PRIMEFOCUS

Tri-Valley Stargazers

September 2003

TVS

Tri-Valley Stargazers

Meeting Info:

What
Viewing the Sun with 0.1 Arcsecond Resolution

Who
Dr. Thomas Berger

When
September 19, 2003
Conversation at 7:00 p.m.
Lecture starts 7:30 p.m.

Where
Unitarian Universalist Church in Livermore
1893 N. Vasco Road

Inside

September Meeting

Viewing the Sun with 0.1 Arcsecond Resolution

Dr. Thomas Berger

The Swedish 1-meter Solar Telescope on the island of La Palma, Spain, is now fully operational. The telescope is a 1-meter aperture vacuum refractor utilizing adaptive and active optics to produce stabilized diffraction-limited movies of the solar photosphere and chromosphere. I will show some of the latest images and movies from the SST focusing on data taken in the 430nm G-band and 394nm H-line spectral regions which achieve 0.1 arcsecond spatial resolution (about 100 km on the Sun). The images and movies reveal previously undetected details of sunspot penumbral fibers, sunspot lightbridges, and the structure of "faculae" visible near the limb. These data are leading to new ideas regarding the magnetohydrodynamic generation and structuring of the solar magnetic field with implications in solar active region dynamics and flaring as well as solar irradiance input to the Earth's atmosphere.

Dr. Thomas Berger is a staff physicist at the Lockheed Martin Solar and Astrophysics Lab in Palo Alto, CA. He has a bachelors degree in engineering physics from U.C. Berkeley, a masters degree in fluid mechanics, and a Ph.D. in physics (1996) from Stanford. His research currently focuses on visible light observations of the generation and evolution of the solar magnetic field, both in large scale active regions and in small-scale networks. He has been observing at the Swedish Solar Observatory on La Palma since 1994 and is a co-investigator on the Focal Plane Package instrument of the Japanese Solar-B satellite which will be launched in 2006.

News & Notes

Welcome

TVS welcomes our newest member to the club: **Walter McNabb**.

2003 TVS Meeting Dates

Below are the TVS meeting dates for the rest of the year. The lecture meetings are held on the third Friday of the month, with the Board meeting on the Monday following the lecture meeting. The *Prime Focus* deadline applies to that month's issue (e.g., the Oct. 5th deadline is for the Oct. issue).

Lecture Meeting	Board Meeting	*Prime Focus* Deadline
Sept. 19	Sept. 22	Sept. 7
Oct. 17	Oct. 20	Oct. 5
Nov. 21	Nov. 24	Nov. 9
Dec. 19	Dec. 15	Dec. 7

Money Matters

At the August Board meeting, Treasurer **Gary Steinhour** gave us the account balances (as of August 17, 2003) of TVS's accounts:

Checking	$1,417.39	
CD #1	$3,918.59	matures 11/17/03
CD #2	$2,418.31	matures 11/27/03
CD #3	$2,060.25	matures 10/16/03

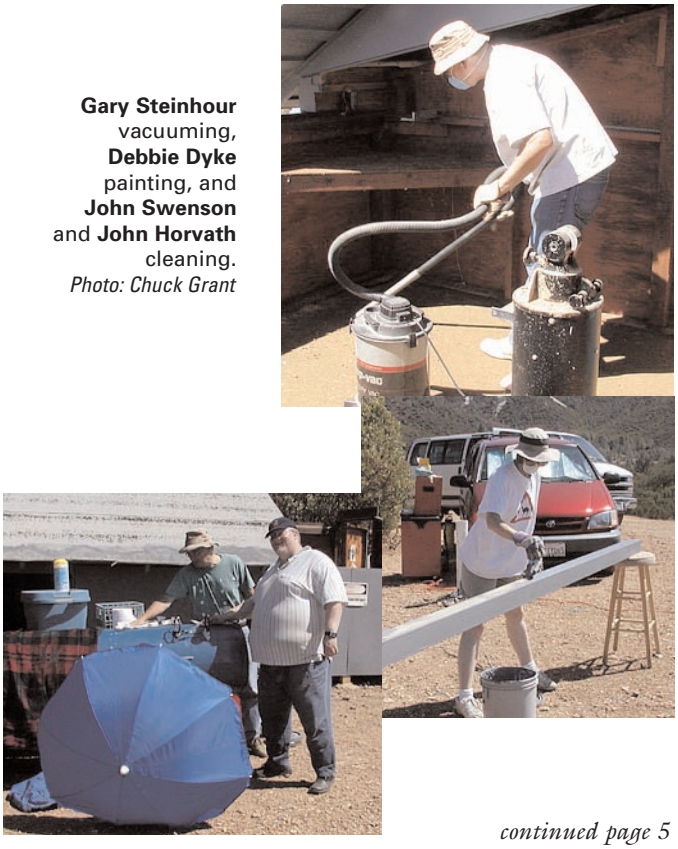
Adieu Frank

Our Vice President, **Frank Rogue**, is resigning his position in order to pursue a more relaxing retirement. **Rich Campbell** will be taking over the position until the November elections when a new VP will be elected.

