

Sonoma Skies

Newsletter of the Sonoma County Astronomical Society
A nonprofit scientific and educational organization

www.sonomaskies.org



March 2007

Volume XXX No. 3



The 2007 Striking Sparks Winners!

2007 Striking Sparks Award Celebration

by *Larry McCune, Striking Sparks Coordinator*

The Striking Sparks awards celebration was held at the Young Astronomers (YA) meeting at Apple Blossom School in Sebastopol Friday evening, February 16. Adult Advisor Gary Jordan and YA President Melissa Downey kicked off the meeting as the room was filled with the excitement of Striking Sparks winners anticipating the receipt of their telescopes.

Len Nelson organized some Young Astronomer members so they could perform some important tasks: Jeffrey Knoll demonstrated how a Newtonian telescope works, why the image is up-side-down and why mirror size matters; Christopher O'Connor explained how to use a Planisphere and why it worked; Blaine Eldred (2007 Sparks winner) explained how to align the finder on the new Sparks scopes; how to collimate the mirror & how to assemble & disassemble it and Gary Jordan explained and demonstrated how to clean eyepieces.

Larry McCune reflected on how the Sparks Program began with Bob Ferguson's desire to create an interest in science and astronomy by having children involved in amateur astronomy. Bob had shared his telescope making skills with a few in the Petaluma area. His goal was striking that spark of interest. Larry joined Bob in fabricating the first 5 telescopes to be awarded and with the involvement of many more SCAS volunteers grinding mirrors, fabricating parts, painting and assembling telescopes the program expanded. This is the 22nd year of the program and 206 telescopes



Surprise Program

SCAS March 14 Meeting, Proctor Terrace School

Join us for an evening with fellow members. Use this opportunity to sell or trade astronomy items at our silent auction table.

COMING TO SCAS IN APRIL

Dr. Adrienne Cool of San Francisco State, speaking on globular clusters.

have now been awarded. We were pleased that June Ferguson attended the awards ceremony.

This year six Sonoma County school children were selected to win telescopes after they wrote astronomy essays and attended Young Astronomers meetings or the Robert Ferguson Observatory public programs. The winners are:

- Sara Bunyard*, 4th Grade, Merryhill School
- Blaine Eldred*, 6th Grade, Miwok Valley Elementary
- Adam Ferrick*, 5th Grade, Grant Elementary
- Casper Max*, 2nd Grade, Healdsburg Elementary
- Christopher Spitzka*, 4th Grade, Healdsburg Elementary, Fitch Mountain Campus
- Esther Unti*, 5th Grade, Healdsburg Elementary, Fitch Mountain Campus

The sponsors were represented by Cecelia and Dennis Yarnell, Walt and Sandra Bodley, Sam Sweiss of Scope City, and Kenneth Frank representing AANC, the Astronomical Association of Northern California. Representatives of the Frank Hejtmanek Fund, Robert Leyland or Larry and Erika Koneck were unable to attend. The Frank Hejtmanek Fund was established in his memory to sponsor a

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Sparks Winner Casper Max with sponsors Kenneth Frank from the AANC and Sam and Maria Sweiss of Scope City

Young Astronomers See page 6

Sonoma County Astronomical Society (SCAS)

Membership Information

Meetings: 7:30 PM on the second Wednesday of each month, in the Multipurpose Room of Proctor Terrace Elementary School, 1711 Bryden Lane at Fourth Street, Santa Rosa, unless otherwise announced in this publication. The public is invited.

Dues: \$25, renewable June 1 of each year. New members joining between December 1 and May 31 pay partial-year dues of \$12.50.

Star Parties: See the Events section for dates and times.

Rental Telescope: Members are eligible to borrow the club's 80mm refractor with tripod. Contact any Board member listed below.

Egroup URL: Connect with other members about going observing, observing reports and chat about astronomy and news items from AANC and *Sky & Telescope*. Hosted by Robert Leyland at r.leyland@verizon.net. Any SCAS member is welcome to join. Visit <http://groups.yahoo.com/group/scas> and click the "Join" button, or send an email to scas-subscribe@yahoogroups.com

Discount Subscriptions: For *Sky & Telescope*, new subscribers may send a check for \$32.95 payable to "SCAS", with your complete mailing address, directly to: Larry McCune, 544 Thyme Place, San Rafael, CA 94903. For renewals, send him your check with the completed renewal card and return envelope. Discount subscriptions to *Astronomy* Magazine occur annually in October. Check *Sonoma Skies* for details.

