PRIMEFOCUS
Tri-Valley Stargazers

June 2005

TVS
Tri-Valley Stargazers

Meeting Info:

What
The Stratospheric Observatory for Infrared Astronomy (SOFIA)

Who
Dr. Jürgen Wolf

When
June 17, 2005
Conversation 7:00 p.m.
Lecture 7:30 p.m.

Where
Unitarian Universalist Church in Livermore
1893 N. Vasco Road

Inside

June Meeting

The Stratospheric Observatory for Infrared Astronomy (SOFIA)
Dr. Jürgen Wolf

Airborne astronomy in the infrared spectral range at NASA's Ames Research Center started in 1965 with a Convair 990 aircraft. In the late 1960's and early 1970's a 0.3 meter (12 inches) telescope was flown on a Learjet, and in 1974 a C141 Starlifter was dedicated as the Kuiper Airborne Observatory (KAO). With its 0.91 meter (36 inches) infrared telescope the KAO operated for over 20 years. Its users have produced over 1,000 refereed science publications and about 50 U.S. and international Ph.D. students have earned their degrees on the flying observatory. Probably the KAO is best known for the discovery of Uranus' ring system in 1977.

In the mid 1980's scientists using the KAO started dreaming of a larger, more capable airborne telescope. The idea of a 3-meter-class telescope operating onboard a Boeing 747 in the dry and infrared transparent stratosphere was born and a name was found—the Stratospheric Observatory for Infrared Astronomy, SOFIA. Advocating the new project to their space agencies, astronomers in the U.S. were seeking funds from NASA and scientists in Germany requested support from the German Aerospace Center DLR. It took both science communities, space agencies and their contractors in industry about a decade of feasibility studies, design and re-design studies, prototyping and wind tunnel tests until the final concept of SOFIA emerged: a 2.7 meter infrared optimized telescope integrated into the aft-fuselage of a B747SP.

In December 1996 NASA and DLR signed a Memorandum of Understanding to jointly develop SOFIA and to operate it for 20 years, sharing the financial burdens and its observing time at a ratio of 80 (U.S./NASA) to 20 (Germany /DLR) percent. In the development phase NASA and its contractors provide the aircraft and its necessary modifications to accommodate the telescope

system and develop the ground support facilities at the Ames Research Center. DLR funds the development of the SOFIA telescope in German industry and supports its integration into the aircraft including functional and performance testing.

The original project schedule had called for completion of the observatory and a start of its observing flights in 2001. However, the complexity of the SOFIA system had been underestimated. For example, major difficulties had to be solved in the design and for the flight safety of the shutter mechanism (called 'door') in the fuselage covering the telescope during take-offs and landings. On the telescope side, achieving the pointing stability requirement of 0.2 arcseconds (RMS) onboard the flying aircraft with wind loads when the door is open, is a major engineering challenge that can only be completed when in-flight performance data are available to optimize the stabilization system and its algorithms.

The mechanical integration of the telescope into the aircraft has been completed in early 2004 and first ground tests with real starlight were conducted successfully in the summer of 2004. Now, in mid 2005, SOFIA is approaching the completion of the aircraft modifications. When all paperwork for the re-certification with the Federal Aviation Administration (FAA) is completed, the first test flight series can commence—currently anticipated for late 2005/early 2006.

While SOFIA is approaching the finish line to become a widely usable and versatile observatory, nine groups of universities and research institutes in the U.S. and in Germany are working to complete scientific receiver instruments that they hope to attach to the flying telescope as soon as possible. Three infrared cameras will cover a wavelength range of 1 to 240 μm, and five grating, Fabry-Perot and heterodyne spectrometers will work at wavelengths of 60 to 650 μm and up to a very high spectral resolution of $\lambda/\Delta\lambda \sim 1{,}000{,}000$. In addition to these infrared instruments, a high-speed imaging photometer in the visible will take advantage of the airborne observatory's mobility to investigate localized events such as occultation and eclipses. The science programs that are being prepared for SOFIA target a wide range of objects, from solar system bodies and their atmospheres to the most distant galaxies, including observations of extra-solar planets and of proto-planetary and debris disks around stars.