We wish Frank happy days and clear nights and hope to see him our meetings from time to time.

H2O Work Party Results

On August 16, five intrepid souls gathered at the club's observing site, H2O, for a day of belated Spring cleaning. The temperature rose to the upper 90s as **Gary Steinhour**, **John Horvath**, **Chuck Grant**, **John Swenson**, and **Debbie Dyke** disinfected, cleaned, dusted, sweated, and repaired the site. Special brownie points go to Gary who had cut down all the weeds around the observatory (before everyone else arrived, no less), did all the vacuuming, and the majority of the grunt work in replacing the rotted out roof beam. Thanks to all who gave up their Saturday to do lots of cleaning in the sweltering heat.



Gary Steinhour vacuuming, **Debbie Dyke** painting, and **John Swenson** and **John Horvath** cleaning.
Photo: Chuck Grant

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Calendar of Events

Classic Sci-Fi Film Series

Chabot Space & Science Center

The movies are shown in their original theater format at the 60' Tien MegaDome Theater. Tickets are $5 per person and are available at the door, at TicketWeb.com, or the Chabot Box Office, 510-336-7373.

Movies:
Batman, October 3-5

Showtimes:
Friday – Sunday on the first weekend of each month.
Friday & Saturday – 7:30 p.m., Sunday – 4:00 p.m.

Newsletter header image: NGC 3370.

"Recent observations taken with the Advanced Camera for Surveys show intricate spiral arm structure spotted with hot areas of new star formation. But this galaxy is more than just a pretty face. Nearly 10 years earlier NGC 3370, in the constellation Leo, hosted a bright exploding star."

NGC 3370 is 98 million light-years away. The image is 3.4 arcminutes wide (95,000 light-years) and was taken during April & May of this year, with an exposure time of 25 hours.

Photo: NASA, The Hubble Heritage Team and A. Riess (STScI)

Calendar of Events *continued*

September 14-October 19, 7:30–9:30 p.m.
What: *Adult Astronomy Class*
Who: Staff members
Where: Chabot Space and Science Center
Cost: $55 members, $65 non-members

Chabot is offering a six-week astronomy course designed for adults who are curious about the universe surrounding them and want to learn more.

The non-mathematical class will cover constellations, the solar system, stars, galaxies, and the universe. Historical conceptions and modern research will also be discussed. The course will utilize the Ask Jeeves Planetarium and the Observatories.

Space is limited, so early reservations are encouraged. Call 510-336-7368 to sign up.

September 16, 7:30 p.m.
What: *Seven Ways a Black Hole Can Kill You*
Who: Dr. Phil Plait (Sonoma State Univ.)
Where: Morrison Planetarium, San Francisco
Cost: Free

Astronomer Phil Plait (webmaster of Bad Astronomy at www.badastronomy.com) will light-heartedly show you all the nasty and gruesome ways a black hole can ruin your day, and in the process show you what black holes are, how they form, how they can die, and how scientists have figured all this out. Book signing to follow.

September 20, 5:00 p.m.
What: *Women of Space: Cool Careers on the Final Frontier*
Who: Laura S. Woodmansee
Where: Morrison Planetarium, San Francisco
Cost: Free

Laura will talk about some of the more than 100 women who work in a vast variety of space-related careers. Find out what these women space explorers do, what challenges they've had to overcome, and what advice they have for you. Book signing to follow.

September 23, 7:30 p.m.
What: *Mapping the Universe From Antarctica*
Who: Dr. Kim Coble (University. of Chicago & Adler Planetarium)
Where: Morrison Planetarium, San Francisco
Cost: $3

The Cosmic Microwave Background (CMB), which formed when the Universe was only a few hundred thousand years old, is one of the most important lines of evidence for the big bang theory. Observations of the CMB, including ones made from Antarctica, can be used to test models of how large-scale structures formed and to answer questions about the nature of our Universe.