Library: SCAS Librarian Joan Thornton hosts a library of astronomy books that may be checked out by members at SCAS meetings, to be returned at the next meeting. Videotaped lectures on astronomy may be rented for \$3 per month.

Sonoma Skies is the monthly newsletter of the Sonoma County Astronomical Society (SCAS). Subscription is included as part of membership. Articles and member announcements are welcome and are published on a first come, first served basis, space permitting, and may be edited. **The deadline for submissions is 10 days prior to the end of each month.** Mail to: Editor, SCAS, P.O. Box 183, Santa Rosa, CA 95402, or email publications@sonomaskies.org

SCAS Elected Board

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SieraMolly@aol.com

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Visit us on the web at:
www.sonomaskies.org

ASTRONOMY, S&T BACK ISSUES

A former club member needed to clear out his workspace and wants to pass along roughly 20 years of *Astronomy* and *Sky & Telescope* magazines to a good home. They are sorted and boxed by year and in good shape. Give Bruce Lotz a call at 576-7833 if you are interested in this collection—they're in his garage now.

OCCULTATION RESEARCH PROJECT

There is a research project observing occultations of stars by Pluto. Careful studies give valuable information about the atmosphere of Pluto! The next event is 18 Mar 2007. Researchers are seeking amateur astronomers to help out (and be listed as authors on any resulting paper). Franck Marchis gave a talk about this project and you can see slides of his talk at http://astro.berkeley.edu/~fmarchis/document/Pluto18Mar2007/pluto_charon_occ.pdf

If interested, contact Franck Marchis at fmarchis@berkeley.edu



Goldstonebowl - size comparison 70 meter antenna in the Rose Bowl

Photo: Jane Houston Jones

A VISIT TO DSN GOLDSTONE

by Jane Houston Jones

The DSN comprises three Deep Space Network (DSN) Communication Complexes. To compensate for Earth's rotation and allow 24-hour communication with distant spacecraft, the complexes are located about 120 degrees apart in longitude. The Jet Propulsion Laboratory, a division of the California Institute of Technology, manages the DSN for NASA.

The Australian complex is located 40 kilometers (25 miles) southwest of Canberra near the Tidbinbilla Nature Reserve. The Spanish complex is located 60 kilometers (37 miles) west of Madrid at Robledo de Chavela. The Goldstone complex is located on the U.S. Army's Fort Irwin Military Reservation, approximately 72 kilometers (45 miles) northeast of Barstow, CA. Each complex is situated in semi-mountainous, bowl-shaped terrain to shield against radio frequency interference.

Recently, a group of Cassini-Huygens Mission outreach and science planning staff scheduled a visit to Goldstone. It's been on my list of things to do and places to see for a long time, so I signed up immediately.

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March Observing Notes

- 3/1 Moon near Saturn
- 3/3 The Full Moon occurs at 9:45 PM; Occultation of Rho Leo: Mag 3.8 rho Leonis disappears behind the “dark” limb of a nearly full moon at about 0224. The moon is at alt/az of 46/238.
- 3/11 Daylight Saving Time begins at 2:00 AM.
- 3/11 Last Quarter Moon
- 3/17 It’s Messier Marathon time—see below
- 3/18 New Moon
- 3/20 Vernal Equinox at 5:07 PM
- 3/21 Mercury at greatest elongation W
- 3/25 First Quarter Moon
- 3/28 Moon near Saturn
- 3/29 Moon near Regulus
- 4/2 Full Moon

Observing Treats

Zodiacal Light: March continues good observing of this phenomenon. See last month’s issue for more details.

Mercury appears in the presunrise east-southeast from about March 16-28, reaching greatest elongation west on March 21. It’s a poor apparition, though: ~28° elongation, ~5° altitude 30 minutes before sunrise.

Messier Marathon: This year’s optimum dates for a Messier marathon fall on the weekend of March 17-18 during the new moon. Now, if the weather cooperates, it’ll be perfect! Here are a couple of websites to help you prepare:

<http://www.messiermarathon.com/>, and

<http://www.richardbell.net/marathon.html> (click on the link at the bottom to get the Messier list).

