

EPHEMERIS

September 2011

SJAA Activities Calendar

Jim Van Nuland

Upcoming Speaker List

August (late)

- 19 Astronomy Class at Houge Park. 8:00 p.m. The topic: Star charts and planetarium programs.
- 19 Houge Park star party. Sunset 7:55 p.m, 66% moon rises 11:39 p.m. Star party hours: 9:00 until midnight.
- 27 Dark-Sky weekend. Sunset 7:44 p.m, 1% moon rises 6:08 a.m. Henry Coe Park's "Astronomy" lot has been reserved.

September

- 2 Houge Park star party. Sunset 7:35 p.m, 33% moon sets 10:24 p.m. Star party hours: 8:30 until 11:30 p.m.
- 10 General Meeting. Board meeting at 6:30; General Meeting at 8:00. Slide/Image & Equipment Night
- 23 Astronomy Class at Houge Park. 7:00 p.m. The topic: Deep sky observing - galaxies, nebulae, clusters, etc.
- 23 Houge Park star party. Sunset 7:03 p.m, 15% moon rises 3:44 a.m. Star party hours: 8:00 until 11:00 p.m.
- 24 Dark-Sky weekend. Sunset 7:02 p.m, 8% moon rises 4:54 a.m.

October

- 1 Dark-Sky weekend. Sunset 6:51 p.m, 29% moon sets 10:02 p.m. Henry Coe Park's "Astronomy" lot has been reserved.
- 7 Houge Park star party. Sunset 6:42 p.m, 87% moon sets 4:05 a.m. Star party hours: 7:30 until 10:30 p.m.
- 8 General Meeting. Board meeting at 6:30; General Meeting at 8:00. Our speaker is Dr. Puragra Guhathakurta of Lick Observatory, on "Our Place In The Cosmos".
- 21 Astronomy Class at Houge Park. 7:00 p.m. The topic: Fall Constellation / Highlight Objects. (outdoors)
- 21 Houge Park star party. Sunset 6:23 p.m, 28% moon rises 2:32 a.m. Star party hours: 7:15 until 10:15 p.m.
- 22 Dark-Sky weekend. Sunset 6:22 p.m, 19% moon rises 3:42 a.m.
- 29 Dark-Sky weekend. Sunset 6:13 p.m, 15% moon sets 10:48 p.m. Henry Coe Park's "Astronomy" lot has been reserved.

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

The following speakers are scheduled in the upcoming months. Mark your calendars. We hope to see you at the 8 p.m. meetings at Houge Park.

9/10 Slide and Equipment Night, aka "Show and Tell"

10/08 Dr. Puragra Guhathakurta Our Place In The Cosmos

11/12 Dr. Lynn Rothschild Life at the Edge: Life in Extreme Environments on Earth and the Search for Life in the Universe

12/10 Dr. Bruce Margon The Beauty of Hubble: Astronomy, Art & Culture from the Hubble Space Telescope

01/07 Dr. Alex Filippenko The Birth and Early Evolution of the Universe

02/04 John Dillon "Medieval Astronomy: more exciting than it sounds!"

03/10 Dr. Graeme Smith Two Views Of The Moon

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

Charcoal and light

Akkana Peck

The autumnal equinox is on Friday, September 23rd. And in this equinoctial month, most of the bright planets cluster around early evening or post-midnight.

In the dusk sky, Saturn disappears in the twilight over the course of the month, while Venus moves up away from the sun by month's end.

On September 29 they'll be only 1.3 degrees apart: catch them early in twilight, before they sink too low.

Jupiter rises around 10pm early September, a couple of hours earlier by month's end, so it's still best viewed after midnight.

Mars and (in the first half of the month) Mercury are visible in the predawn sky.

Neptune, in Aquarius off the left tip of Capricornus, is just past opposition and well placed for observation this month.

Uranus, a couple hours behind it, reaches opposition on the 25th, standing all by itself in a sparsely populated area of Pisces.

Fortunately, Uranus is bright enough that it's relatively easy to find.

There's something besides Uranus at opposition this month. Asteroid (1) Ceres, our largest asteroid, reaches its opposition on the 16th.

While Ceres isn't normally a major target for amateur observers, the NASA "Dawn" asteroid mission has been in the news lately.

Not for Ceres — Dawn won't get there until February of 2015 — but because it reached orbit around another asteroid, (4) Vesta. And both asteroids are visible this month.

