend the City, and in particular those copied on this e-mail, for their diligent efforts at problem solving, when our organization faced a recent “deal breaker” maintenance problem at Houge Park. Richard and Mary stayed on top of overseeing our situation, and Jaime addressed the on-site details, and I know it was no small task, in order to come to what seems a happy conclusion. Thank you all.

I send this to you to commend them for their efforts, and support. I am terrifically impressed with the people at City of San Jose, all the way back to the initial contacts preceding our contract with the City (Rudy Navarro, now retired). I have nothing but admiration and thanks.

I look forward to many more years of partnering our organization with City of San Jose.

I will be submitting this letter to our newsletter, and would be happy if you found some way to use it in promotion of those with the City, who work so hard for us.

Sincerely,

Mark Wagner
President
San Jose Astronomical Association

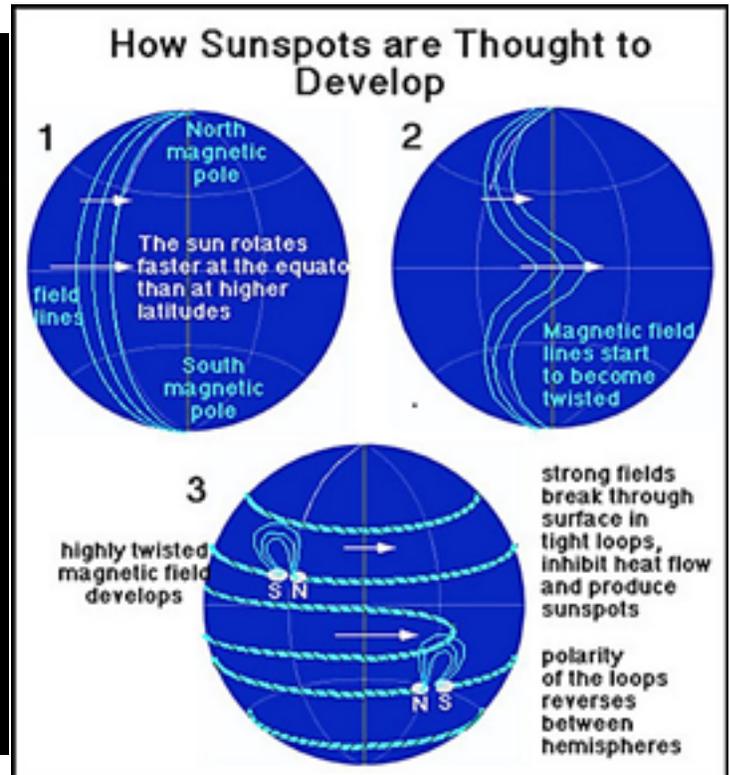
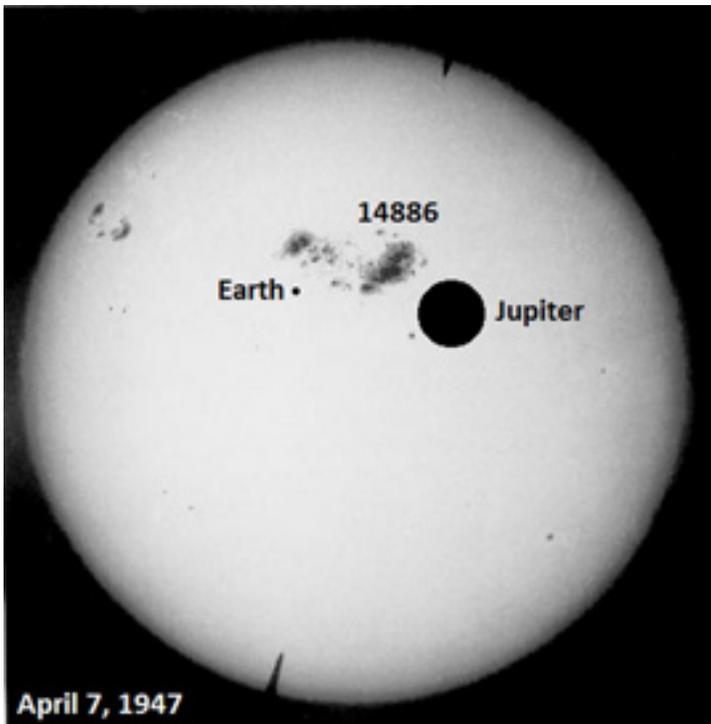
cc: Mayor Chuck Reed
Mary O’Meara
Richard Guimmond
Jaime Ruiz

A Deeper Look At Sunspots, Part 2

Michael Packer

From our brief history of collecting solar data we know the magnetic field that creates sunspots and prominences can be awesome. The largest film-recorded sunspot was on April 7, 1947. The size of this sunspot dwarfed Earth and was larger in extent than Jupiter, which itself is 11 times larger than the Earth (see below pic). This active region (AR) 14886 was in fact 3 times larger than AR9393, the large sunspot that triggered a geomagnetic storm in March 1989 that knocked out much of Canada's power grid.