—Some of above info courtesy of Jack Welch

USEFUL LINKS

AstronomyCast: Thanks to Robert Davis for the tip on this podcast, available at <http://www.astronomycast.com/>. According to Robert, you can subscribe through iTunes or download the mp3 files directly from their archives: www.astronomycast.com/archive. The shows are about a half hour long, come out weekly and have so far covered everything from getting started in amateur astronomy to Special Relativity and Dark Matter.

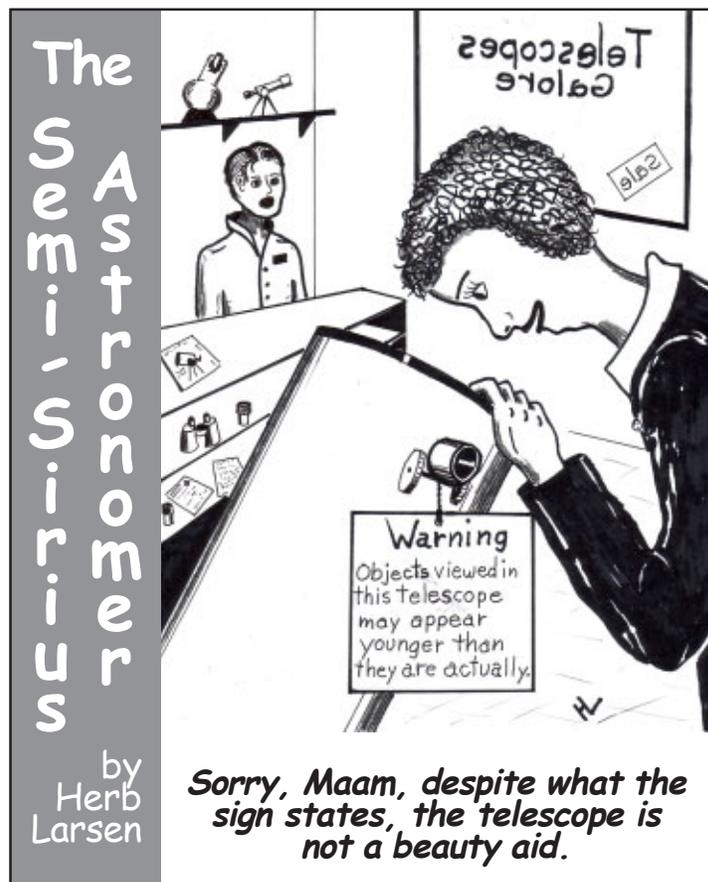
Bay Area Resources: I thought it was time to remind you of some of the great destinations you can enjoy right here in the Bay Area, in addition to those we usually list in the newsletter:

Lawrence Hall of Science, Berkeley:
<http://www.lawrencehallofscience.org/>

NASA Research Park, Moffett Field:
<http://researchpark.arc.nasa.gov/>

Chabot Space & Science Center, Oakland:
<http://www.chabotspace.org/>

Lick Observatory, Mt. Hamilton:
<http://www.ucolick.org/public/sumvispro.html>



SOCIAL AMENITIES

Thanks to Emilio Ricci and John Jaffray for providing coffee and refreshments at the February meeting.

You can sign up to provide refreshments at a meeting, too. It’s easy! Just contact any Board member and choose a month.

WELCOME NEW MEMBER!

The SCAS wishes to welcome to Alan Karbousky of Santa Rosa.

SILENT AUCTION

Bring any astronomy-related items you wish to sell to the February meeting. Another member might be looking for that very thing!

Scope City
New Member Bonus!

- Scope City at 350 Bay Street, San Francisco, is offering a
- **\$25 merchandise discount to new members.**
- Manager Sam Sweiss has supported SCAS and Striking
- Sparks and offers a huge selection of telescopes, accessories
- and more. Obtain a receipt from Walt Bodley, Membership
- Director, showing you have paid the \$25 SCAS membership
- dues. To arrange for your merchandise discount, contact
- Sam at 415/421-8800 or at sanfrancisco@scopecity.com

Events

ROBERT H. FERGUSON OBSERVATORY

Public Viewing: Saturday, March 17

Solar Viewing: 12:00 AM - 4:00 PM

Night Viewing begins 8:00 PM

The Observatory: Three scopes are operating: The 14-inch SCT with CCD camera in the East wing, the 8-inch refractor under the dome and the 24-inch Dobsonian in the West wing. No admission fee for the solar viewing, but donations are appreciated. The Park charges \$6 per vehicle for entry. A \$2 donation is requested from adults 18 and over for admission to the observatory during night viewing sessions. SCAS members may set up telescopes in the observatory parking lot to assist with public viewing. Auto access closes at dusk; late arrivals must carry equipment from the horse stable parking area.