Home base for SOFIA will be at Moffett Field. To observe objects in the Southern skies, deployments to New Zealand are planned once or twice a year. The telescope will also visit its home country during trips to Stuttgart, Germany, where the operations management center for the German part of SOFIA is now located.

News & Notes

2005 TVS Meeting Dates

Below are the TVS meeting dates for the next few months. The lecture meetings are on the third Friday of the month, with the Board meetings on the Monday following the lecture meeting. The Prime Focus deadline applies to that month's issue (e.g., the July 3rd deadline is for the July issue).

Lecture Meeting	**Board Meeting**	***Prime Focus* Deadline**
June 17	June 20	June 6
July 15	July 18	July 3
Aug. 19	Aug. 22	Aug. 7

Money Matters

At the May Board meeting, Treasurer **Gary Steinhour** reported the TVS account balances (as of May 21, 2005):

Checking	$1,435.02	
CD #1	$3,469.59	matures 08/17/05
CD #2	$2,443.34	matures 05/27/05
CD #3	$1,081.23	matures 07/16/05

We Have A Winner!

TVS member **Hilary Jones** is the winner of Meade's Messier Challenge—his prize is a new 10" RCX400 telescope!

This image of M16, the Eagle Nebula, is representative of the photos submitted to Meade. To see more of his winning images, go to Meade's web site: www.meade.com/messier/winners/hilary_jones.html.

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Newsletter header image: M97 - The Owl Nebula
This image was taken with an 8" Meade LX200GPS, f/3.3 focal reducer, using an Alt/Az mount. The shot was unguided. Exposure time: 3.3 hours, 10-30 seconds/frame, some with red filter. This is an example of the image submitted to Meade for their contest (see above).
Photo by: Hilary Jones

Calendar of Events

June 11, 8:30 p.m.
What: *Galaxies Like to Live Together*
Who: Dr. Roy R. Gal (U.C. Davis)
Where: Mt. Tam
Cost: Free

How are galaxies distributed throughout the universe and what can surveys of galaxy clusters teach us about cosmology.

Program is held in the Mountain Theater on Mt. Tam. Weather permitting, after the lecture there will be telescope viewing in the Rock Spring parking lot. For more information visit www.mttam.net and the SFAA web site www.sfaa-astronomy.org/sfaa/starparties/index.shtml.

July 9, 8:30 p.m.
What: *Postcards from Saturn: Cassini Explores the Lord of the Rings*
Who: Dr. Mark Showalter (SETI Institute)
Where: Mt. Tam
Cost: Free

An update on the latest and greatest results from the Cassini Spacecraft, revealing wonders of the Saturn's rings, moons and clouds.

Program is held in the Mountain Theater on Mt. Tam. Weather permitting, after the lecture there will be telescope viewing in the Rock Spring parking lot. For more information visit www.mttam.net and the SFAA web site www.sfaa-astronomy.org/sfaa/starparties/index.shtml.

August 27, all day
What: *AANC-Con 2005*
Who: You
Where: Randall Museum, San Francisco
Cost: $25

The AANC (Astronomical Association of Northern California) is a group that promotes communication and coordination among Northern California astronomy clubs, planetaria, observatories, and businesses. TVS is a member of the AANC.

This year's conference is a celebration of Bay Area astronomy. The one day conference will have various speakers and vendors, as well as a celebration of John Dobson's 90th birthday with a 'Dob In A Day' scope making project.

Details are still in the works. Some of the speakers who are scheduled include author Timothy Ferris, and space artist Lynette Cook. A partial vendor list includes Celestron, Meade, Scope City, Parks Optical, Lumicon, and TeleVue.

Cost includes entrance to all lectures, exhibit space, workshop, plus a box lunch. T-shirts and lapel pins, designed by yours truly, will be available for purchase.

