

PRIMEFOCUS

Tri-Valley Stargazers

August 2002



Meeting Info:

What

Spectral Interferometry

Who

David Erskine

When

August 16, 2002

Conversation at 7:00 p.m.

Lecture at 7:30 p.m.

Where

Unitarian Universalist
Church in Livermore
1893 N. Vasco Road

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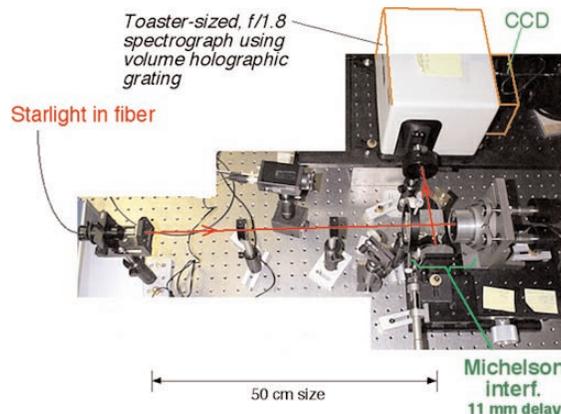
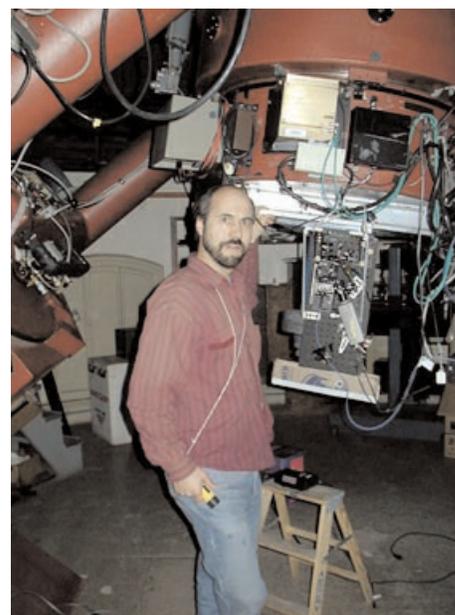
August Meeting

Spectral Interferometry: Making the Doppler Planet Search Practical for Small Telescope Facilities

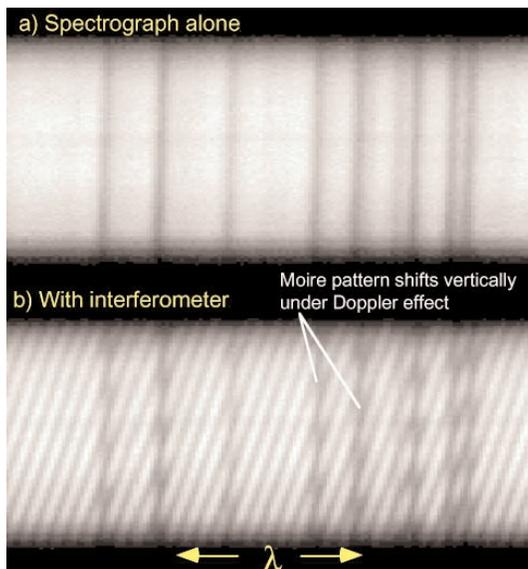
David Erskine

To date almost all exoplanets have been discovered by the Doppler technique, where subtle shifts in the wavelengths of features in the stellar spectra are measured to a precision of one part in 2000 of the width of the feature itself. Previously this required very high resolution grating spectrographs. These instruments are very expensive (several million dollars), bulky (5 meters in length), immobile, and need thermally isolated rooms. Consequently there are only a few of these around the world.

I will describe a new technique that can measure these Doppler shifts to same or better precision, with potentially higher overall light efficiency, and yet is much more compact and inexpensive. It combines a small interferometer with a low or medium resolution grating spectrograph (Fig. 2). The interferometer takes over responsibility for measuring the Doppler shifts. The external spectrograph can have lower resolution now, because its function is just to keep the major spectral features from overlapping each other on the detector and washing each other out. The optical and environmental tolerances on the spectrograph are dramatically reduced.



