SJAA EPHEMERIS

The Shallow Sky

Mars Observing 101

Akkana Peck

The big news this month is the Mars opposition.

What is an opposition, anyway? The term means that the planet in question is on the opposite side of the earth from the sun. In other words, it's highest at midnight. (At least, more or less midnight — you do have to allow for details like daylight savings time and the equation of time.) More important, an opposition is when a planet is closest to us, because we and the planet are both on the same side of the sun. With an outer planet like Jupiter which is always far away, that doesn't matter much; but for a planet that's small and close, like Mars, it makes a huge difference in how big the planet appears.

Okay. To be completely truthful, the opposition isn't this month. That won't happen until November 9th. But because of eccentricities in Mars' orbit and our own, the closest approach between Mars and Earth happens at the end of this month, on October 29. Just in time to set up a telescope for Halloween and show the kids a Halloween-colored planet!

By then, Mars will be rising about half an hour after sunset. Its size will be 20.2", big enough to show a nice disk with surface features in a telescope of any size. (Remember I said opposition makes a big difference in a planet's apparent size? Mars began 2005 at an apparent size of 4.5".)

Even 20.2" might seem disappointing to observers who remember the 25" disk Mars showed for the 2003 opposition (AS BIG AS THE MOON! Well, give or take a factor of 70 or so). But don't be disappointed! In 2003, Mars only rose to 37 degrees above the horizon at its best, way down in the murky, unsteady haze. This year, it'll be 60 degrees up, in the clear, steady air that planetary observers love best. You'll be able to use much higher magnifications (assuming we get some decent weather) and you may be able to see much more.

What can you see? The map here, adapted from Daniel M Troiani's ALPO Mars map, shows most of the features you'll be able to see in a typical amateur telescope on a good night. South is up.

The first time you point a telescope at Mars, you won't see anything like this. Don't panic! Observing Mars takes

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SJAA Activities Calendar

Jim Van Nuland

October

- **1** Dark sky weekend. **CalStar Party continues.** Sunset 6:51 p.m., 1% moon rises 6:19 a.m. DST
- **7** Houge Park star party. Sunset 6:42 p.m., 22% moon sets 9:07 p.m. Star party hours: 7:30 p.m. to 10:30 p.m.
- **8** ATM Class at Houge Park. 7:30 p.m.
- **15** **General meeting** at Houge Park. 8 p.m. Diane Wooden of NASA will discuss Deep Impact.
- **20** ATM Class at Houge Park. 7:30 p.m.
- **28** Hougе Park star party. Sunset 6:14 p.m., 13% moon rises 4:07 a.m. Star party hours: 7:30 p.m. to 10:30 p.m.
- **28** Astronomy Class at Hogue Park. 7:30 p.m.
- **29** Dark sky weekend. Sunset 6:13 p.m., 8% moon rises 4:04 a.m. DST
- **30** Daylight Savings Time end. Retard Clock 2 a.m. to 1 a.m.

November

- **5** Dark sky weekend. Sunset 5:06 p.m., 19% moon sets 7:53 p.m.
- **11** Houge Park star party. Sunset 5:00 p.m., 83% moon sets 3:01 a.m. Star party hours: 7:00 to 10:00.
- **12** **General meeting** at Houge Park. Ben Shelef of the Spaceward Foundation, will speak on using space elevators to geosynchronous orbit.
- **13** Fall swap. Noon until 3-4 p.m.
- **17** ATM class at Houge Park. 7:30 p.m.
- **25** Houge Park star party. Sunset 4:52 p.m., 27% moon rise 1:53 a.m. Star party hours: 7:00 to 10:00
- **25** Astronomy Class at Houge Park. 7:30 p.m.
- **26** Dark sky weekend. Sunset 4:52 p.m., 19% moon rises 2:53 a.m

The Board of Directors meets at 6:00 p.m. preceding each general meeting. All are welcome.

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

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practice. It's one of the most difficult planets to observe, for several reasons: it's quite small even at opposition; it's only that large for a few months every two years, so we don't get much practice at it; all its features are subtle shades of brown and orange, no sharp features. At first you may only see one or two light blobs and one or two dark blobs, but keep at it and you'll gradually see more.