Check www.planitarium.net/aanc/aanc-con2005/program_guide and http://sfsidewalkastronomers.org/news-articles/aanccon2005main for more info. Plans are in the works for online registration, although that hasn't happened yet at press time.

Astro Events

Jupiter Transits

Below is a listing of transit times for various Jupiter related objects. The abbreviations are fairly straight forward: G=Ganymede, C=Callisto, I=Io, E=Europa, GRS=Great Red Spot, and if you see an 's' next to one of the moons, it means its shadow (e.g., Cs=Callisto's shadow); na means Jupiter is below the horizon or it is daylight at that time.

June

Tues 7	G	10:47p	11:59p	1:28a
	GRS	11:15p	1:06a	na
Wed 8	GRS	na	na	10:52p
Thurs 9	E	na	9:13p	10:37p
	I	9:19p	10:24p	11:31p
	Es	10:20p	11:26p	1:01a
	Is	10:29p	11:22p	12:39a
Fri 10	GRS	12:48a	na	na
	GRS	na	10:43p	12:37a
Sun 12	GRS	10:23p	12:19a	na
Wed 15	GRS	na	9:49p	11:47p
Thurs 16	E	10:28p	11:47p	1:10a
	I	11:11p	12:16a	1:23a
Fri 17	Is	12:24p	1:16a	na
	Es	12:58a	2:01a	na
	GRS	9:28p	11:27p	1:30a
Sun 19	GRS	11:13p	1:05a	na
Wed 22	GRS	na	10:40p	12:30a
Sat 25	GRS	10:17p	12:17a	na
	GRS	na	na	10:00p
	I	na	na	9:44p
	Is	na	9:41p	10:57p

July

Fri 1	GRS	11:13p	na	na
Sat 2	GRS	na	8:57p	10:52p
	I	9:27p	10:30p	11:39p
	Is	10:42p	11:35p	12:51a
Mon 4	Es	na	na	10:08p
	GRS	na	10:34p	12:40a
Wed 6	Gs	na	na	9:55p
	GRS	10:10p	12:13a	na
Thurs 7	GRS	na	na	10:00p
Sat 9	GRS	na	9:45p	11:50p
	I	11:23p	na	na

White Mountain Star Party

Dave Rodrigues

For several years we have talked about scheduling our annual high altitude observing trip to span two weekends and the week between them. An obvious time to do this presents itself in early August 2005. This is a joint activity of TVS and the Eastbay Astronomical Society. TVS will be doing the public observing sessions at Glacier Point in Yosemite on Friday, July 29 and Saturday, July 30. This is an outstanding location for public observing.

The annual low oxygen star party will be held again this summer at the Barcroft Lab at 12,435 feet elevation in the White Mountains northeast of Bishop, CA. Barcroft is part Shangri-La and part Antarctic Research Station. You'll NEVER forget your view of the Milky Way from Barcroft! You'll also have great fun hanging around with some of the best amateur astronomers in the world and comparing notes.

We will be there in early August this year and have up to seven nights of observing from this outstanding site. The schedule calls for assembling at the Grandview Campground (8,600 ft) the night of Sunday, July 31. This is an important stopover to begin adjusting to the altitude. If you don't want to camp out here we strongly encourage spending the night at Mammoth Lakes (as some who have camped out in Yosemite for two nights will want to do) which is at about 8,000 feet (Several of us regularly stay at the Swiss Chalet in Mammoth). Spending the whole weekend at altitude would help even more. On Monday, August 1 we go up past the Bristlecone pines to Barcroft. You don't have to arrive that day if you don't want to. The longer the stay the better the chance of good weather and the easier it gets to do almost anything at that altitude. Most people will probably stay until Sunday, August 7 and a few until Monday, August 8. New Moon is in the evening of Thursday, August 4 so the whole week will provide dark skies. Note that it is possible to do the over weekend stay like in the past by coming to Barcroft on Friday, August 5th.

The nearest significant source of light pollution is Las Vegas which is 200 miles away then the Pomona-Ontario-San Bernardino area about 250 miles to the South. The Milky Way actually looks like a galaxy from there. Limiting magnitude is 6.4, conservatively estimated.