News & Notes



Figures
3a & 3b

Figure 3a shows a set of absorption lines in a convention spectrograph. Figure 3b shows the effect of introducing the interferometer. A slanted comb of interferometer fringes overlays the vertical absorption lines to create a vertically sinusoidal Moire pattern. This pattern shifts vertically (in phase) under a Doppler shift. These phase shifts can be measured to higher precision than the longitudinal shifts, because the sinusoidal behavior in the vertical direction is mathematically simple, while the blurring behavior of the spectrograph in the horizontal direction is relatively complicated, temperature sensitive, and poorly known to the level of precision desired (1/3000th of a pixel).

I will report on demonstrations of the technique on starlight and sunlight made at LLNL and the Lick Observatory.

David Erskine is a physicist at Lawrence Livermore National Lab with 14 years experience in measuring velocities through the Doppler effect using interferometers, particularly interferometers using white light and other broadband illumination. His introduction to Doppler velocimetry was to measure high velocities involved with shock wave physics experiments. However, during the last 5 years he has been developing new techniques to apply broadband velocity interferometry to astronomy, namely for the detection of extrasolar planets. His goals are to improve the light efficiency and velocity precision over the conventional technique, and to lower the cost so that the Doppler method of planet searching is affordable for the small telescope user.

New Members

TVS welcomes two new members, **Dan Margolis** and **Dave Sopchak and Family**. Please say hello to them the next time you see them at the lecture meeting.

2002 TVS Meeting Dates

Below are the remaining meeting dates for 2002. 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 October 6th deadline is for the October issue).

Lecture Meeting	Board Meeting	Prime Focus Deadline
Aug. 16	Aug. 19	Aug. 4
Sep. 20	Sep. 23	Sep. 8
Oct. 18	Oct. 21	Oct. 6
Nov. 15	Nov. 18	Nov. 3
Dec. 20	Dec. 16	Dec. 8

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Calendar of Events

Classic Sci-Fi Film Series Chabot Space & Science Center

The movies are shown at the Tien MegaDome Theater. At press time there was only one upcoming movie listed. Tickets are \$5 per person and are available at the door, at TicketWeb.com, or the Chabot Box Office, 510-336-7373.

Movies:

Indiana Jones and the Raiders of the Lost Ark (PG),
September 6 – 8

Showtimes:

Friday – Sunday on the first two weekends of each month.

Fridays – 7:30 p.m.

Saturdays – 4:30 & 7:30 p.m.

Sundays – 4:30 p.m.

Newsletter header image: NGC 6781, an 11.8 mag. planetary nebula in Aquila. The image was taken in July by **Gert Gottschalk** using his 13" f/4 Newt and Starlight HX516 CCD camera. It is a composite of 24 4 minute exposures that was then calibrated, averaged and processed with a mild sharpening high pass filter. He then adjusted the brightness and contrast. Gert comments "The final image shows some nice detail in the nebula. It seems there are more than one super-imposed rings at the perimeter. Perhaps there are multiple stacked bubbles in this object. Also on the inside of the nebula are some structure indicating perhaps the presence of some nebula filaments. It would be interesting to know if there are reports from visual observers for this object".

Calendar of Events *continued*

June 29–September 15

What: *The Lost Spacecraft: Liberty Bell 7 Recovered*

Where: Chabot Space & Science Center

Cost: General Admission price

See the actual spacecraft that sunk to the bottom of the ocean in 1961 and learn about its recovery 38 years later. Climb inside a capsule, watch rocket launches, experience centrifuge-training, pilot a remote-controlled vehicle, and learn about the history and technology of space flight.

September 28–29

What: *The ASP's 2002 Annual Meeting*

Where: Various Bay Area locations

Cost: \$35 adults, \$30 ASP members, \$25 students

Is life widespread through the cosmos, or is Earth a lonely oasis? The Astronomical Society of the Pacific cordially invites you to learn more about this fascinating topic by attending its 114th Annual Meeting. The theme of this year's meeting is "The Cosmic Thread: From Stars to Life."

On Saturday, September 28, the Society will be sponsoring a free public astronomy lecture by renowned comet discoverer and author **David H. Levy**. The lecture will be held at 7:30 p.m. in the amphitheater near the summit of Mt. Tamalpais in Marin County. Levy's talk is entitled "From Stars to Life: Suppose You Had to Design a Universe?" A free public star party, sponsored by the San Francisco Amateur Astronomers (SFAA), follows Levy's talk. Don't worry about bringing a telescope; SFAA members will be out in force!