(I have to put in a plug for sketching: it's a great way to train your eye and think about what you're really seeing. Don't worry if your Mars sketches look awful. Mine do too. But whether or not you're making good art, the act of sketching what you see will help you see more. I promise!)

There's one more reason Mars is a harder target than other planets: it rotates fast (its day is just a hair longer than our own), and its axis is inclined slightly more than our own. The result? It's hard to tell which side we're looking at, or even where the poles are so you can tell north from south.

“ ... sketching what you see will help you see more. I promise!”

The best way to figure out what you're looking at on Mars is to use a computer program: either a good planetarium program, a special purpose program, or a PDA program, to tell you how it's oriented right now. I have a list of programs I know about on my Mars page, http://shallowsky.com/mars.html — if you know of one I've missed, please let me know.

In addition, a Mars globe is really helpful. The only real globe you can buy is expensive and too large to carry on star parties; but there are several globes and icosohedrons available on the web which you can print out and use to make your own Mars globe. There's also an inflatable Mars beach ball available which has a surprisingly good map. Unless you're adept at mentally warping rectangular maps onto circles, a globe will help you a lot with identifying features.

So you've got your globe, your software and a map and you're looking at Mars. You see a dark smudge and a light smudge. What are they?

Mars' southern hemisphere will be tilted toward us throughout this pass. So if you see any polar cap, it'll be the south pole. However, it's late summer in Mars' southern hemisphere, so the polar cap will be very small and hard to see. If you see something big that looks like a polar cap, it's probably Hellas, a huge impact basin which sometimes fills with fog and looks more icy than the icy polar caps themselves.

The most obvious dark spots you'll see are Syrtis Major, the Sirenum/Cimmerium complex, and the Erythraeum area. These are all distinctive in shape — Syrtis Major looks like India or Africa with bright Hellas on one edge, Sirenum/Cimmerium are two elongated areas, and Erythraeum is a larger and more general dark area.