Incidentally, the NASA Kepler Mission can discern good sized sunspots on distant stars by the variation in light output and has indeed found exo-sunspots in its search for exo-planets.

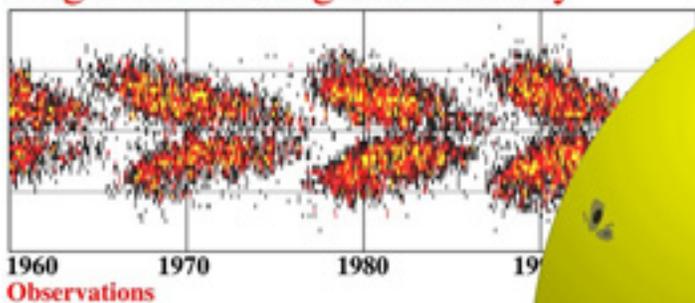


Last month's article on sunspots noted that, despite being dark, sunspots are semi-transparent "holes" that are less dense compared to the surrounding photosphere. This is because the presence of a magnetic field quenches convection (heat transfer) leaving a sunspot about 2000K cooler relative to the surround. Now we will take a look at why the internal magnetic field breaks through the photosphere and why our sun has sunspots in the first place.

At solar minimum there can be zero sunspots over the course of months. There is also minimal plage, prominences and solar flares. At minimum, the internal solar magnetic field is normal, stable, with a definable magnetic north and south pole. The field lines look like diagram 1 in the figure above. The sun however is not solid and these field lines don't stay fixed. They are connected and move with the plasma (think current) which in turn moves with the rotational forces of the sun. Around the equator of the sun the period of rotation of this plasma is 25 days and is faster than the period of rotation of plasma at latitude $\pm 60^\circ$, 31 days, and faster still than the period of rotation at the poles, 36 days. This in turn causes the field lines to twist (diagram 2 of above figure). Over the course of an 11 years cycle, this twisting continues until the differential or non-uniform rotation of the sun (both in latitude and depth) causes the field lines to buckle and loop as shown in diagram 3 (also see below image).

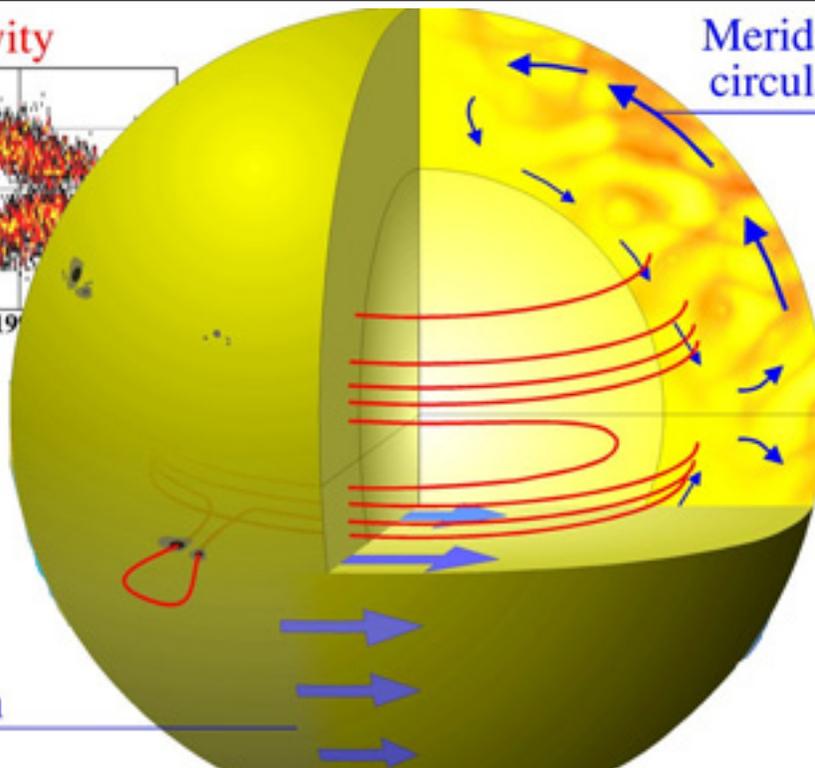
Recent research shows that meridional circulation along with solar rotation determines at what latitude and extent and duration sunspots may form and poke through the photosphere. Meridional circulation in turn is caused by variation in radiative temperature at the equator verses the poles. Hot gas tends to rise, migrate to the cooler polar regions where it cools and sinks. Each sunspot cycle opens with spots forming at latitudes around 35° North and South of the Sun's equator, and as the cycle progresses, spots form closer to the equator in both hemispheres. The maximum number of spots form when sunspots are forming at latitudes around 25° in both hemispheres. When the last spots of a cycle are forming near 5° North or South, a few spots again form at latitudes around $\pm 35^\circ$ heralding the beginning of a new cycle.