Mt. Tamalpais State Park, which is co-sponsoring the event, is charging \$5.00 for parking permits for all visitors that evening. People can order pre-paid parking permits to guarantee they will have a parking space near the theater.

To purchase a pre-paid parking permit, send a self-addressed stamped envelope and a check for \$5.00 (payable to MTIA) to: MTIA Astronomy Programs, c/o Tinka Ross, 89 Dominican Drive, San Rafael, CA 94901.

Parking is limited, so car pooling is encouraged. If MTIA does not sell all the parking passes before September 28, it will sell the remaining passes on a first-come, first-serve basis at the entrance gate to Mt. Tamalpais State Park.

On Sunday, September 29, the Society will host a full day of lectures by some of the world's leading astronomers. The lectures will run from 9:00 a.m. to 5:35 p.m. at Pimentel Hall on the U.C. Berkeley campus. Scheduled speakers include **Alex Filippenko** (ASP President, U.C. Berkeley), **Geoff Marcy** (U.C. Berkeley), **Chris McKay** (NASA's Ames Research Center), **David Morrison** (NASA's Ames Research Center), **Jill Tarter** (SETI Institute), **Chris Impey** (University of Arizona), **Ben Zuckerman** (U.C.L.A.), and **Seth Shostak** (SETI Institute).

From 7:00 to 10:00 p.m. the ASP will be hosting a reception at the U.C. Berkeley Faculty Club, followed by a dinner banquet in the Heyns Room. Award-winning author and journalist **Timothy Ferris** will speak at the banquet. Following Ferris's talk, the ASP will present its 2002 Annual Awards, including the Society's prestigious Bruce Medal for lifetime achievement in astronomical research. Banquet seating is extremely limited, so please sign up now! Admission to the reception and banquet is \$60.00.

For more details and for registration information, please visit the Society's web site at: www.astrosociety.org/events/meeting.html

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Lecture Meeting:

Unitarian Universalist Church
1893 N. Vasco Road, Livermore

Board Meeting:

Round Table Pizza
1024 E. Stanley Blvd., Livermore

Web & E-mail

www.trivalleystargazers.org

tvst@trivalleystargazers.org

Eyes on the Skies

Eyes on the Skies is a robotic solar telescope run by Mike Rushford (rushford@eyes-on-the-skies.org). You may access it by visiting www.eyes-on-the-skies.org.

Star Parties

Check the club's web site (www.trivalleystargazers.org) for updates and more information.

Aug 10, Sept 7

Sycamore Grove Star Party, Livermore

TVS, in conjunction with the LARPD puts on public star parties at Sycamore Grove in Livermore. If you'd like to help, contact Roger Gathers at 925-455-6039.

Aug 10 thru Oct 12 Mt. Diablo Star Party

The Mt. Diablo Astronomical Society's public star parties on top of Mt. Diablo. Check their web site for more info: <http://members.aol.com/mdas101b/private/index.htm>. Listed are the dates and the topics they will be discussing for each star party.

August 10	"What causes meteor showers?"
September 7	"Why are the days getting longer?"
October 12	"Why is there a North Star?"

August 10 Fremont Peak

The Fremont Peak Star-B-Que will be held August 10 this year. Bring a dish to share and FPOA will provide the hot dogs, hamburgers, veggie burgers, drinks and utensils. There'll be activities for kids and an Astronomical Gastronomical contest. The Star-B-Que and potluck begins around 5:00 p.m. This will be followed with games, the Trivia Contest and door prizes to follow. After that, **Alex Filippenko**, Professor of Astronomy at U. C. Berkeley, will present his talk entitled *Einstein's Biggest*

Blunder? The Case for Cosmic "Antigravity". If you plan to attend, PLEASE call the FPOA hotline 831-623-2465 by August 4 (or even after August 4) and leave your name, number of guests, name of your astronomy club and whether or not you are a FPOA member. Map and more at www.fpoa.net