The Barcroft Lab is a research facility and there are usually scientists there conducting high-altitude studies. Meals and bunk beds are provided and the cost is only $55/day/person. There are showers, real flush toilets, and the highest pool table in the United States as well as other luxuries and comforts (e.g., satellite TV) not normally associated with dark sky observing. The food is consistently excellent!

Due to the level of research at Barcroft we are limited in the number of participants (usually about 20 but sometimes fewer). Priority will be given to those staying three nights or more. Send your check for $55 per person per night payable to Dave Rodrigues, 1633 Graff Ct., San Leandro, CA 94577. If you have questions contact Dave at 510-483-9191 or davevrod@aol.com.

Astronomical Insights

by David Feindel

As mentioned last month, I'm on a quest to improve the wide-field views in my SCT. I had acquired a second-hand Meade SWA 40mm eyepiece two years ago, but wasn't particularly pleased with its performance. My complaint was that stars weren't in focus across the field of view. So I recently acquired a second 40mm eyepiece, a Pentax XL. Again, second-hand, although this one was noticeably closer to "new", with no setscrew marks on the barrel and no visible dust/dirt around the edges of the glass.

How to compare them? Given the usual clouds moving in whenever any astronomical gear is purchased, I started off with tests I could do during daylight, looking for any color cast. The Meade, it turns out, has a slight greenish cast when viewing a white target (your basic copy machine paper). Not much, and not noticeable, except in a direct comparison. Probably not noticeable at all when looking at stars, except that now I mentally know its there—and it will bother me for the rest of eternity. Physically, they are surprisingly different; the Pentax is about 30% lighter, slightly smaller in both diameter and height, and has shorter eye relief (with EPs of this focal length, that's an advantage). The apparent field of view slightly favors the Meade, 67° to 65°. When new, the Meade actually cost a bit more, but since both are now discontinued, that's a moot point.

More importantly, though, how do they compare astronomically? The first test was to look at the moon. Or rather look just off to the side to compare the light scatter. No noticeable difference. Moving the scope slightly to frame the first-quarter moon in the center of the FOV, both showed crisp, sharp edges, with no color fringe. Both have fully multi-coated optics and blackened interior surfaces. A toss-up.

Looking at Jupiter was next on the list. Not quite sure what I was looking for, as 50x magnification wasn't going to show any festoons in the belts, regardless of the optical quality. But the views were crisp, and the three visible moons were all seen as small disks. Jupiter is always interesting to look at, at just about any magnification. After all, that's the real purpose in amateur astronomy. This also convinced me that my idea of looking at close doubles wasn't going to be very revealing.

It was time to go look at open clusters. Here I could judge how uniform the field of focus is. So off to the M's in Auriga. Always favorites, M36, 37, and 38 cover the range of open cluster density. All three are small enough to comfortably fit in the field of view, about 80 arc minutes in diameter. I knew the Meade would have problems. Focusing carefully on the central stars to bring them to sharp focus, stars about half way out started to grow wings. Turning the focus knob about 20 degrees brought the outermost stars into focus. Repeating this experiment with the Pentax showed improvement, but not perfection. Rotating the focus knob about 10-15 degrees was required to bring everything into focus. (BTW, these two EPs are very, very close to being par focal.). By this time, my scope had been outside for two plus hours, so I checked the collimation. At 290x, the out-of-focus diffraction rings are still round, both inside and outside of focus. So perhaps not perfectly collimated, but pretty close.

The conclusion? As usual, further testing is necessary. There is a problem, either with my eyes or the scope itself. But two reputable EPs having the same problem imply the problem is elsewhere. As to which one to keep? Probably the Pentax, simply because its lighter and smaller, and most of my other EPs are also Pentax. But both are good.