September 27, 7:30 p.m.
What: *Art, Science and the Hubble Heritage Project*
Who: Tiffany Borders (Sonoma State University, Hubble Heritage Project Intern)
Where: Mt. Tam
Cost: $3

The Hubble Heritage Project is responsible for turning Hubble Space Telescope data into works of art—a delicate balance between aesthetics and preserving scientific data.

The lecture is held in the Mountain Theater, telescope viewing is in the Rock Springs parking area. For more information and directions, call 415-455-5370 or 415-388-2070, or visit www.mttam.net.

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Calendar of Events *continued*

October 2, 7:00 p.m.
What: *Mingling Planetary Microbes: Protecting Alien Ecosystems…and Our Own*
Who: Several speakers
Where: Morrison Auditorium, California Academy of Sciences, S.F.
Cost: $3 advanced, $5 at the door

"As we expand our exploratory presence on Mars and other planets, what might we be bringing with us that could threaten their ecosystems?

And when we return samples—or astronauts—to Earth, what dangers could they pose to our own planet?"

Speakers include **Margaret S. Race** (Ecologist, Planetary Protection, SETI Inst. & NASA), **Christopher P. McKay** (Planetary scientist; NASA/Ames Research Center) and **Sandra M. Dawson** (Risk Communication; NASA/JPL).

You can get tickets in advance by mail: Send a check for $3.00 payable to The Planetary Society, and a self-addressed stamped envelope to:

Planetary Microbes, c/o Ron Peterson,
7410 Stonedale Dr., Pleasanton, CA, 94588.

Orders received after Sept. 24, or without SASE, will be held at Morrison Auditorium. Tickets are limited and non-refundable.

This talk is presented by the Planetary Society Bay Area Volunteer Network and the Morrison Planetarium.

On the web, visit The Planetary Society at http://planetary.org and The Bay Area Volunteer Network at www.tpsbavn.org For directions to the California Academy of Sciences, call 415-750-7144

October 8, 7:00 p.m.
What: *The Mars Exploration Rover Mission: Following the Water*
Who: Dr. David Des Marais (NASA Ames)
Where: Smithwick Theater, Foothill College, Los Altos
Cost: Free. Parking on campus costs $2.

Dr. Des Marais, a member of Science Operations Working Group for the mission, will describe the plans for landing two advanced rovers on the surface of the red planet in January. Both rovers will have instruments on board that can act as "robot geologists", searching for evidence of past water on our neighbor planet.

The talk is part of the Silicon Valley Astronomy Lecture Series and is co-sponsored by NASA Ames Research Center, The Foothill College Astronomy Program, The SETI Institute, and The Astronomical Society of the Pacific

To reach Foothill College, take Highway 280 to the Los Altos hills and take the El Monte Road exit. Call the series hotline at 650-949-7888 for more information.

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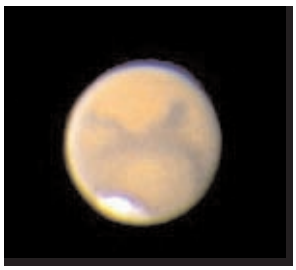
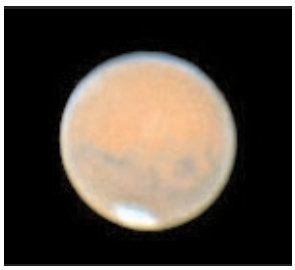
Astro Events

Mars

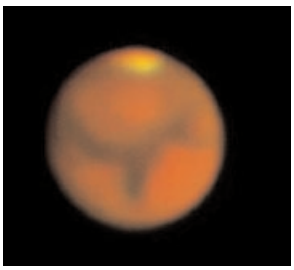
If you haven't seen Mars yet, all is not lost. You can still view the planet through the rest of the year, although by December it will be half the apparent size as it is now.



August 4, 8:12 UT
11" f4.75, 5x barlow,
ToUCam 740k, 240 Exp.
Gert Gottschalk



August 24, 7:58 UT
11" f4.75, 5x barlow,
ToUCam 740k, 400 Exp.
Gert Gottschalk

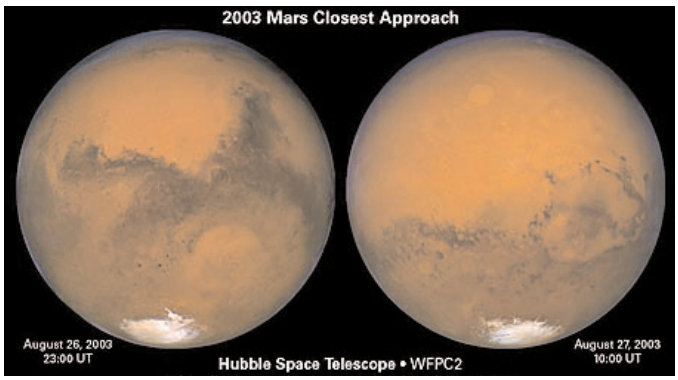


August 11
20" f/16.8 refractor (Rachel),
4 1/30sec exposures combined.
Conrad Jung