Once you orient yourself and figure out which part of the planet you're looking

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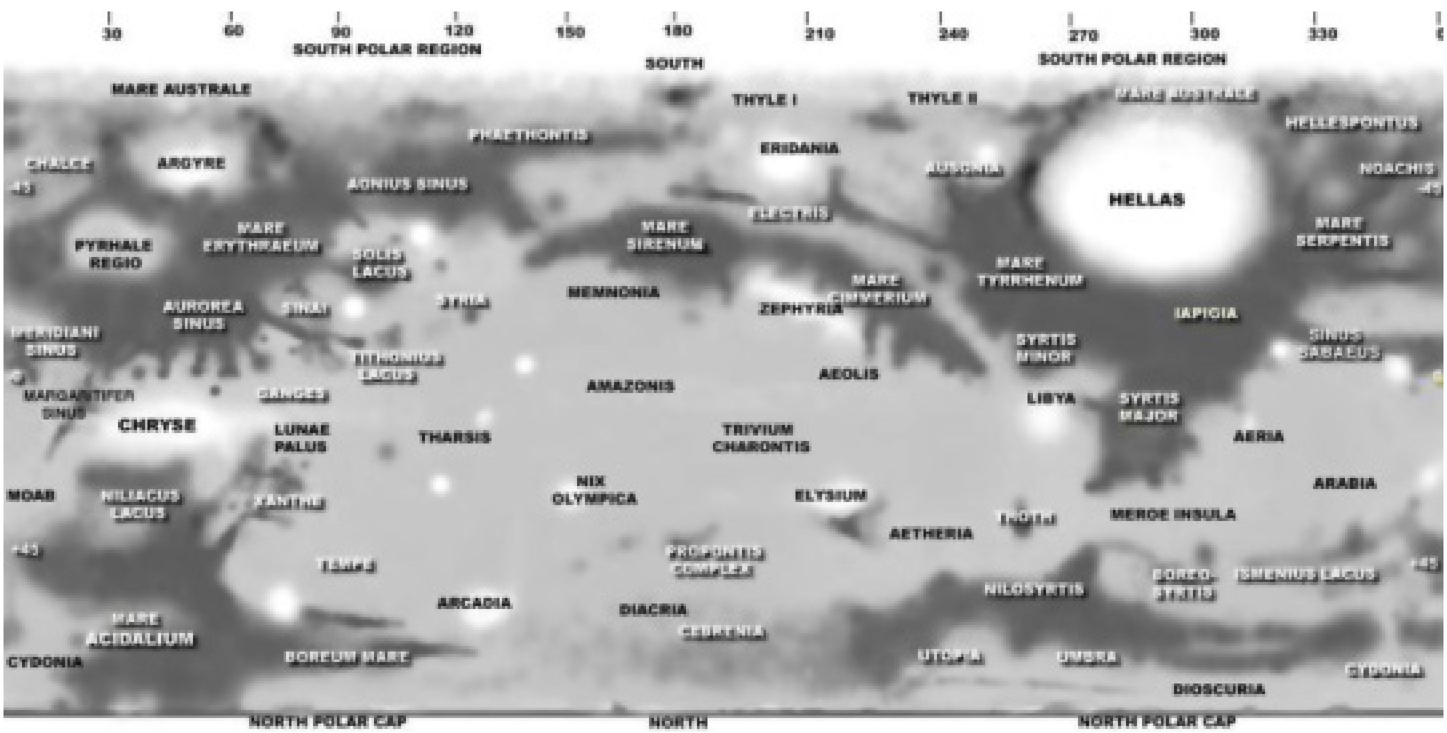
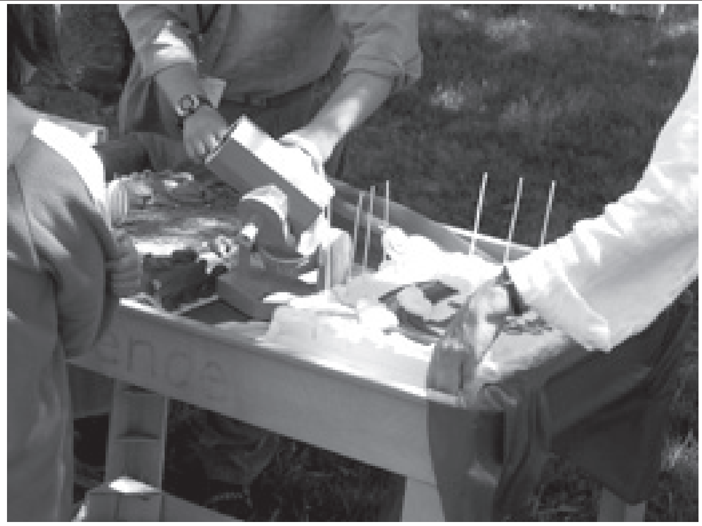


Mars map copyright of Daniel Troiani and ALPO. See the web version of the Ephemeris for another map which was created by the author.

Birthday for a Legend

AANC-Con 2005

It was an unusually clear, sunny day in San Francisco, perfect for observing through solar scopes as part of the Astronomical Association of Northern California's 2005 conference at the Randall Museum on Saturday, August 27th. Over 100 people gathered to celebrate the 90th birthday of John Dobson, co-founder of The Sidewalk Astronomers, teacher, and best known for designing and constructing the "Dobsonian" mount.



Dobsonian Cake *– It wouldn't be a birthday party without cake although John Dobson says he never eats cake.*

I know what that is *- John Dobson makes a point about a plaque that he's just been given.*

Richard Ozer from the AANC Board welcomed all and specially mentioned the San Jose Astronomical Association, stating that it was a "good example of what an amateur club should be." The conference included mirror grinding by Chabot Telescope Makers Workshop, "Dob in a Day" by San Francisco Sidewalk Astronomers Randall staff, and photo shoots at the "Valley of the Dobs." A birthday cake, bearing a telescope, was presented and John was given a proclamation from Mayor Newsom honoring him for the things he had accomplished and declaring the day as "John Dobson Day."

The day concluded with AANC awards, raffle and pizza, the feature film "A Sidewalk Astronomer" (a film about John Dobson), and a discussion and Star Party with the honoree of the day.