Vesta, the brightest asteroid, is about 2 degrees northwest of the bottom of the Capricornus "smile". Start at the bottom point of Capricornus, Omega Cap, then

Ceres is quite a bit harder. First, it's far away from anything, off in the western reaches of Cetus. There is one 4th-magnitude star half a degree to the west-northwest that might help you locate Ceres — XEphem calls it Cetus 6, or HIP 910.

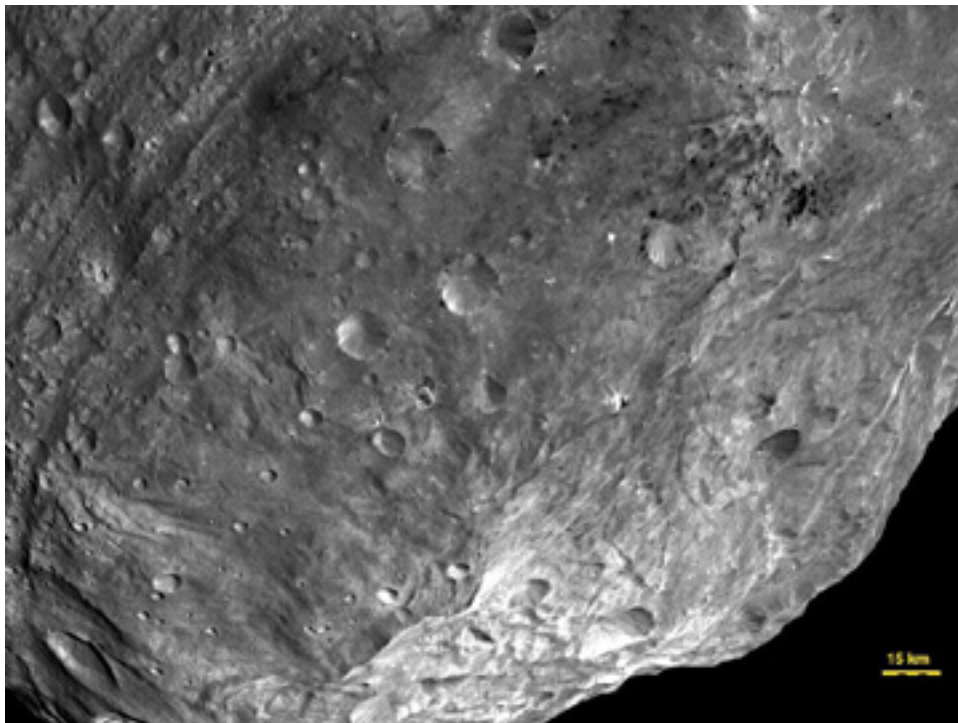
But a second reason Ceres is difficult is that it's much fainter than Vesta, at magnitude 7.8. Why is that, if Ceres is bigger?

It is indeed much bigger — 950 km in diameter to Vesta's 530. But Ceres is very dark, with an albedo of only 0.09. Albedo is a measure of surface brightness, without taking size into account. For comparison, the moon (made largely of dark basalt rock) has an albedo of 0.12, and charcoal's albedo is 0.04. So 0.09 is quite dark!

Vesta's albedo, on the other hand, is 0.35 — very close to the Earth's average albedo, with all our blue water and reflective white clouds. So Vesta is quite bright — making it the

only asteroid which is sometimes bright enough to be seen with the naked eye. And that's why it's a much easier target for observation than its big sister Ceres.

An easy answer — but now you may be wondering: why is Vesta so bright and Ceres so dark? And I tried to find out — but nobody seems to know, or even to



This image of Vesta was taken by the Dawn spacecraft from an altitude of 3200 miles above the surface. Dawn is a part of the Discovery program managed by the NASA office in Huntsville, AL. UCLA is responsible to the scientific portion of the mission.

go up and right (northwest) a couple of degrees to a 4th magnitude star, Psi Cap. From there, magnitude 6.25 Vesta is a quarter of a degree south-southwest. There are no other stars that bright nearby, so Vesta should be an unusually easy shot, and fun to observe at the same time Dawn is observing it.

ask the question.

Vesta is mostly basalt, while Ceres is a carbonaceous chondrite with a bit of a reddish tinge. Both types of rock are normally fairly dark: basalt is your typical Hawaiian volcanic rock, rather like dark asphalt. Carbonaceous chondrites are a little less common, but you may have seen some as meteorites at the last SJAA auction.

