Sonoma Skies

Newsletter of the Sonoma County Astronomical Society

A nonprofit scientific and educational organization

www.sonomaskies.org

November 2005 **Volume XXVIII No. 9**

Help Wanted

by Keith Payea

As the end of the year approaches, it can only mean one thing. No, not Thanksgiving and Christmas. It is time for our annual elections. This is your chance to step up and become a real contributor to our club.

After two years as your president, it is time for me to step down. I've really enjoyed being the president of SCAS, but the demands of my business have been steadily increasing over the last two years. I find myself having to choose between SCAS and work too often now. I would like to hand over the reins to someone who can put more time into the job.

This means that the board will need at least one new member. Of course, all positions are up for re-election. If you feel you could do a better job than someone on the board you should seek nomination. We don't require that you find someone to nominate you for election. You can simply volunteer to have your name on the slate. If there is more than one person running for a particular position, we will give each of them an opportunity to state their case and tell the members why they should be elected.

At the next two meetings I will ask for nominations from the floor. That's the time to raise your hand and volunteer. Here's a list of the positions:

- President: Presides over the general meetings and board meetings
- Vice President: Covers for the president if needed. Primary duty is as the program director, lining up speakers for our meetings.
- Secretary: Keeps the official notes of the board meetings
- Treasurer: Keeps track of the club's money
- Publications Director: Editor of the newsletter
- Community Activities Director: Coordinates school star parties
- Membership Director: Manages the membership database

Everyone on the board does much more than the title and brief description shown above. These people are the ones that make sure our meetings and public events happen the way they should.

So, if you have ideas about how our Society could be better, this is your chance to make them happen. Please step forward and run for office. And keep looking up.

Meet Mr. Comet!

with Don Machholz

SCAS *November 9* Meeting, Proctor Terrace School

Recently we were visited by four significant comets in one year. Two were discovered by high-tech automated sky surveys. But the brightest, and certainly most persistent comet was C/2004 Q2. I think we all prefer its "humanized" name, comet Machholz. But did you know this was the 10th comet with that name? SCAS is pleased to welcome its namesake, Don Machholz, as our speaker for the November meeting. Come meet the very human side of one of the most prolific comet discoverers of our day.

Certainly one of the oldest pursuits for observers of the stars has been the search for those transient wraiths that mysteriously grace (some said curse) the firmament on occasion. In ancient times star gazers earned their keep as soothsayers to the well-healed and powerful by advising them as to the presence of comets. These days, professionals study comets to understand the origin and makeup of solar systems. But we astronomers know them as beautiful visitors and some are lucky enough to know the adventure of their discovery.

Don Machholz is not a professional astronomer, although many certainly know who he is. He is an amateur's amateur, meaning that he explores the night sky for the real love of it. Like many of us his enthusiasm spills over from his quest at the eyepiece to sharing his passion for astronomy with others. In the spirit of the Sidewalk Astronomer, he can often be found attending to star parties, teaching classes, or writing books or articles for the media. (In fact, he discovered one comet, 1985e, during the Riverside Telescope Makers Conference!)

Like many of us, his love for astronomy started early at around the age of 8, with a pair of binoculars. He now uses a few

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Young Astronomers: See page 6

Sonoma Skies

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 the last Wednesday of each month.** Mail to: Editor, SCAS, P.O. Box 183, Santa Rosa, CA 95402, or email Editor: Cecelia Yarnell, *ceceliay@sbcglobal.net*

SCAS Membership Information

Membership Meetings: 7:30 PM on the second Wednesday of each month, in the Multipurpose Room of Proctor Terrace Elementary School on Bryden Lane near Fourth Street in 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 may pay partial-year dues of $12.50.

SCAS Star Parties: See the Events section for dates and times. The Geysers observing site is locked to public access. For use during monthly star parties, SCAS members may obtain the combination to the gate lock at the site by contacting any board member listed below.

Rental Telescopes: Members are eligible to borrow telescopes for a $10 per month donation, or ***FREE*** each month you participate in a SCAS-related Public Star Party. Five telescopes are available: 8" and 5" Celestron SCTs, 8" and 12.5" Newtonians on Dobsonian mounts; and an 80mm refractor. Contact John Roush at 792-1199, *jroush@spamlion.com*.

SCAS Egroup URL: Any SCAS member is welcome to join. Hosted by Robert Leyland at *r.leyland@verizon.net* the majority of traffic is about going observing, observing reports and astronomy-related news. We get news items from AANC and Sky & Telescope and chat about astronomy. To join, either 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 Magazine,*** 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.

SCAS Elected Board

President: Keith Payea, 566-8935, *kpayea@bryantlabs.net*
Vice-President & Program Director: John Whitehouse, 539-5549, *jmw@sonic.net*
Treasurer: Larry McCune, (415)492-1426, *llmccune@comcast.net*
Secretary: Loren Cooper, 525-8737, *lorenco@sonic.net*
Membership Director: Walt Bodley, 823-5268, *wbodley@sonic.net*
Community Activities Director: Len Nelson, 763-8007, *lennelsn@comcast.net*
Publications Director: Cecelia Yarnell, 569-9663, *ceceliay@sbcglobal.net*

SCAS Appointed Positions

Amateur Telescope Making: Steve Follett, 542-1561, *sfollett@sonic.net*
Young Astronomers Advisor: Gary Jordan, 829-5288, *SieraMolly@aol.com*
Striking Sparks Program Coordinator: Dickson Yeager, 539-2385, *deep6@sonic.net*
Librarian: Joan Thornton, 762-0594, *phonyjoanie@earthlink.net*
Public Star Party Coordinator: Bruce Lotz, 576-7833, *ablotz@sonic.net*

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Striking Sparks Report

Orion Telescopes Purchased

by Dickson Yeager

SCAS has purchased ten Orion SkyQuest XT6 Dobsonian telescopes. Each includes two Sirius Plössl eyepieces—25mm and 10mm. The scopes arrived mid-October. Thanks to Len Nelson, June Ferguson, Walt Bodley, John Whitehouse, Cecelia Yarnell and Keith Payea for storing the telescopes. The scopes were purchased early to avoid any supply issues and ensure we had the scopes for the March 18, 2005 awards potluck.