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at, you can start to look for finer features. See if you can see Sinus Sabaeus and Sinus Meridiani. Look for the "Eye of Mars" near Solis Lacus, an area which looks surprisingly like a human eye. You'll probably be able to see Niliacus Lacus (isn't Mars nomenclature wonderful?) and Acidalium to the north of Erythraeum — they're quite dark and usually easy to see.

Look for lighter areas around the Tharsis plateau, where most of Mars' big volcanos are. The volcanos are big enough that they generate "orographic clouds", air driven upslope so that it cools and the moisture in it condenses, just like the clouds you sometimes see over Mt. Hamilton when the rest of the sky is clear. Weather features come and go, so keep watching and see whether you see changes in the lightness of the Tharsis area. Blue or green filters may help a little.

Speaking of weather changes, watch for dust storms. Sometimes you look at Mars and don't see the features you expect to see. On a desert planet like Mars, you never know when a dust storm might blow in and cover everything. Usually they only last a few days, but sometimes they last for weeks. If it happens, try not to be too disappointed at not being able to see features — think of how mind-boggling it is to be able to watch the weather on another planet. Maybe that's worth missing a few features.

October 15 Speaker: Dr. Diane Wooden, on what we have learned from Deep Impact

David Smith

What are comets? What are they made of, and how are they structured? People have long been amazed, mystified, inspired, and even terrified by comets. Scientifically, they are interesting in their own right, but also because they are time capsules dating back to the formation of the solar system. They are deep freezers containing some of the ice and dust present at the formation of the giant planets.

On July 4, 2005 (Universal Time), the impactor from the Deep Impact spacecraft smashed at high speed into Comet Tempel 1, an event monitored by the main spacecraft, and by astronomers on Earth. What has been learned from these observations of the comet and the material blasted out of it? We will learn about this from our October 15 speaker, Dr. Diane Wooden, who is an astrophysicist at NASA Ames Research Center.

Dr. Wooden received her Ph.D. in astronomy and astrophysics from UC Santa Cruz in 1979, and has worked at Ames Research Center since 1983. She studies the origins and evolution of cosmic dust, and has been involved with the Deep Impact mission.

Avid readers of the Ephemeris have already noted that Dave North's column is missing. Dave has decided to take a break from writing a regular column. Dave's columns were often the most talked about feature of this newsletter. He will be missed. Thank you Dave for all the great articles over the years.

Marveling the August Celestial Fireworks

Ernie Piini

I joined Dr. Peter Jenniskens, a noted meteor storm expert and a staff member for SETI, on Thursday night, August 11, at Fremont Peak State Park to watch and record the annual Perseid shower. As predicted, the first quarter moon was down by 11 pm and a low fog had dimmed the bright lights below. It was a warm, beautiful night and the skies above were dark. This made for a brilliant display of each meteor zooming by whether bright or faint. It looked like diamonds displayed against a black cloth at a jewelry store.

We set up our equipment next to the observatory where Peter assigned me to survey and record an area within the south eastern sky. I brought with me my recently redesigned Image Intensifier recording system. My new system consists of a Lens, Image Intensifier Tube, Control box, and a Canon ES2000 Hi-8 Camcorder. At the spectacular November 18, 2001 Leonid shower, I had used a 50 mm. f/1.4 lens, although with very successful results, provided only a 22-degree field of view. It now has a wide angle 24 mm, f/2.8 lens which provides a field of view of 60-degrees (almost eight times more coverage). The Canon ES2000 Hi-8 camcorder displays a recordable time down to a second for ease in logging meteor sightings.

Originally I had developed the Image Intensifier system for the 1977 Total Solar Eclipse in Colombia, where I attempted to capture the faint, but illusive "Shadow Bands." For those unfamiliar with this phenomenon, the bands normally appear a few moments before and after totality. Visible to the naked eye as fast moving light and dark bands along the ground or wall surface, they are much like those seen on the bottom of a swimming pool when the surface water has been disturbed. I have since found that my Intensifier system works well for recording meteor streaks.

The Image Tube was discarded by our former companies' Low Level Light TV group, because of the burned spot near the center. The tube is a micro channel high gain amplifier with a brightness gain of 30,000 and a nominal magnification of 1. The minimal resolution is 30 line pairs/mm. The unit has fiber optic input and outputs and is essentially a bundle of micro miniature photo-multiplier tubes. It electronically multiplies the input image by a gain factor depended on the applied voltage—in this case 7 kV obtained from a high voltage power supply operating from two "AA" size batteries located in the control box.