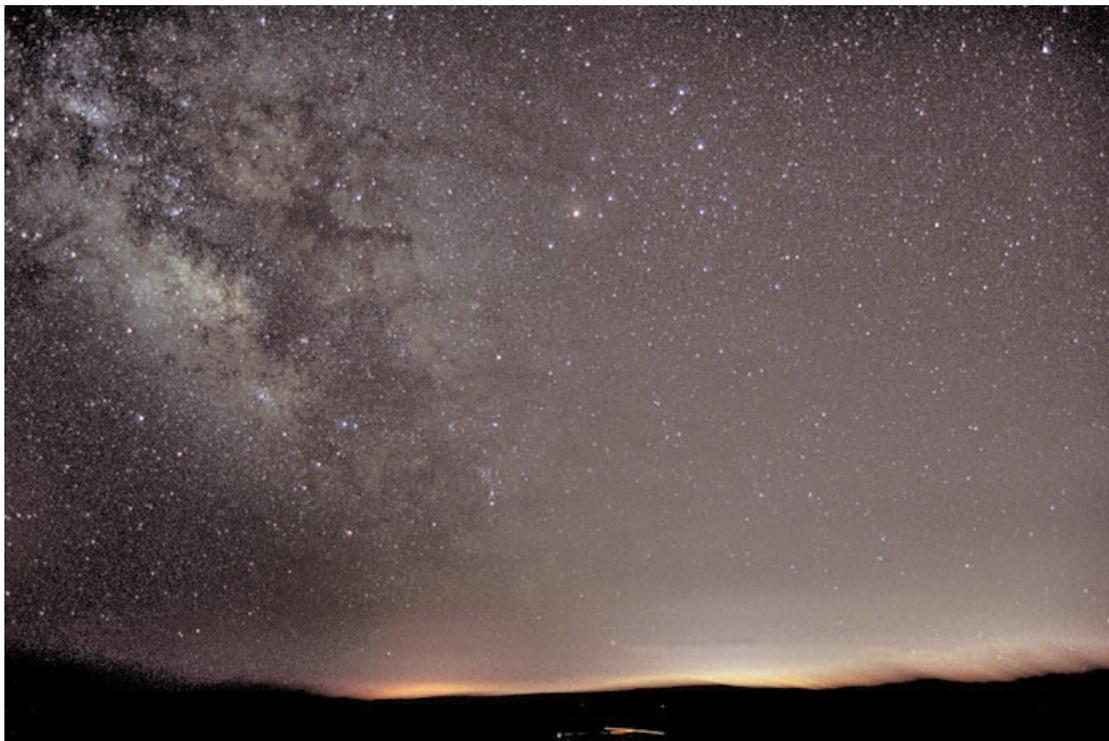
August 28 - September 3 Sierra Foothills

Starry Starry Nights in the Foothills (7 Nites at 7 Sites). A series of star parties will be held in the Sierra foothills area during Labor Day Week. For more information, see the Starry Starry Night Page at www.geocities.com/donmachholz/index.html or call Don Machholz at 530-346-8963.

September 28 H2O Open House

Spend an evening under the stars at the club's dark sky site. Meet at the corner of Mines & Tesla at 6:00 p.m. There is a \$3 per car fee, bring exact change. The observing site is primitive – there are two outhouses and no water or power outlets. Be sure to bring everything you think you might need (e.g., food, water, red flashlights, warm clothing in case it gets cold, extra batteries, your telescope or binoculars, etc.). Expect to stay until after midnight. If you have any questions, contact President **Chuck Grant** at 925-422-7278 or cg@fx4m.com.

Gert Gottschalk took a series of photographs from H2O and stitched them together to create a 360° view. Go to www.trivalleystargazers.org/gert/h2o/h2o_panorama_en.htm to see a daytime view from our dark sky site.



Scorpius Region

This wide field view of the summer Milky Way was taken by **Sibylle Fröelich** in July 2002 from TVS's Hidden Hills Observatory (H2O) site. The image is a 20 min. exposure, using a 35mm zoom setting at f/3.5 and Fuji 100 Superia film. Sibylle scanned the negative and did some processing to compensate for the vignetting. She used an unsharp mask, then adjusted the brightness levels.

Astronomical insights

by David Feindel

“Dark sky”. Magic words to amateur astronomers. I muttered it about every 10 minutes while at the TVS Star Party at Yosemite in July. I’m now beginning to understand the level of light pollution in the Tri-Valley. At Yosemite, the mountains and trees ate up some of the horizon and the forest fires further east contributed some particulates, but did those dark skies make up for it! Not to mention the ambiance of Glacier Point.