Pictures below:

Top:
Left - August 20, 22:38 UT
6" double refractor, f14.7,
2x barlow, ToUCam 740k + IR,
1/25 sec.
Right - computer simulation
of the same view.
Sibylle Fröhlich.

Bottom:
Left - August 26 23:00 UT
Right - August 27 10:00 UT
Hubble WFPC2; *NASA, J. Bell (Cornell Univ.) and M. Wolff (STSci).*



Astronomical Insights

by David Feindel

A warm summer night in August, perfect for discovering comets. And I was blessed—six in the field of view at once. For a split second… then, of course, reality hit, and I realized my scope had been knocked out of alignment, and EVERY star was a comet. So it was time for another lesson in my astronomy education. Just how do you collimate a SCT? Reading the manual and perusing a couple of web sites (http://perso.club-internet.fr/legault/collim.html among others) told me the theory, but as usual, there's no substitute for hands-on experience. Which I set out to do. What I learned first of all is that it's hard to use a 2.5mm allen wrench in the dark. And my paranoia (or perhaps wisdom gained over the years in learning the definition of "clumsy") made me leery of using an allen in close proximity to the glass corrector plate on my scope. So I decided to invest $16 in a set of Bob's Knobs, plastic thumbscrews that replace the allen head screws. A very noticeable improvement, and heartily recommended for SCT owners.

Now all that was needed was a night of good seeing. But as several others have pointed out, we really haven't had a night of "good seeing" for several weeks. And in collimating an 8" SCT, you start at 200x and work up to 400x or 600x, so good seeing is a requirement. During my second night's attempt, another detail in the technique became obvious—when you loosen one screw, the two on the other side need to be tightened, to hold the secondary mirror in position. Just loosening one screw will appear to improve the collimation, but only until the scope is moved a bit, and then the secondary shifts. So after my third attempt, at the Saturday September 6th Sycamore Grove star party, I'm now "well collimated" at 400x, and awaiting a night with better seeing to make the final adjustments at 600x. Now Dob owners are saying "What's the big deal? We have to collimate every night!" And perhaps they're right. Some SCT owners go years without collimating. But since it was my first attempt, I was wary. And as someone pointed out, in collimating a SCT, you're really collimating a f/2 or f/2.5 mirror, so adjustments are sensitive.

This month's software rave is with Paul Rodman's shareware program *Astro Planner*. Version 1.3 was released in late August, and it is a major upgrade to an already great program. *AP*'s forte is planning observing sessions, then documenting your results. You select the objects you want to observe from any of about 20 catalogs, and the program calculates coordinates, visibility from your location, etc. You can then enter the results of your observations, which it logs. What got me excited is that the field of view capability now presents the exact view you get at your scope, not only including the left-right and/or up-down reversals, but also the field rotation for alt-az mounts! So no more mental gymnastics rotating fields 20 degrees. It also computes expected visibility based on conditions, a fuzzy-logic-based scale of difficulty for double stars (61 Cygni = 3, while Castor = 77 in difficulty), the ability to sort the planned objects by a variety of criteria including minimizing travel, meridian time, etc., and an automated tour planner (which I haven't used, as observing plans are not what I'm lacking; observing time what's in short supply!). For $20, quite a deal.

Calendar of Events *continued*

October 11-12
What: *115th Annual Meeting of the ASP (Astronomical Society of the Pacific)*
Who: Various Speakers
Where: Various Locations
Cost: Various Costs

The ASP's annual meeting encompasses various activities throughout the Bay Area during two days. On the 11th, there will be a half-day tour of SLAC (Stanford Linear Accelerator Center), the ASP Annual Members' Meeting (for ASP members only), and an awards banquet & ceremony with guest speaker **David Levy** in Emeryville.

The October 12th events include a series of speakers at Wheeler Auditorium at the UC Berkeley Campus. Included are: **Sandra Faber**, **Matthew Malkan**, **Alex Filippenko**, **Shrinivas Kulkarni**, **Sumner Starrfield**, **Robert Lin**, and **Kevin Zahnle**.