The fun begins when reviewing the Hi-8 tapes on my TV screen and looking for the bright and faint streaks to show up. During the course of the Perseid storm night I recorded over 150 meteors consisting of 25 bright displays, the remainder between faint and medium traces and 6 strays. The count is not complete as I continue to find more faint traces.

Dr. Jenniskens predicted elevated rates around 1:18 a.m. PDT and again later in the night. The results from one camera alone are not enough precise to measure that. We are waiting for the results of three other intensified cameras operated by Dr. Jenniskens, as well as four other cameras operated by amateur astronomers David Holman and Peter Gural at Susanville and near San Diego, respectively.

Many thanks to my personal editors, Joe Heim and May Coon, for reviewing this text and to Dr. Jenniskens for his review and also his guidance and teachings at our site. I also wish to acknowledge the help I received from SJAA President Mike Koop and FPOA Director of Instruments Ron Dammann for making this endeavor possible.

Improbable Bulls-Eye

Dr. Tony Phillips

Picture this: Eighty-eight million miles from Earth, a robot spacecraft plunges into a billowing cloud almost as wide as the planet Jupiter. It looks around. Somewhere in there, among jets of gas and dust, is an icy nugget invisible to telescopes on Earth—a 23,000 mph moving target.

The ship glides deeper into the cloud and jettisons its cargo, the "impactor." Bulls-eye! A blinding flash, a perfect strike.

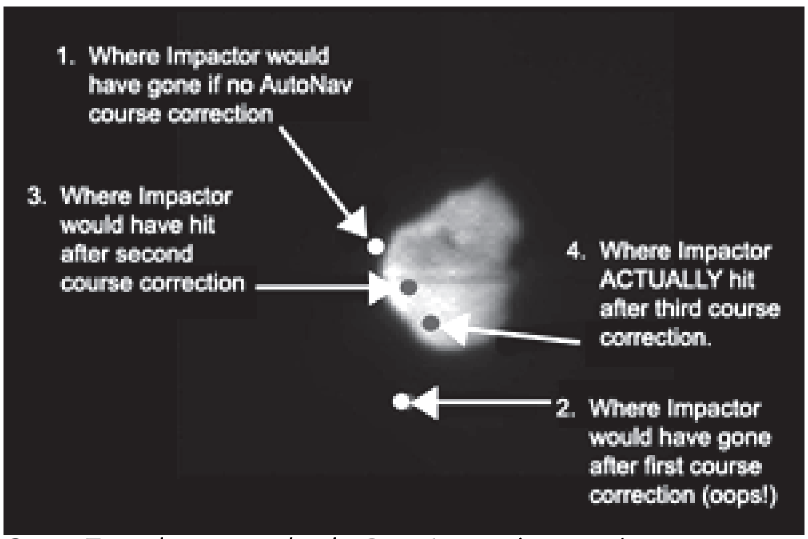
As incredible as it sounds, this really happened on the 4th of July, 2005. Gliding through the vast atmosphere of Comet Tempel 1, NASA's Deep Impact spacecraft pinpointed the comet's 3x7-mile wide nucleus and hit it with an 820-lb copper impactor. The resulting explosion gave scientists their first look beneath the crust of a comet

That's navigation.

Credit the JPL navigation team. By sending commands from Earth, they guided Deep Impact within sight of the comet's core. But even greater precision would be needed to strike the comet's spinning, oddly-shaped nucleus.

On July 3rd, a day before the strike, Deep Impact released the impactor. No dumb hunk of metal, the impactor was a spaceship in its own right, with its own camera, thrusters and computer brain. Most important of all, it had "AutoNav."

AutoNav, short for *Autonomous Navigation*, is a computer program full of artificial intelligence. It uses a camera to see and thrusters to steer—no humans required. Keeping its "eye" on the target, AutoNav guided the impactor directly into the nucleus.