Even stranger, Ceres is thought to perhaps have water in its interior, and a hint of an atmosphere. The more I read, the more evidence I see that would lead me to expect Ceres to be the brighter one.

So how does basaltic Vesta manage an albedo comparable to our bright Earth? Is its regolith — the fine soil created by constant bombardment with micro-meteors — full of glassy particles that reflect a lot of light? But that's true of the moon, too, and the moon's albedo is nowhere near Vesta's.

It's an interesting mystery, and the first batch of Dawn images — which show a wonderful, moon-like cratered surface — don't offer any obvious answers. I'll be watching the Dawn results with interest.

ASTRONOMY magazine renewal time!

Jim Van Nuland

It's time to renew our group subscription to Astronomy magazine. The rate for 2012 is still \$34, or \$60 for two years. Please send a check payable to me: Jim Van Nuland, 3509 Calico Ave., San Jose CA 95124.

SUBSCRIBERS — you should have gotten an e-mail from me, with particulars of your subscription. If not, write me, address below.

If you subscribe independently, and your subscription ends during 2011 or 12, you may convert to the group rate. Send a check and the renewal card or a copy of a mailing label to me, and you'll be added to the group for an additional 12/24 months.

If you do not subscribe and wish to do so, send the \$34/60 and your subscription will begin with the January 2012 issue.

I will hold your checks until early October, when the renewal package must be sent in. So don't worry that your check doesn't clear promptly. I will acknowledge receipt of your checks.

If you subscribe but do not wish to continue, tell me that too, so I don't continue to ask you about it.

Any questions? Call me at 408.371.1307 from 11 a.m. to 11 p.m., or e-mail at <jvn@svpal.org>.

PLEASE NOTE: this applies to Astronomy magazine, not Sky & Telescope! The latter subscription is paid to the treasurer as part of your SJAA dues.

Good Reading!

Slide and Equipment Night

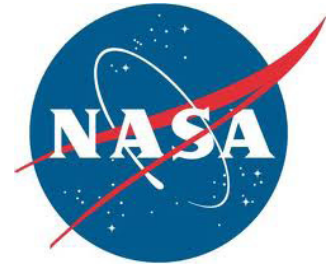
September 10th is the annual slide and equipment night. This is also known as our "Show and Tell" night. The "slide" part is old terminology. If you actually have real slides you might need to bring your own projector. But if you have images to share on your laptop or thumb drive, you are encouraged to share. Last year two people brought pictures from 2010 solar eclipse. Other pictures have highlighted home observatories, astronomy-themed vacations, and, of course, astrophotography. Equipment is often home-made scopes, mounts or accessories but if you are one of the first to buy some particular equipment that would be of interest also. The fun starts at 8 p.m.

Bay Area Science Festival

One of the great advantages to living in the Bay Area is the number of scientific events that are available to everyone. For example, in July the SETI Institute had a science day at their offices in Mountain View. Last year, SETI also had a weekend called SETIcon which included talks from nationally well known astronomers. Based on a recent survey sent to last year's attendees, it may be that a second SETIcon will take place next summer.

A 10 day long celebration of science is coming up this fall. From October 29 to November 6 a number of science institutions lead by UCSF are putting on the inaugural Bay Area Science Festival. Of particular interest to SJAA members and friends is the astronomy and star party night planned for November 5th. Jim Van Nuland will coordinate the SJAA portion.

By the time you read this, the first press releases announcing the festival will already be out. The total event list is still being compiled. You can learn more at <http://www.bayareascience.org/>.



Solar System Size Surprise

Dr. Tony Phillips

News flash: You may be closer to interstellar space than you previously thought.