The SLAC tour is $25, Awards Banquet $60, and the Lecture Series are priced at $25 for students, $30 for ASP members, and $35 for the general public.

For online registration and info, go to: www.astrosociety.org/events/meeting.html. You may also request info by mail or fax by calling 415-337-1100 x109.

News & Notes *continued*

2003 Observer's Handbook

We still have some RAS Observer's Handbooks left for sale. Since the year is half over, we're selling them at half off — $7.50. The Handbook is a wealth of info, chock full of astronomical info for this year, as well as other info on observing, and deep sky objects.

There are timeless chapters on basic astronomical data, optics and observing, the Sun, Moon, planets and their satellites, asteroids, meteors, stars, nebulae and galaxies.

What's Up *by Debbie Dyke*

All times Pacific Daylight Savings Time unless otherwise noted.

September

3 Wed **First Quarter Moon** 5:34 a.m.
1976 Viking 2 lands at Utopia Planitia on Mars.

10 Wed **Full Moon** (the Harvest Moon) 9:36 a.m.

11 Thurs Inferior conjunction of Mercury.
1816 Carl Zeiss born.

12 Fri 1959 Luna 2 becomes first spacecraft to reach the Moon.

14 Sun 1915 John Dobson born.
1999 Galileo spacecraft closest approach to Jupiter.

16 Tues Moon at apogee (250,923 mi/404,714 km) 2:00 a.m.

18 Thurs **Last Quarter Moon** 12:03 p.m.

19 Fri **Tri-Valley Stargazers general meeting**. 7:30 p.m. at the Unitarian Universalist Church, 1893 N. Vasco Road, Livermore.

20 Sat **H2O Open House**. Last one of the season.

21 Sun **Tri-Valley Stargazers discussion meeting**. 2:00 p.m. at the Round Table Pizza on 1024 E. Stanley Blvd., Livermore. Discuss astro stuff with your fellow members.

22 Mon **Tri-Valley Stargazers Board meeting**. 7:00 p.m. at the Round Table Pizza in Livermore.

23 Tues **Autumnal Equinox** 3:47 a.m.
1846 Neptune discovered in Berlin (apparently it got lost). Using the calculations provided by Urbain Jean Joseph Le Verrier, Johann Gottfried Galle spots the little blue-green disk in his scope.

24 Wed The Zodiacal light may be visible in the east before morning twilight for the next two weeks.

25 Thurs **New Moon** 8:09 p.m.

26 Fri Mercury at greatest elongation west (18°) 5:00 p.m.
Rosh Hashanah begins at sundown. Hebrew year 5764.

27 Sat Moon at perigee (224,958 mi/362,835 km) 11:00 p.m.
Greatest western elongation of Mercury.

30 Wed 1880 Henry Draper takes the first photograph of the Orion Nebula.

October

2 Thurs **First Quarter Moon** 12:09 p.m.
1608 J. Lippershey patents the telescope.

3 Fri 1959 Luna 3 takes the first photos of the Moon's far side.

4 Sat 1957 Sputnik 1 is launched by the Soviet Union, becoming the first artificial satellite to orbit the Earth.

5 Sun Yom Kippur begins at sundown.

6 Mon 1923 Edwin Hubble discovers Cepheid in the Andromeda Galaxy.
1995 First extrasolar planet discovered orbiting 51 Pegasi. Since then an additional 109 planets have been discovered.

7 Tues 1959 First photo of the "dark side" of the Moon taken by Luna 3.

9 Thurs Draconid meteors peak at 2:00 a.m.

NASA's Space Place

Careful Planning and Quick Improvisation Succeed in Space Biz

by Dr. Tony Phillips

On December 18, 2001, ground controllers at JPL commanded NASA's Deep Space 1 (DS1) spacecraft to go to sleep. "It was a bittersweet moment," recalls Marc Rayman, the DS1 project manager. Everyone was exhausted, including Deep Space 1, which for three years had taken Rayman and his team on the ride of their lives.

DS1 blasted off atop a Delta rocket in 1998. Most spacecraft are built from tried-and-true technology—otherwise mission controllers won't let them off the ground. But Deep Space 1 was different. Its mission was to test 12 advanced technologies. Among them: an experimental ion engine, a solar array that focused sunlight for extra power, and an autopilot with artificial intelligence. "There was a good chance DS1 wouldn't work at all; there were so many untried systems," recalls Rayman.