Comet Tempel 1, as seen by the Deep Impact impactor's camera. Three last-minute AutoNav-controlled impact correction maneuvers enabled the Impactor to hit the bulls-eye.

The system was developed and tested on another "Deep" spacecraft: Deep Space 1, which flew to asteroid Braille in 1999 and Comet Borrelly in 2001. The mission of Deep Space 1 was to try out a dozen new technologies, among them an ion propulsion drive, advanced solar panels and AutoNav. AutoNav worked so well it was eventually installed on Deep Impact.

"Without AutoNav, the impactor would have completely missed the nucleus," says JPL's Ed Riedel, who led the development of AutoNav on Deep Space 1 and helped colleague Dan Kubitschek implement it on Deep Impact.

En route to the nucleus, AutoNav "executed three maneuvers to keep the impactor on course: 90, 35, and 12.5 minutes before impact," says Riedel. The nearest human navigators were 14 light-minutes away (round trip) on Earth, too far and too slow to make those critical last-minute changes.

Having proved itself with comets, AutoNav is ready for new challenges: moons, planets, asteroids ... wherever NASA needs an improbable bulls-eye.

Dr. Marc Rayman, project manager for Deep Space 1, describes the validation performance of AutoNav in his mission log at http://nmp.nasa.gov/ds1/arch/mrlog13.html (also check mrlog24.html and the two following). Also, for junior astronomers, the Deep Impact mission is described at http://spaceplace.nasa.gov/en/kids/deepimpact/deepimpact.shtml

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

Silicon Valley Astronomy Lecture Series

Cynthia Phillips to talk on October 5, 2005 at 7 p.m.

Andrew Fraknoi

Astronomer Cynthia Phillips will give a non-technical, illustrated talk on: Jupiter's Tantalizing Moon: Water (and Life?) Under the Ice of Europa in the Smithwick Theater, Foothill College, El Monte Road and Freeway 280, in Los Altos Hills, California. Free and open to the public. Parking on campus costs $2.Call the series hot-line at 650-949-7888 for more information.

Ever since robot spacecraft have been exploring the Jupiter system, one moon has especially captured the interest of astronomers. Although Europa's surface is cold and frozen, there is evidence that, under the ice, it has an ocean of warmer, liquid water. In her talk, Dr. Phillips will explore Europa's geology, focusing on the prospects for water and the possibilities of life in that deep alien ocean.

No background in science will be required for this talk, which will interest both fans of astronomy and the search for life.

Dr. Phillips is a Principal Investigator for a number of projects investigating Europa and Mars at the SETI Institute. She specializes in the geology of planetary surfaces and the search for life in the solar system. She worked with the Galileo spacecraft imaging team to help design observations of Europa and other moons of Jupiter. She is co-author of "The Everything Astronomy Book" and "The Everything Einstein Book," both published by Adams Media.

Co-sponsored by:

* NASA Ames Research Center
* The Foothill College Astronomy Program
* The SETI Institute
* The Astronomical Society of the Pacific

Solar System Stats for October 2005

Adapted from the Observer's Handbook published by The Royal Astronomical Society of Canada which in turn gets this data from the U.S. Naval Observatory's Nautical Almanac Office and Her Majesty's Nautical Almanac Office and contributions by David Lane, St. Mary's University, Halifax NS.

		Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Sun
RA	1	13^h06^m	15^h16^m	3^h26^m	13^h32^m	8^h45^m	22^h38^m	21^h10^m	12^h29^m
	11	14^h03^m	16^h02^m	3^h23^m	13^h40^m	8^h49^m	22^h37^m	21^h09^m	13^h05^m
	21	14^h59^m	16^h49^m	3^h14^m	13^h49^m	8^h51^m	22^h36^m	21^h09^m	13^h43^m
Dec.	1	-6°39'	-20°14'	+16°26'	-8°30'	+18°26'	-9°28'	-16°30'	-3°07'
	11	-13°27'	-23°23'	+16°37'	-9°18'	+18°15'	-9°35'	-16°32'	-6°57'
	21	-19°01'	-25°37'	+16°32'	-10°04'	+18°06'	-9°40'	-16°33'	-10°37'
Dist (AU)	1	1.40	0.92	0.53	6.40	9.57	19.20	29.45	1.001
	11	1.34	0.85	0.49	6.43	9.42	19.30	29.59	0.998
	21	1.24	0.77	0.47	6.44	9.26	19.42	29.75	0.995
Mag	1	-0.7	-4.0	-1.7	-1.7	0.4	5.7	7.9	
	11	-0.3	-4.1	-1.9	-1.7	0.4	5.8	7.9	
	21	-0.2	-4.2	-2.1	-1.7	0.3	5.8	7.9	
Size	1	4.8"	18.1"	17.8"	30.8"	17.3"	3.6"	2.3"	31'57"
	11	5.0"	19.7"	19.0"	30.6"	17.6"	3.6"	2.3"	32'03"
	21	5.4"	21.6"	19.9"	30.6"	17.9"	3.6"	2.3"	32'08"