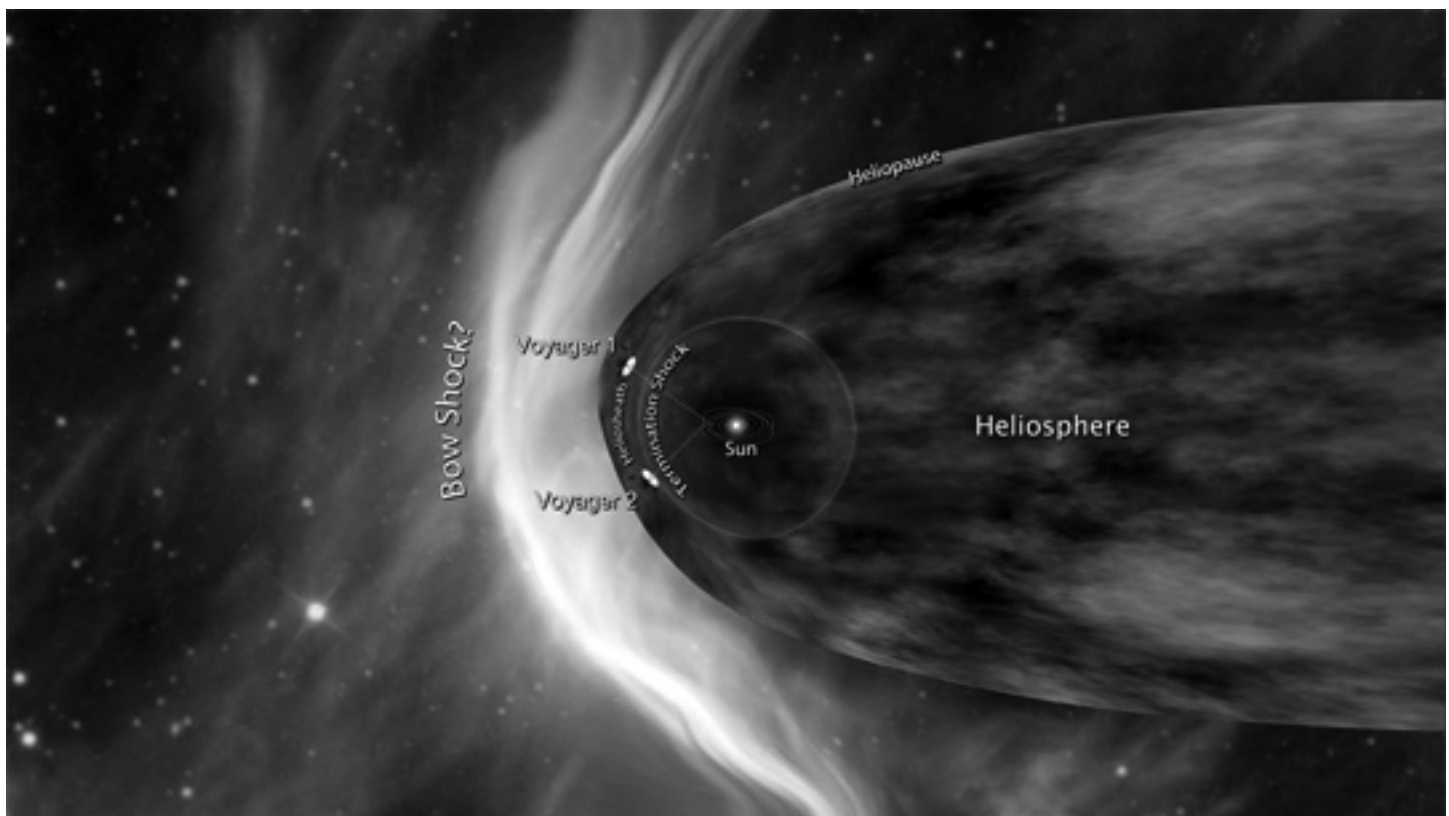
A team of researchers led by Tom Krimigis of the Johns Hopkins University Applied Physics Laboratory announced the finding in the June 2011 issue of *Nature*. The complicated title of their article, "Zero outward flow velocity for plasma in a heliosheath transition layer," belies a simple conclusion: The solar system appears to be a billion or more kilometers smaller than earlier estimates.

The recalculation is prompted by data from NASA's Voyager 1 probe, now 18 billion kilometers from Earth. Voyagers 1 and 2 were designed and built and are managed by NASA's Jet Propulsion Laboratory. Aging but active, the spacecraft have been traveling toward the stars since 1977 on a heroic mission to leave the solar system and find out what lies beyond.

To accomplish their task, the Voyagers must penetrate the outer walls of the heliosphere, a great bubble of plasma and magnetism blown in space by the

solar wind. The heliosphere is so big, it contains all the planets, comets, and asteroids that orbit the sun. Indeed many astronomers hold that the heliosphere defines the boundaries of the solar system. Inside it is "home." Outside lies the Milky Way. For 30+ years, the spacecraft have been hurtling toward the transition zone. Voyager 1 is closing in.