Classes, Labs

Night Sky Spring Series #3, Mar. 13, 7:30 PM

Night Sky Spring Series #4, Mar. 20, 7:30 PM

Each class includes a lecture on the constellations of the season, their history and mythology, and how to find objects within them. Learn the bright stars, deep-sky objects, and visiting planets of the spring skies. After each presentation (sky conditions permitting), enjoy a review of the constellations in the actual night sky and learn how to find them for yourself. Viewing through telescopes follows.

Fees: \$75 for the series of six presentations. (Single session fee is \$23). Classes are held at the Observatory. Reservations recommended. (707) 833-6979, <http://www.rfo.org> or nightsky@rfo.org

Reserve the Observatory!

Groups of up to 50 can be accommodated. Astronomer docents provide sky interpretation and operate telescopes, and you can stay up as late as you want! Make your reservation at least two weeks prior to your event. Best times for optimal sky gazing are any time more than a week away from a Full Moon.

In addition to \$111 charged by the RFO for use of the observatory facilities, the State Park System charges \$111 for use of the *Group Campground*. Because it is adjacent to the Observatory, the group camp must be reserved for private events. Total Cost: \$222. For information on how to reserve, visit www.rfo.org or contact George Loyer at gloyer@rfo.org.

SSU OBSERVATORY PUBLIC VIEWING

Mar. 16, 8-10 PM: Saturn, Eskimo Nebula, Cone Nebula

Observatory located inside the stadium area at the SE corner of campus (E. Cotati Ave. and Petaluma Hill Rd., two miles east of US 101). Follow signs to campus. Parking Lot F is most convenient. Call 707/664-2267 before coming if it appears weather may force cancellation. <http://www.phys-astro.sonoma.edu/observatory/pvn.html>

SRJC PLANETARIUM

"Sixteen Years of Hubble" begins Mar. 9

In this show we celebrate the 16 year life of the Hubble Space Telescope. Through a myriad of vivid images you will see nature's sculpting of stars from gas and dust; observe the dramatic end of stellar life; view spectacular galaxies as they swirl, collide, and erupt from galactic black holes; and look to the most distant reaches of the universe.



Shows are held at Santa Rosa Campus, Lark Hall, Room 2001, on Fridays and Saturdays at 7:00 PM and 8:30 PM,

Sundays at 1:30 PM and 3:00 PM during the Fall and Spring semesters. Admission is \$5 General; \$3 Students and Seniors (60+). Tickets are sold at the door only, beginning 30 minutes before show time. A parking permit is required and is included in the Planetarium admission price. Pick it up at the planetarium when you pay admission. Please arrive early enough to place your permit on your vehicle's dashboard before the show starts.

Info: 527-4372, <http://www.santarosa.edu/planetarium/>

SONOMA STATE UNIVERSITY SERIES "WHAT PHYSICISTS DO"

Mondays at 4:00 PM

Darwin Hall Room 103 (Coffee at 3:30 PM)

Mar. 5—Ultrafast Lasers and Ultrafast Science. Dr. Jim Kafka of Spectra-Physics, a division of Newport Corporation, will present the design of ultrafast Ti:sapphire lasers and describe several scientific and industrial applications for these lasers. This lecture is presented by the Distinguished Traveling Lecturer Program of the American Physical Society Division of Laser Science.

Mar. 12—Reducing Leaking Electricity to a Trickle. Dr. Alan Meier of the Lawrence Berkeley National Laboratory will describe efforts to cut standby power use in appliances which are responsible for 1% of global CO₂ emissions

Mar. 19—The First Stars in the Universe. Dr. Aparna Venkatesan of the University of San Francisco will present current observations and theoretical ideas on the first stars in the universe—unique objects that strongly influenced their environment despite their brief existence.

Mar. 26—Spintronics: From Materials to Devices. Dr. Yuri Suzuki of the University of California at Berkeley will discuss the basics of how both spin and charge of the electron can be exploited in spin-based electronics and the fundamental and technological issues associated with incorporating novel magnetic materials into these next-generation devices.