News & Notes *continued*

July Nuptials

Congratulations to TVS member **Gert Gottschalk** for his upcoming wedding to long time girlfriend **Sibylle Fröhlich**. Sibylle is the president of the astronomy club that meets at the Wilhelm-Foerster-Observatory in Berlin. Sibylle gave a presentation on Martian volcanology to TVS a few years back. Gert will continue to work in Fremont, while Sibylle will continue to work in Berlin. Too bad transporter technology won't be invented for a few centuries yet.

In case your German is a little rusty, the wedding annoucement says "Even light years can't keep us apart. We marry!".

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What's Up *by Debbie Dyke*

All times Pacific Daylight Saving Time unless otherwise noted.

June

6 Mon **New Moon** 2:55 p.m.

8 Wed 1625 Giovanni Cassini born.

9 Thurs Double shadow transit on Jupiter. Europa & Io's shadows start their transit at 10:20 and 10:29 p.m., respectively. They reach the midpoint at 11:26 p.m. (Europa) and 11:22 p.m. (Io). The transit ends as Io's shadow exits at 12:39 p.m., followed by Europa's at 1:01 a.m.
Saturn 5° South of the Moon as they set in the West. 9:00 p.m.

10 Fri Moon at apogee (251,413 miles) 11:00 p.m.

13 Mon Pluto at opposition. 8:00 p.m.
1831 James Clerk Maxwell born.
1944 JPL was formed; originally called Air Corps Jet Propulsion Research Project.

14 Tues Venus at perihelion.
First Quarter Moon. 6:22 p.m.

15 Wed Jupiter 1° 12' North of the Moon. 12:00 a.m.

16 Thurs 1963 Valentina Tereshkova becomes the first woman in orbit.

17 Fri **Tri-Valley Stargazers general meeting**. 7:30 p.m. at the Unitarian Universalist Church, 1893 N. Vasco Road, Livermore.
Double shadow transit on Jupiter. Io's shadow starts to appear around 12:24 p.m., followed by Europa's at 12:58 a.m. Saturday morning. Io reaches it's midpoint at 1:16 a.m., Europa at 2:01 a.m. The transit ends for both of them after it gets light.

18 Sat 1983 Sally Ride becomes the first U.S. woman in space, 20 years after USSR sent Valentina up for a spin.

19 Sun Father's Day.
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.

20 Mon **Summer Solstice** 11:46 p.m.
Tri-Valley Stargazers Board meeting. 7:00 p.m. at the Round Table Pizza in Livermore.

21 Tues **Full Moon** 9:14 p.m.

22 Wed 1675 Royal Greenwich Observatory founded.
1978 James Christy discovers Pluto's satellite Charon.

23 Thurs Moon at perigee (222,996 miles) 5:00 a.m.
Venus 5° South of Pollux (22° E) 500 a.m.

24 Fri Mercury 5° South of Pollux (21° E) 1:00 a.m.
Neptune 5° North of the Moon. 9:00 p.m.

25 Sat 1178 Five British monks observe an impact on the crescent Moon. Theory has it that the resulting crater is the one we know as Giordano Bruno.

26 Sun 1730 Charles Messier born.
1824 Lord Kelvin born.

28 Tues Last Quarter Moon 11:23 a.m.
Mars 2° South of the Moon. 9:00 p.m.

29 Wed 1868 George Ellery Hale born.

30 Thurs 1905 Einstein submits his new theory of special relativity.
1908 An asteroid breaks up and explodes over Siberia near Tunguska with the force of a hydrogen bomb. Ka-boom.

Seeing in the Dark with Spitzer

by Patrick L. Barry and Tony Phillips

Have you ever gotten up in the middle of the night, walked to the bathroom and, in the darkness, tripped over your dog? A tip from the world of high-tech espionage: next time use night-vision goggles.