Much of Voyager 1's long journey has been uneventful. Last year, however, things began to change. In June 2010, Voyager 1 beamed back a startling



This artist's concept shows NASA's two Voyager spacecraft exploring a turbulent region of space known as the heliosheath, the outer shell of the bubble of charged particles around our sun. Image credit: NASA/JPL-Caltech.

number: zero. That's the outward velocity of the solar wind where the probe is now.

"This is the first sign that the frontier is upon us," says Krimigis.

Previously, researchers thought the crossing was still years and billions of kilometers away, but a new analysis gave them second thoughts. Krimigis and colleagues combined Voyager data with previously unpublished measurements from the Cassini spacecraft. Cassini, on a mission to study Saturn, is nowhere near the edge of the solar system, but one of its instruments can detect atoms streaming into our solar system from the outside. Comparing data from the two locations, the team concluded that the edge of the heliosphere lies somewhere between 16 to 23 billion kilometers from the sun, with a best estimate of approximately 18 billion kilometers.

Because Voyager 1 is already nearly 18 billion kilometers out, it could cross into interstellar space at any time—maybe even as you are reading this article.

"How close are we?" wonders Ed Stone, Caltech professor and principal investigator of the Voyager project since the beginning. "We don't know, but Voyager 1 speeds outward a billion miles every three years, so we may not have long to wait."

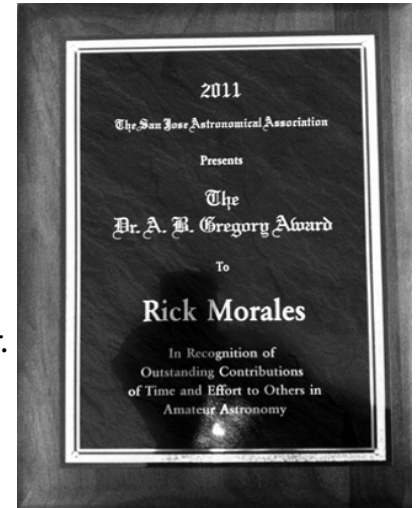
Stay tuned for the crossing.

For more about the missions of Voyager 1 and 2, see <http://voyager.jpl.nasa.gov/>. Another Voyager project scientist, Merav Opher, is the guest on the newest Space Place Live cartoon interview show for kids at <http://spaceplace.nasa.gov/space-place-live>.

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

2011 Gregory Award

Congratulations to Rick Morales (Ranger Rick) for receiving the Gregory Award. The presentation was made at the July General Meeting. Photos by Mark Wagner.



The Last Month In Astronomy

AUG-11-2011 **Graphene in Space** Astronomers using the Spitzer Space Telescope have detected the first extragalactic detection of a fullerene molecule (C70) and maybe the first detection of graphene (C24). These are carbon molecules that have unusual properties. Fullerenes, aka Buckyballs, form a three dimensional sphere. Graphene is a flat sheet of carbon atoms. The first synthesis of graphene in 2004 led to the 2010 Nobel Prize in physics. It might be that these large carbon molecules are created by stellar winds in metal poor galaxies such as the Magellanic Clouds which is where these discoveries were made. <http://www.astronomy.com/en/News-Observing/News/2011/08/Has%20graphene%20been%20detected%20in%20space.aspx>

AUG-10-2011 **Opportunity at Endeavour** The Mars rover Opportunity, now the only working Martian rover, has arrived at Spirit point which overlooks the crater. Opportunity traveled 13 miles to get this location named after the now defunct rover. The actual distance from Victoria crater to Endeavour was 7 miles as the bird flies but there aren't any birds on Mars. <http://www.jpl.nasa.gov/news/news.cfm?release=2011-248>

AUG-05-2011 **Juno on the Way** NASA's Juno spacecraft is on the way to Jupiter. This spacecraft will be the deepest space mission to use solar power. The plutonium needed to power spacecraft deeper than this is in very short supply. Juno's state of the art solar panels will arrive at Jupiter in 5 years. When it arrives it will enter into a polar orbit. Its mission is to study the Jovian planet's structure by studying its magnetosphere and atmosphere. <http://www.jpl.nasa.gov/news/news.cfm?release=2011-245>