Contact <http://phys-astro.sonoma.edu/wpd/>

Events

MARCH COMMUNITY OUTREACH

The club has three school star parties scheduled for the month of March. They are:

March 7 (Wednesday) 6:00-8:00 PM: El Verano Elementary School, 18606 Riverside Drive, Sonoma. <http://maps.google.com/maps?oi=map&q=18606+Riverside+Drive.,Sonoma+CA>

March 14 (Wednesday) 7:00-9:00 PM: Evergreen Elementary School, 1125 Emily Ave. Rohnert Park. <http://maps.google.com/maps?oi=map&q=1125+Emily+Ave.,Rohnert+Park+CA>

March 21 (Wednesday) 7:00-9:00 PM: Hidden Valley Elementary, 3435 Bonita Vista Ln, Santa Rosa. <http://maps.google.com/maps?oi=map&q=3435+BonitaVista+Lane.,Santa+Rosa+CA>

Contact Lynn Anderson at astroman@sonic.net if you are able to volunteer for any or all of these community outreach events.

SCAS STAR PARTY REPORT

Windsor Creek Elementary, February 22—Lynn Anderson:

Does one star make a star party? If so, then this was a success. Len Nelson, Merlin Combs, John Jaffray, Walt Bodley and Lynn Anderson were on hand to show the sky to the hundreds of students and parents who had come to see the solar system displays at the school's Astronomy Night. Unfortunately, the clouds were too thick and except for a brief few minutes when the moon or Sirius broke through, there was nothing but street lights to show the children and parents who ventured out to the playground.

UC BERKELEY ASTROPHYSICS CLUB

Institute for Particle Astrophysics Journal Club Seminars

Mar. 2: "Examples of the Zeroth Theorem of the History of Science"—J. D. Jackson (LBNL)

The zeroth theorem of the history of science, enunciated by E. P. Fischer, states that a discovery (rule, regularity, insight) named after someone (often) did not originate with that person. I present five examples from physics: the Lorentz condition, $\text{partial}_{\mu} A^{\mu} = 0$, of the electromagnetic potentials; the Dirac delta function $\delta(x)$; the Schumann resonances of the earth-ionosphere cavity; the Weizsacker-Williams method of virtual quanta; the BMT equation of spin dynamics. I give illustrated thumbnail sketches of both the true and reputed discoverers and quote excerpts from their "discovery" publications.

Mar. 23: "Imprints of a Primordial Preferred Direction on the Microwave Background"—Mark Wise (Caltech)

Lectures: 12:00 Noon. Location: Bldg. 50, room 5026, Lawrence Berkeley National Laboratory, 1 Cyclotron Rd., Berkeley. Contact Vitaliy Fadeyev VAFadeyev@lbl.gov. Information: <http://stokstad.lbl.gov/INPA/journalclub.html#aboutjclub>

SCAS AT YOSEMITE AUG. 3 & 4

This year the club has been assigned the first weekend of August to provide telescope viewing to the visitors of Yosemite National Park from the 7214-ft. (2199 m) Glacier Point look-out area. This weekend comes with a 3/4 moon rising at approximately at 11:00 PM. Navigational twilight occurs around 9:15, astronomical twilight is around 10:00. This should give us until about midnight before the sky gets too washed out for viewing in the east. The zenith and views to the west should be good for viewing for a few more hours after midnight. Saturn will be in good position.

The National Park Service is hoping that there will be between 10 and 20 telescopes set up for park visitors to look through. Each night we can expect 500 or more park visitors to be at Glacier Point. Yosemite is an international destination and should you be there, you will have the opportunity to practice your foreign language skills.

The Park Service provides five campsites within one loop at the Bridalveil Campground (about 8 miles from Glacier Point) for the SCAS volunteers. There is a limit of two vehicles and no more than six persons per site. We will probably need more than the five provided campsites, so someone will have to go up early Friday (or perhaps Thursday) to secure more campsites for our group. There are 110 campsites on a no-reservation, first come/first served basis. The campsites have a fire pit, picnic table, running water and a bear-proof storage locker. This campground is at the 7,000 foot elevation, so it's colder than the valley and there are mosquitoes. There are flush toilets and a cold water sink in the restrooms. More information about camping in Yosemite can be found at <http://www.yosemite.national-park.com/camping.htm>

Some people may elect to make their own reservations in Yosemite Valley (about 25 miles away by auto), or at one of the lodges just outside the park in El Portal. Ranger Dave Balogh also mentioned the Yosemite West Condominiums, located just a few miles from the campground and 16 miles from the observing site. We have several months yet, to work out these logistics.