Migration of magnetic activity



Meridional circulation

Differential rotation



If it were not for solar rotation and the convection zone, we would not have many sunspots. The differential rotation causes the magnetic field lines to twist and loop through the convection zone where the field impedes heat transfer to the photosphere. However, if our star was 1.3 times more massive we would not see as many sunspots either. In this case the stellar core temperature is 15 million degrees Kelvin and the self-maintaining CNO chain of fusion starts occurring over the proton-proton chain. And at this temperature the convection zone is no longer just under the photosphere but deep in stellar interior next to the core! More information on the sunspot formation is at <http://solarscience.msfc.nasa.gov/dynamo.shtml>.

The Last Month In Astronomy

SEP-05-2012 **Sweet Astronomy** Glycolaldehyde is a sugar molecule. It may not be used to sweeten your corn flakes but it is used in the formation of RNA. That makes it a building block of life. The Atacama Large Millimeter/submillimeter Array (ALMA) has found this molecule around the binary star IRAS 16293-2422. This binary has a total mass that is similar to the sun's. These molecules have not been seen before around another star. Jes Jorgensen of the Neils Bohr Institute in Denmark said "If we can show that the same molecules exist around additional Sun-like stars, that would be an indication that they also have been present around the Sun 4.5 billion years ago". http://lightyears.blogs.cnn.com/2012/09/05/sweet-stars-hint-at-building-blocks-of-life/?hpt=hp_t3

SEP-05-2012 **DAWN leaves Vesta** NASA's Dawn spacecraft has left its orbit around the asteroid Vesta and is on its way to Ceres. It will not arrive at Ceres until 2015. Dawn was launched in 2007 and entered orbit around Vesta on July 15, 2011. <http://www.jpl.nasa.gov/news/news.php?release=2012-277>

AUG-30-2012 **WISE Hotdogs** NASA's Wide-field Infrared Survey Explorer (WISE) has found millions of black hole candidates across the universe. These are in objects that are dark in visible light but bright in the infrared. These are called Dust-Obscured Galaxies ("DOGs") and since they are undoubtedly hot and because it makes a cute name they are called "hot DOGs". <http://www.astronomy.com/News-Observing/News/2012/08/WISE%20survey%20uncovers%20millions%20of%20black%20holes.aspx>

AUG-29-2012 **Double star, double planet** About a year ago, Kepler detected the first circumbinary planet, an exoplanet that is in orbit around two stars (not the same as a planet in orbit around one star where a companion star is also orbiting the primary star). Now Kepler has found a system where at least two planets are in orbit around a binary. The stars eclipse each other once every 7.5 days. The inner planet, Kepler-47b orbits once every 50 days and the outer, Kepler-47c orbits once every 303 days. The outer orbit would be in the habitable zone but the planet appears to be larger than Neptune and is probably a gas giant. <http://www.astronomy.com/News-Observing/News/2012/08/Kepler%20discovers%20multiple%20planets%20orbiting%20a%20pair%20of%20stars.aspx>

If You're Reading This - We Want You!

Mark Wagner

Don't worry, this is not military conscription or jury duty. Its just your humble astronomy club reaching out a friendly hand.

I'm Mark Wagner, President of SJAA through next February. I will be relieved, in more ways than one, to hand over the "reigns" of this starship to some capable and enthusiastic successor, a volunteer, who will help grow the club and find new ways to both offer new and exciting programs to our members and visitors, and to involve those with energy and ideas.