The first highlight, of course, was our own Sky Wizard **Dave Rodriguez**, with his lecture on astronomy that touched on observations made thousands of years ago by the Egyptians to the discovery of significant amounts of water on Mars a month ago. Even my 12-year old, who refuses to do anything more intellectual than play computer games during the summer, found it fascinating—and listened intently both nights. Great job, Dave!

Observing Friday night looked a bit problematic at 7:00 p.m., with lots of clouds and haze. But by 9:30, clouds and haze had dissipated leaving those gorgeous dark skies. Like all newbies confronted with their first dark sky, it took awhile to re-orient myself. At Del Valle, Lyra’s four star asterism can be seen. At Yosemite, I saw an additional 17 stars inside the parallelogram. Will be interesting to count at H2O under good conditions.

With 3 family members and a handful of guests to share the ‘scope with, it was GOTO time (purists may want to skip the rest of the paragraph). Besides, I wanted to see if the new AutoStar software and the retraining of the drives made any difference. Did the alignment on Vega and Altair. Punched in M57. Bam. Alberio. Bam. M56. Bam. Called up the “What’s Out Tonight” tour. Thirty-some targets. Thirty-some hits, the vast majority within 15' of the center of the FOV. That’s what EZ astronomy is all about. My prior best was about 50% success; this night’s 95%+ was startling. Those not looking through the ‘scope did “eyeball astronomy”; our count got to 17 satellites, a new record. Do dark skies help make satellites more obvious or perhaps give you a longer window to observe them? We folded up at 1:30 due to exhaustion, leaving the field to a half-dozen other TVSers.

Saturday night’s activities were as fun, but in a different way. Substantial reinforcements arrived in people, telescopes, food, and home-brewed beer. The pot luck dinner was a huge success, and provided a great opportunity to meet and chat with many club members and their spouses. At 7:30, we adjourned to Glacier Point to set up, occasionally looking warily at the clouds overhead. Dave stretched his presentation a bit in hopes of the clouds leaving, but it was not to be. Sucker holes came and went—10 minutes in Lyra, 15 minutes Ursa Major, then 5 minutes in Cassiopeia. By 11:30, we all packed it in.

This month’s web highlight is Rod Mollise’s *From City Lights to Deep Space*. Rod, author of *Choosing and Using a Schmidt-Cassegrain Telescope* and frequent posts to the sci.astro.amateur usenet group, has written a 77-page guide for new astronomers detailing what you should and should not expect to see in small aperture telescopes (roughly defined as 100mm or less). You can find it at <http://skywatch.brainiac.com/citylites/citylites.pdf>. 3.5MB of solid information. You can also find brief reviews and comments on Palm astro software, as well as links to sources.

News & Notes *continued*



Would you buy a used scope from this man?

Scopes for Sale

TVS member **Brinton “Jonsey” Jones** has a couple of scopes he’s trying to sell due to ongoing eye problems. He’s pictured here with one of the scopes, a 10" f/5 truss tube dob with Tech 2000 drive and an eyepiece laser and collimation tool. He’s asking \$2,000 for it. He’s also selling his 18" f/4.5 Telekit, which he just completed this year. Asking price for the 18" is \$4,000. If you’re interested in either one of his large light buckets, drop him a line at bmrjones@pacbell.net or 510-471-1616.

It’s Raining Asteroids and Comets

In the past month there have been several announcements from the astronomy community regarding the discovery of a couple of new asteroids and one new comet.

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What's Up *by Debbie Dyke*

All times Pacific Daylight unless otherwise noted.