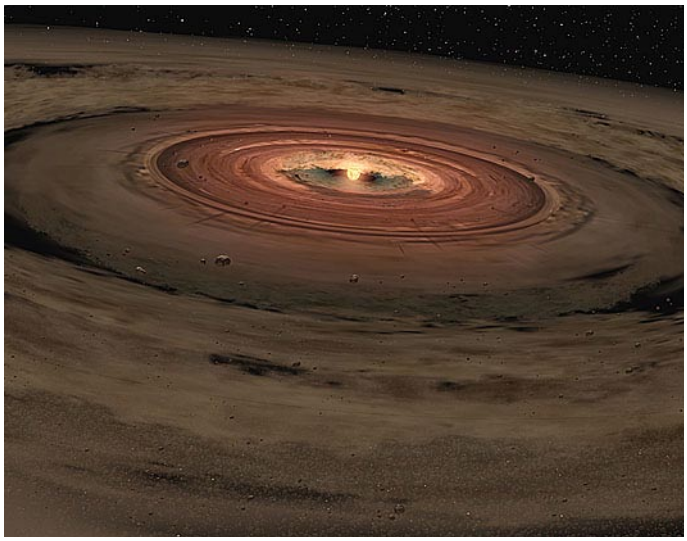
Night vision goggles detect heat in the form of infrared radiation—a "color" normally invisible to the human eye. Wearing a pair you can see sleeping dogs, or anything that's warm, in complete darkness.

This same trick works in the darkness of space. Much of the exciting action in the cosmos is too dark for ordinary telescopes to see. For example, stars are born in the heart of dark interstellar clouds. While the stars themselves are bright, their birth-clouds are dense, practically impenetrable. The workings of star birth are thus hidden.

That's why NASA launched the Spitzer Space Telescope into orbit in 2003. Like a giant set of infrared goggles, Spitzer allows scientists to peer into the darkness of space and see, for example, stars and planets being born. Dogs or dog stars: infrared radiation reveals both.

There is one problem, though, for astronomers. "Infrared telescopes on the ground can't see very well," explains Michelle Thaller, an astronomer at the California Institute of Technology. "Earth's atmosphere blocks most infrared light from above. It was important to put Spitzer into space where it can get a clear view of the cosmos."

The clear view provided by Spitzer recently allowed scientists to make a remarkable discovery: They found planets coalescing out of a disk of gas and dust that was circling—not a star—but a "failed star" not much bigger than a planet! Planets orbiting a giant planet?



Artist's rendering of brown dwarf OTS44 with its rotating planetary disk.

The celestial body at the center of this planetary system, called OTS 44, is only about 15 times the mass of Jupiter. Technically, it's considered a "brown dwarf," a kind of star that doesn't have enough mass to trigger nuclear fusion and shine. Scientists had seen planetary systems forming around brown dwarfs before, but never around one so small and planet-like.

Spitzer promises to continue making extraordinary discoveries like this one. Think of it as being like a Hubble Space Telescope for looking at invisible, infrared light. Like Hubble, Spitzer offers a view of the cosmos that's leaps and bounds beyond anything that came before. Spitzer was designed to operate for at least two and a half years, but probably will last for five years or more.

For more about Spitzer and to see the latest images, go to www.spitzer.caltech.edu/spitzer. Kids and grown-ups will enjoy browsing common sights in infrared and visible light at the interactive infrared photo album on The Space Place, http://spaceplace.nasa.gov/en/kids/sirtf1/sirtf_action.shtml.

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

News & Notes *continued*

Club Secretary & Program Director Needed

Our Secretary, **Mike Rushford**, has to step down from his duties due to a scheduling conflict. We are in need of someone to take over the secretarial duties. Attendance at the majority of the board meetings is required, as the secretary is the one taking the meeting minute notes. The secretary is also responsible for handling what little correspondence comes through our PO box.

The club is also still in need of a Program Director—someone to handle the task of getting speakers for the club meetings.

If you are interested in either position, please talk with any Officer or Board Member.

H2O Open House

We have two Open House nights scheduled for our dark sky site, H2O. The first is coming up on June 25th. August 27 is the second Open House night.

Marling Scope Progress Report

As those who attended the April TVS meeting can attest, the repairs and upgrade to the Marling scope mount is complete. The mount is at H2O awaiting installation.

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.