Sign-ups are being taken by Lynn Anderson astroman@sonic.net

MORRISON PLANETARIUM DEAN LECTURE SERIES

Mar. 19, 7:30 PM: "New Worlds in the Making: Origins of Planets and Brown Dwarfs"—Dr. Ray Jayawardhana, University of Toronto

Astronomers are deciphering the birth and early evolution of planets and brown dwarfs using remarkable new observations and sophisticated computer simulations. (Co-Sponsored by The Planetary Society)

Location: Kanbar Hall, Jewish Community Center, 3200 California Street (at Presidio). Parking in the UCSF Laurel Heights campus parking lot is \$1.25/night. Parking in the JCC garage is \$1.25 per half-hour. Tickets \$4 at the door or by email. Contact: 415/321-8000, <http://www.calacademy.org/planetarium/dean.cfm>

Young Astronomers



Extreme Astronomy

YA March 16 Meeting,
7:30 PM at Apple Blossom School

So, you may be asking yourself “What is extreme astronomy?” Come to our next YA meeting and find out! On Friday, March 16th, Young Astronomers president Melissa Downey will discuss some of the most exotic objects in the universe, such as supermassive black holes, quasars, “super-galaxies”, and dark matter. This truly is going to be astronomy to the extreme! Don’t miss it!

(This presentation was originally planned for our January meeting, but had to be rescheduled for March).

Weather permitting, bring your telescope for star viewing after the general meeting. We look forward to seeing you in March!



SAILMAST is the thin triangular truss in front of the picture. It is attached to a section of a silver foil solar sail section shown here in a laboratory test. The mast in the picture is 2m (6 ft) long. The Space Technology 8 mission will test the SAILMAST, which is 20 times longer.

Even Solar Sails Need a Mast

by Patrick L. Barry

Like the explorers of centuries past who set sail for new lands, humans may someday sail across deep space to visit other stars. Only it won’t be wind pushing their sails, but the slight pressure of sunlight.

Solar sails, as they’re called, hold great promise for providing propulsion in space without the need for heavy propellant. But building a solar sail will be hard; to make the most of sunlight’s tiny

push, the sail must be as large as several football fields, yet weigh next to nothing. Creating a super-lightweight material for the sail itself is tricky enough, but how do you build a “mast” for that sail that’s equally light and strong?

Enter SAILMAST, a program to build and test-fly a mast light enough for future solar sails. With support from NASA’s In-Space Propulsion Program to mature the technology and perform ground demonstrator tests, SAILMAST’s engineers were ready to produce a truss suitable for validation in space that’s 40 meters (about 130 feet) long, yet weighs only 1.4 kilograms (about 3 pounds)!

In spite of its light weight, this truss is surprisingly rigid. “It’s a revelation when people come in and actually play with one of the demo versions—it’s like, whoa, this is really strong!” says Michael McEachen, principal investigator for SAILMAST at ATK Space Systems in Goleta, California.

SAILMAST will fly aboard NASA’s Space Technology 8 (ST8) mission, scheduled to launch in February 2009. The mission is part of NASA’s New Millennium Program, which flight tests cutting-edge technologies so that they can be used reliably for future space exploration. While actually flying to nearby stars is probably decades away, solar sails may come in handy close to home. Engineers are eyeing this technology for “solar sentinels,” spacecraft that orbit the Sun to provide early warning of solar flares.

Once in space, ST8 will slowly deploy SAILMAST by uncoiling it. The truss consists of three very thin, 40-meter-long rods connected by short cross-members. The engineers used high-strength graphite for these structural members so that they could make them very thin and light.

The key question is how straight SAILMAST will be after it deploys in space. The smaller the curve of the mast the more load it can support. “That’s really why we need to fly it in space, to see how straight it is when it’s floating weightlessly,” McEachen says.

It’s an important step toward building a sail for the space-mariners of the future.

Find out more about SAILMAST at nmp.nasa.gov/st8. Kids can visit spaceplace.nasa.gov/en/kids/st8/sailmast to see how SAILMAST is like a Slinky® toy in space.

—Article provided by JPL/NASA

YA INFORMATION

Meetings: 7:30 PM the second Friday of each month of the school year, at Apple Blossom School, 700 Water Trough Road, Sebastopol, in the Multipurpose Hall. Open to all Sonoma County students.
Telescope viewing is held in the upper parking lot after the meeting. **Directions:** From Hwy. 116 in Sebastopol, go west onto Bodega Ave. Continue almost two miles to Water Trough Rd. Turn left and go about 1/3 mile to the school, on your right.