August

- 1 Thurs **Last Quarter Moon** 3:22 a.m.
Neptune at opposition 6:00 p.m.
1818 Maria Mitchell born.
- 8 Thurs **New Moon** 12:15 p.m.
White Mountain Star Party trip begins (ends on the 13th).
St. Dominic - patron saint of astronomers.
- 9 Fri Stellafane Convention in Springfield VT begins. The fun ends on the 10th.
- 10 Sat Moon at perigee (225,014 mi) 4:00 p.m.
Fremont Peak Observatory Association's annual Star-B-Q at the Fremont Peak State Park.
- 11 Sun 1877 Asaph Hall Sr. discovers Mars' moon Deimos.
- 12 Mon **Perseid meteors peak** at 3:00 p.m.
- 15 Thurs **First Quarter Moon** 3:12 a.m.
- 16 Fri **Tri-Valley Stargazers general meeting.** 7:30 p.m. at the Unitarian Universalist Church,
1893 N. Vasco Road, Livermore.
- 17 Sat 1877 Asaph Hall discovers Mars' other moon, Phobos.
- 18 Sun **Tri-Valley Stargazers discussion meeting.** 2:00 p.m. at the Round Table Pizza on 1024 E. Stanley
Blvd., Livermore. Get together with your fellow members to chat about all things astronomy related.
- 19 Mon **Tri-Valley Stargazers Board meeting.** 7:00 p.m. at the Round Table Pizza in Livermore.
- 20 Tues Uranus at opposition 6:00 p.m.
- 22 Tues Venus at greatest elongation E (46°) 6:00 a.m.
Full Moon 3:29 p.m.
- 24 Sat 1989 Voyager 2 flies past Neptune.
- 26 Mon Moon at apogee (251,531 mi) 11:00 a.m.
- 30 Fri **Last Quarter Moon** 7:31 p.m.
- 31 Sat Venus 0.9° S of Spica in the west around sunset - 8:30 p.m.

September

- 1 Sun Saturn 2.8° S of Moon 5:00 a.m.
1979 Pioneer 11 is first spacecraft to fly past Saturn. Unless you count those aliens that keep flying by...
- 2 Mon **Labor Day**
- 4 Wed Jupiter 3.3° S of Moon 5:00 a.m.
- 6 Fri Possibility of the Zodiacal Light being visible in the east before morning twilight for the next two weeks.
New Moon 8:10 p.m.
- 7 Sat Moon at perigee (222,422 mi) 8:00 p.m.
- 8 Sun 1966 Star Trek debuts.
- 11 Wed 1816 Carl Zeiss born.
- 13 Fri **First Quarter Moon** 11:08 a.m.

News & Notes *continued*

On July 4th, astronomers discovered an asteroid named 2002 NY40. It measures about 800 meters across, and follows an orbit that ranges from the asteroid belt to the inner solar system. On August 18th, the asteroid will pass by us only 1.3 times farther away from us than the Moon. In July, 2002 NY40 was at 17th magnitude. But on August 18, it is estimated to brighten to 9th magnitude. On that date it will be near Vega. Sky watchers with large binoculars or small telescopes can see it as a speck of light moving 8 degrees per hour. You can see it best after sunset on Aug. 17th. Hours after it passes Earth it will quickly fade away from view.

On July 9, MIT astronomers discovered 2002 NT7, a 2 km-wide asteroid. It spends most of its time far above or below the rest of the solar system. However, every 2.29 years the asteroid passes through the inner solar system not far from Earth's orbit. This is the asteroid that the news media made a big fuss over, as the scientists calculated that there was a chance that it might hit our planet on February 1, 2019. The odds of impact: 1-in-250,000. The odds will change as they get more info about its orbit.

In July, a new comet was discovered by Sebastian Hoenig, a German amateur astronomer. It's now at 10th magnitude, slowly making its way from Andromeda into

Cassiopeia. It should brighten to 9th magnitude by mid-August as it enters the north circumpolar sky, then remain at that magnitude through September as it passes through Ursa Major. Comet Hoenig will reach perihelion (its closest point to the Sun) around October 1st.

Some web sites to check for more info about these fun objects flying through space:

www.spacedaily.com/news/asteroid-02e.html

http://science.nasa.gov/headlines/y2002/30jul_ny40.htm?list517804

http://skyandtelescope.com/news/current/article_685_1.asp

The Summer TVS BBQ

Our July meeting was our annual summer BBQ. The club provided hamburgers and sodas, and TVS members brought lots of good food to share for the potluck portion. Thanks go to VP **Gary Steinhour** who brought his Weber grill, saving TVS the trouble and expense of renting a grill. Thanks also go to our cook for the evening, TVS Librarian **Jim Alves**. After the tables and chairs were put away, the scopes came out for a bit of stargazing.

TVS members and guests enjoying the BBQ & potluck.



PRIMEFOCUS



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

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 _____

Choose one: _____ I wish to download *Prime Focus* from the web (an e-mail notification will be sent to me when it's available for download). I understand that a paper version will *not* be mailed to me.
_____ I wish *Prime Focus* to be mailed to me.

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

Membership category: _____ \$5 Student _____ \$20 Individual _____ \$25 Family
_____ \$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.