If you are reading this, that probably describes you!

Let me tell you about a few new programs, that are good examples of what may be done with the club. The foremost thing to realize is this is your club. I'll come back to that. So, what's new?

Solar Observing. We have a new solar telescope - a 100mm Lunt, and take it out for the public to look through from 2 to 4 PM every first Sunday of the month, at Houge Park. It is absolutely awesome. If you've never looked through a good solar scope, come out and see for yourself. This program is headed up by Michael Packer - a knowledgeable and enthusiastic solar observer (he owns an 80mm Lunt). We started this program just a few months back, and now club members are joining in bringing out their own solar setups for the public to enjoy. Sound fun? It is!

Fix-It Day. This is another new program, that is concurrent with Solar Sunday each month. From 2 to 4 PM we invite anyone with astro-gear they'd like looked at - to ascertain how to use it, or to repair it, to bring their goodies to Houge Park, where four volunteers (currently Ed Wong, Phil Chambers, Karl Ressler and Dave Ittner) will provide man power and advice. So far we've had a good response, and the program is proving popular and effective.

Imaging Special Interest Group (SIG) - is headed up by Harsh Kaushikkar. It is still in its infancy, but the first few meetings have had a great turnout, and I'm certain with the popularity of imaging, that this will remain a vital program for the SJAA. You can learn more by contacting Harsh - he's also our Membership Chairman.

Quick START - headed up by new member Dave Ittner, with all sorts of creativity and enthusiasm - the club purchased several new Dobs and purged old gear from the loaner program, in order to offer beginner training on easy to use telescopes. Dave takes reservations by newbies, they get together as a group, and learn the basic ropes - then head out to a nearby darker site, where people get an eye full! New program, new ideas, new members, new fun for all! Kudos to Dave for coming up with this!

Social Time - - - huh? Social? Yes, we amateur astronomers actually can be sociable, despite our reputation for having a solitary hobby, we know getting together in groups is fun! So, SJAA has moved its board meeting back 1/2 an hour to allow some social time at 7:30 PM, before our General Meeting Speakers, so we can talk, have some refreshments, and get to know what everyone looks like (instead of just voices in the dark). It is fun!

The point is, this club is flexible. New things, new ideas, new blood, all are welcomed here. I could list other new endeavors as well, but the point would be the same - it is your club, and your ideas and enthusiasm that make things happen.

So, if you've read this - - - We Want You! Come to our Board Meetings - they are not "Bored Meetings" by any stretch. Your ideas, participation and enthusiasm are welcomed and you'll have an opportunity to have the club's resources behind you in your endeavor to share the hobby.

Here's an idea or two - we have a non-profit TV studio in San Jose, where we can produce our own programs. Anyone want to be the new Star Hustler? Or, we have people looking at land for an observatory, and others finding new local places to go observing. New ideas welcome here!

Check our schedule, and drop by the board meeting, or contact me. You won't be disappointed. Its a great group, and will welcome you.

Clear skies!

It Must Be Astronomical ...

Neil Armstrong, 1930-2012

Neil Armstrong, the first man to walk on the moon, has passed. As NASA Administrator Charles Bolden said "As long as there are history books, Neil Armstrong will be included in them". <http://www.jpl.nasa.gov/news/news.php?release=2012-259>

"Science has not yet mastered prophecy. We predict too much for the next year and yet far too little for the next 10." - Neil Armstrong

Bay Area Science Festival Starts October 27, 2012.

See <http://www.bayareascience.org/>

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	-	-			
Oct	-	-			
Nov	-	-			
Dec	-	-			
Total	3	3			
Scheduled - for the 2012/2013 school year					
	Total	Firm	Working		
Sep	1	1			
Oct	5	4	1		
Nov	7	5	2		
Dec	2	1	1		
Jan	4	3	1		
Total	19	14	5		

As of August 29, 2012

School Star Party Link

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

Officers and Board of Directors

Pres Mark Wagner
VP Greg Claytor
Sec Rob Jaworski
Tres Michael Packer
Dir Lee Hoglan
Dir Rich Neuschaefer
Dir Rod Norden
Dir Kevin Roberts
Dir David Ittner

School Star Party Chairman

Jim Van Nuland (408) 371-1307

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 Ephemeris ephemeris@sjaa.net

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

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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: _____

City/ST/Zip: _____

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E-mail address: _____