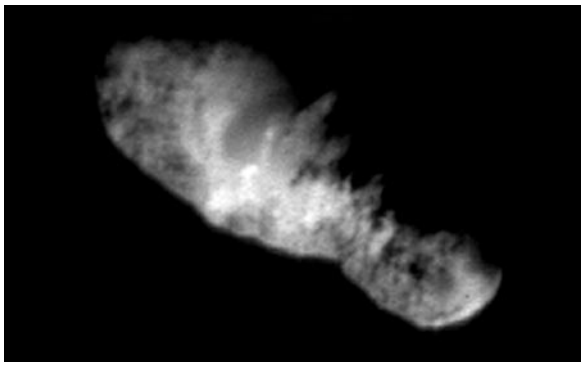
Nevertheless, all 12 technologies worked; the mission was a big success.

Indeed, DS1 worked so well that in 1999 NASA approved an extended mission, which Rayman and colleagues had dreamed up long before DS1 left Earth-a visit to a comet. "We were thrilled," says Rayman.

And that's when disaster struck. DS1's orientation system failed. The spacecraft couldn't navigate!

What do you do when a spacecraft breaks and it is 200 million miles away? "Improvise," says Rayman.

Ironically, the device that broke, the 'Star Tracker,' was old technology. The DS1 team decided to use one of the 12 experimental devices — a miniature camera called MICAS — as a substitute. With Comet Borrelly receding fast, they reprogrammed the spacecraft and taught it to use MICAS for navigation, finishing barely in time to catch the comet. "It was a very close shave."



This was the final image of the nucleus of comet Borrelly, taken just 160 seconds before Deep Space 1's closest approach to it. This image shows the 8-km (5-mile) long nucleus from about 3417 kilometers (over 2,000 miles) away.

In September 2001, DS1 swooped past the furiously evaporating nucleus of Comet Borrelly. "We thought the spacecraft might be pulverized," Rayman recalls, but once again DS1 defied the odds. It captured the best-ever view of a comet's heart and emerged intact.

By that time, DS1 had been operating three times longer than planned, and it had nearly exhausted its supply of thruster-gas used to keep solar arrays pointed toward the Sun. Controllers had no choice but to deactivate the spacecraft, which remains in orbit between Earth and Mars.

Rayman has moved on to a new project—Dawn, an ion-propelled spacecraft that will visit two enormous asteroids, Ceres and Vesta, in 2010 and 2014. "Dawn is based on technologies that DS1 pioneered," he says.

Even asleep, DS1 continues to amaze.

Find out more about DS1 at http://nmp.jpl.nasa.gov/ds1. For kids, go to http://spaceplace.nasa.gov/ds1dots.htm to do an interactive dot-to-dot drawing of Deep Space 1.

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

Astro Events *continued*

Star Parties

H2O Open House
September 20

Last open house in this year's season. For TVS members who would like to check out our club's dark sky site, the H2O Open House offers them just that chance. The meeting time for caravaning will be announced at the September meeting and posted to the TVS e-mail discussion group; meeting location is at the usual place, the corner of Mines and Tesla.

The Third Annual California Star Party (CalStar)
September 25-27

CalStar, hosted by the San Jose Astronomical Association, will be held at Lake San Antonio. Visit www.sjaa.net/calstar2003.html for details.

School Star Party

There will be a school star party sometime towards the end of September. Details to be posted to the TVS e-mail discussion list once they become available.

Tri-Valley Stargazers
P.O. Box 2476
Livermore, CA 94551

PRIMEFOCUS

Tri-Valley Stargazers Membership Application

Member agrees to hold Tri-Valley Stargazers, and any cooperating organizations or landowners, harmless from all claims of liability for any injury or loss sustained at a TVS function.

Name _____ Phone _____ e-mail _____

Address _____

Do not release my: _____ address, _____ phone, or _____ e-mail information to other TVS members.

Membership category:
_____ $5 Student.
_____ $25 Basic. You will receive e-mail notification when the PDF version of *Prime Focus* is available for download off the TVS web site.
_____ $30 Regular. You will receive a paper version of *Prime Focus* in the mail.
_____ $32.95 One year subscription to *Sky & Telescope* magazine.
_____ $29 One year subscription to *Astronomy* magazine.
_____ $55 Two year subscription to *Astronomy* magazine.
_____ $20 Hidden Hill Observatory (H2O) refundable key deposit (key property of TVS).
$_____ Tax deductible contribution to Tri-Valley Stargazers.

$_____ TOTAL – Return to: Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551

Membership information: Term is one calendar year, January through December. Student members must be less than 18 years old, or still in high school.