YA ELECTED OFFICERS

PRESIDENT: Melissa Downey 632-5661

VP/PROGRAM DIRECTOR: Open

RECORDER: Open

NEWSLETTER EDITOR: Max Eliaser

LIBRARIAN: Rachel Loughman, stop_rachel_4_insanity@yahoo.com

ADULT ADVISER: Gary Jordan 829-5288

Striking Sparks! (continued from Page 1)

telescope annually and is administered by his son Mark Hejtmanek in Colorado Springs, Colorado.

We also want to thank Orion Telescope and Binocular in Cupertino, California for supplying the telescopes for Striking Sparks at a discount to retail price. The sponsor's support of the Striking Sparks Program has made it one of the noteworthy projects among astronomy clubs.

The leadership and support provided to the Young Astronomers by Gary Jordan, Len Nelson and Paul Judge give the Striking Sparks winners an opportunity to develop their interest in science and astronomy. There is no limit in what they can achieve.



Blaine Eldred



Esther Unti



Sara Bunyard



Christopher Spitzka



Adam Ferrick

Goldstone *(continued from Page 2)*

After a two and a half hour drive from JPL, our tour began at the Goldstone museum where three large areas are dedicated to current missions, past missions, and Deep Space Network history - plus there is a hands-on activity room for children. The guided tour then travels around the 53-square-mile complex to view the large antennas. Outside the administrative buildings and museum stands DSS-12 Echo, a 34-meter antenna dish named for Project Echo, an experiment that bounced signals off the surface of a balloon-type satellite. Now decommissioned, it is used by the Lewis Center for Educational Research in Apple Valley, CA. GAVRT, the Goldstone Apple Valley Radio Telescope project offers students in classrooms across America the opportunity to participate in radio astronomy through the internet.

The DSN has been the communications link to NASA's robotic spacecraft since 1958. These now legendary missions include five Surveyor landings on the moon in the 1960's; the Mariner journeys to Venus, Mars and Mercury from 1962 to 1973; the Pioneers' travels to Jupiter and Saturn in the 1970's; and the journeys of the twin Viking landers and orbiters to Mars in the mid-1970's. The DSN link was critical to the 1977-1989 Voyagers as they sent back unforgettable images of the Jupiter, Saturn, Uranus and Neptune systems. Now the DSN supports the Voyager Interstellar Mission. Thanks to DSN, we had 14 years of returned detailed photographs and science data from Galileo, communications with Mars Pathfinder and the robots Sojourner, Spirit and Opportunity, and now Cassini data. The DSN is the vital communications pathway between Earth and our distant spacecraft.

After a museum visit and lunch in the Goldstone cafeteria, we were off to visit several of the antennae, named after their initial targets: 36-meter Echo, now used for GAVRT, twin 34-meter Gemini antennae, now supporting SOHO, 34-meter Uranus, initially used for Voyager, and now a workhorse supporting many current missions. Then we were off to Venus, a 34-meter beam waveguide antenna first used for successful radar detection of the planet Venus, and finally to DSS-14 Mars, the 70-meter antenna first used in the 1960's to track Mariner missions to Mars. It was enlarged in the 1970's to support the Voyager 2 mission to Uranus and Neptune.

On the drive from Venus to Mars we passed the Apollo site. The 26-meter Apollo antenna supported the Apollo astronaut missions to the moon. This site also houses three 34-meter beam waveguide antennas, which can be used individually or arrayed with another 34-meter antenna to obtain higher performance.

Goldstone began operating in 1958 to track the Pioneer probes that returned data about radiation around the moon. Goldstone continues to play a vital role in communication with distant spacecraft nearly 50 years later, supporting missions in the 21st century. Worth a detour? Absolutely!

More pictures: Jane and Mojo's Canberra DSN image collection <http://www.whiteoaks.com/Australia2000/pg32.html>; Jane's Goldstone DSN images <http://www.whiteoaks.com/jane/2007Goldstone/>

More info: Goldstone Tours <http://deepspace.jpl.nasa.gov/dsn/features/goldstonetours.html>; DSN website <http://deepspace.jpl.nasa.gov/dsn/>

Sonoma County Astronomical Society

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Sonoma Skies

March 2007

MARCH 14

Surprise Program