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Submit

Submit articles for publication in the SJAA Ephemeris. Send articles to the editors via e-mail to ephemeris@sjaa.net. **Deadline, 10th of previous month.**

SJAA loaner scope status

All scopes are available to any SJAA member; contact Mike Koop by email (koopm@best.com) or by phone at work (408) 473-6315 or home (408) 446-0310 (Please leave message, phone screened).

Available scopes

These are scopes that are available for immediate loan, stored at other SJAA members homes. If you are interested in borrowing one of these scopes, please contact Mike Koop for a scope pick up at any of the listed SJAA events.

# Scope	Description	Stored by
1	4.5" Newt/ P Mount	Annette Reyes
3	4" Quantum S/C	Hsin I. Huang
6	8" Celestron S/C	Karthik Ramamurthy
7	12.5" Dobson	Tom Fredrickson
10	Star Spectroscope	Jim Albers
13	Orion XT6 Dob	Ravinder Pal Singh
14	8" f/8.5 Dob	Colm McGinley
15	8" f/9 Dobson	Scott Pelger
19	6" Newt/P Mount	Daryn Baker
23	6" Newt/P Mount	Wei Cheng
24	60mm Refractor	Al Kestler
26	11" Dobson	Vivek Kumar
27	13" Dobson	Steve Houlihan
28	13" Dobson	Anupam Dalal
29	C8, Astrophotography	Mark Ziebarth
32	6" f/7 Dobson	Sandy Mohan
34	Dynamax 8" S/C	Yuan-Tung Chin
38	Meade 4.5" Digital Newt	Tej Kohli
40	Super C8+	Mike Macedo
41	18" Sky Designs Dob	Len Bradley
42	11x80 Binoculars	Ritesh Vishwakarma

Scope loans

These are scopes that have been recently loaned out. If you are interested in borrowing one of these scopes, you will be placed on the waiting list until the scope becomes available after the due date.

# Scope	Description	Borrower	Due Date
11	Orion XT6 Dob	Ravi Shankar Erram	9/10/05
33	10" Deep Space Explorer	Jack Zeiders	8/23/05
36	Celestron 8" f/6 Skyhopper	Shinji Wakamatsu	11/12/05
37	4" Fluorite Refractor	Bob Leitch	10/1/05
39	17" Dobson	Steve Nelson	10/2/05

Extended scope loans

These are scopes that have had their loan period extended. If you are interested in borrowing one of these scopes, we will contact the current borrower and try to work out a reasonable transfer time for both parties.

# Scope	Description	Borrower	Due Date
2	6" f/9 Dob	John Paul De Silva	?
8	14" Dobson	Colm McGinley	11/01/05
9	C-11 Compustar	Bill Maney	Indefinite
12	Orion XT8 Dob	Kevin Roberts	10/16/05
16	Solar Scope	Bob Havner	9/12/05
21	10" Dobson	Michael Dajewski	Repair
35	Meade 8" Equatorial	Ethan Romander	9/6/05

Waiting list:

16	Solar Scope	Ken Frank
37	4" Fluorite Refractor	Carl Ching

San Jose Astronomical Association Membership Form

You can join or renew with the SJAA online at http://www.sjaa.net/SJAAmembership.html

☐ **New** ☐ **Renewal** (Name only, plus corrections below)

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

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

Bring this form to any SJAA Meeting or send (with your check) to

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