AUG-04-2011 **Beachfront property on Mars** The Mars Reconnaissance Orbiter has discovered features that suggest contemporary flowing water during Mars' warmest months. "The best explanation for these observations so far is the flow of briny water" according to Alfred McEwen, University of Arizona. This the PI for the HiRISE camera. These features are up to hundreds of meters long but the width is 5 meters at most. The reason why salt water is suspected is because the temperatures are too warm at these times for carbon dioxide frost and the too cold for plain water. <http://www.jpl.nasa.gov/news/news.cfm?release=2011-242>

AUG-03-2011 **New Open Clusters** The VISTA infrared survey telescope at ESO's Paranal Observatory has discovered nearly 100 open clusters that had been blocked from our view because of the dust in the Milky Way Galaxy. VISTA is able to see these clusters because the sensitive infrared detectors effectively cut through the dust. Many of the clusters are small with only 10 to 20 stars. In visible light the dust reduces the brightness of these clusters by a factor of 100 million. http://www.eso.org/public/news/eso1128/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+EsoTopNews+%28ESO+Top+News%29

AUG-01-2011 **Oxygen Now Available** Almost 240 years after oxygen was officially discovered on Earth, oxygen molecules have been found in space. If this sounds like old news remember that oxygen atoms and molecules are different. Take a breath. You are using O2 molecules, not atoms. The discovery was done with the Herschel Space Observatory while it was studying the Orion nebula. Researchers expect to use the infrared detectors on that spacecraft to find molecular oxygen in other star-forming regions. <http://www.jpl.nasa.gov/news/news.cfm?release=2011-234>

JUL-27-2011 **Earth Trojan found** Asteroids that stay in a location called a Lagrangian point are called Trojans. Jupiter has a large number of such asteroids. The first Earth Trojan has been discovered. The WISE spacecraft detected the asteroid in the infrared. It is 1000 feet in diameter and it follows a strange kind of orbit called a lissajous. The location of the asteroid is at L4. It stays about 60 degrees ahead of Earth but it is rarely right on the Earth's orbit. What is of interest, maybe, is that if an alien spacecraft wanted to hide out in our solar system, these stable Lagrangian points would be the best place. We have never seen anything like an alien spacecraft but we are only just now able to detect a 1000 foot object - the size of the Starship Enterprise. The asteroid was detectable because its infrared signature indicates a temperature near 0 centigrade, relatively warm. <http://blogs.discovermagazine.com/badastronomy/2011/07/27/wise-finds-the-very-first-earth-trojan-asteroid/>

JUL-22-2011 **Water Reservoir** It appears that black holes do not dissolve in water. If they did then quasar APM 08279+5255 would probably disappear but the 20 billion solar mass blackhole is as happy as a clam. For comparison, the Milky Way galaxy holds large amounts of water vapor but the total amount is 4000 times less than in the quasar. The water vapor around the black hole is in a gaseous region that is hundreds of light-years wide. If all of the material around the black hole falls in then the final black hole will be 6 times its current size but that might not happen. <http://www.jpl.nasa.gov/news/news.cfm?release=2011-223>

It Must Be Astronomical ...

CalStar 2011



Nights of Sept 29, 30, October 1

The annual CalStar star party starts September 29. It is located at Lake San Antonio, south of King City. More information will be available soon. Check <http://www.observers.org/CalStar> for the latest news.

Writers Wanted

Astronomy related articles are requested for this newsletter. Please send articles to ephemeris@sjaa.net. Articles can be in text or MS Word format. Other formats are probably okay too. Articles should be submitted by the 10th of the month.

Writers par Excellence

Speaking of writers, the former SJAA Ephemeris editors, Jane and Morris Jones, have written articles about the recent Juno launch. See Jane's at <http://jane.whiteoaks.com/2011/08/14/mission-juno-launch-august-5-2011/> and Mojo's at <http://mojo.whiteoaks.com/2011/08/11/the-nasa-tweetup-to-launch-juno/>

School Star Parties

Below are the cumulative statistics from 5 years of star parties. Jim Van Nuland and his colleagues have been remarkably consistent. Notice that the number of cloudouts have decreased and the number of noon cancellations have increased as Jim gets even better at being able to tell what the skies will be like.

	Total Sched.	Good Sky	Partial Success	Cloudy Fail	Cancel at noon
2006/7	67	40	9	7	11
2007/8	65	48	4	5	8
2008/9	68	44	7	3	14
2009/10	68	34	8	3	23
2010/11	65	34	11	0	20
Totals	333	200	39	18	76

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>

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Members Email Lists:
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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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New **Renewal** (Name only if no corrections)

Membership Type:

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

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