We owe a huge debt of gratitude to Orion Telescopes & Binoculars, and to Sam Sweiss of Scope City. Sam knows the folks at Orion and offered to contact them on our behalf. Orion responded with very generous pricing. Pat Gillis at Orion said they were very pleased Sam contacted them. Pat is very excited about our Striking Sparks program. Both Pat and Sam have been invited to the awards potluck.

Help us make a great success of the event. It's not too early to sign up. Here's what we need:

- Mentors
- Raffle prizes
- Potluck dishes
- Decorations Coordinator
- Volunteers for the event

Contact me at 539-2385 or by email at: *deep6@sonic.net*

Allen Telescope Array Update

by Dave DeBoer, ATA Project Manager

Dave DeBoer, SETI Institute

The assembled antenna within the construction tent.

The tent looked so big when it was first installed. The vaulted top stands 35 feet above the ground. It is 40 feet wide. The door is almost 30 feet high. It's gleaming white. In short, it's a perfect place within which to build the antennas for the Allen Telescope Array.

Well, when you build an entire 20 x 24 foot antenna on a pedestal inside of it, all of a sudden the tent doesn't look so big. In fact, the door looks a skosh too small. But the assembly does fit in the tent; even the somewhat tricky "flip" needed in the assembly process cleared the ceiling. It also fit through the door, with an inch or two to spare, just as we knew it would. But we still sighed a bit in relief. Our factory was in production! And it all went superbly, a tremendous credit to our chief mechanical engineer, Matt Fleming, who conceived and designed the antenna mount and all of the associated fixtures and hardware.

It has been very gratifying to begin the emplacement of antennas at the Hat Creek Radio Observatory site, something that we've been working towards for several years now. The entire antenna gets assembled using a series of "fixtures" inside of this tent. A fancy forklift then picks up the antenna (complete with the subreflector, cabling and electronics), carries it out to the waiting pedestal and sets it carefully in place.

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NASA Internet Software Zooms to Nearly Anywhere on Moon in 3-D

The newly expanded NASA 'World Wind' computer program can 'transport' Web users to almost anyplace on the moon, when they zoom in from a global view to closer pictures of our natural satellite taken by the Clementine spacecraft in the 1990s. Computer programmers at NASA Ames Research Center in California's Silicon Valley originally designed the World Wind program to deliver satellite images and data of Earth to the Internet. Users can see detailed 3-D pictures of the Earth's land surface, including its elevation and climate.

"We have just digested the best of the Clementine images, so we can now deliver the moon at 66 feet (20 meters) of resolution," said Patrick Hogan, manager of the World Wind Project Office at NASA Ames. "This is a first. No one has ever explored our moon in the 3-D interactive environment that World Wind creates," noted Hogan.

Launched in early 1994, Clementine took 1.8 million pictures of the lunar surface during a two-month orbit of the moon.

"Imagine riding a magic carpet through the world and being able to zoom down to any point, or appear magically at any location. That's what World Wind is like," said Mark Leon, chief of the Education Division at NASA Ames. "Not only has Hogan's team produced new technology with World Wind, but they have done so as open source computer code, so it is free for all who would download it," Leon added.

The personal computer (PC)-compatible World Wind program is available free of charge via Internet 'download.' Computer users from more than 100 nations have acquired the free program, though most users are from the United States. To download World Wind, visit:*http://worldwind.arc.nasa.gov/*

NASA World Wind is delivering terabytes of global NASA satellite data that are a result of years of daily observations of precipitation, temperature, barometric pressure and much more. Recently, hurricane Katrina data have been added to World Wind's collection of images. There are an estimated 10,000 daily users of World Wind.

In addition to improving World Wind by adding images of the moon, NASA programmers recently have increased the resolution of images of Earth from 3,281-foot (one-kilometer) resolution to 1,640-foot (500-meter) resolution in an upgrade called 'Blue Marble, Next Generation Earth.' Also, some World Wind data sets include images of the entire Earth at 49-foot (15-meter) resolution. The United States data in World Wind is at 3.3-foot (one-meter) resolution with some urban areas at one-foot (0.33-meter) resolution.

World Wind has been enabling hundreds of thousands of Internet users to zoom from satellite altitude into any place on Earth to see across the Andes, into the Grand Canyon, over the Alps or along the African Sahara. World Wind accesses public domain United States Geological Survey aerial photography and topographic maps as well as Shuttle Radar Topography Mission and Landsat satellite data.

—NASA Ames Research Center, Moffett Field, CA

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*

Welcome, New Members!

The SCAS is happy to welcome two new members: Benita Lorentz of Cloverdale and Charles Griswold of Petaluma.

2006 Astronomy Calendars

A few 2006 astronomy calendars are yet available for sale. If interested, see Len Nelson at the November 9 meeting. The SCAS group price to you is $7.70 payable by cash or check (payable to SCAS)

Social Amenities

Thanks to Matt Gardner for again providing homebrew coffee and goodies at the October SCAS meeting.

Events

Robert H. Ferguson Observatory

Public Viewing—Mars Mania! Saturday, November 5
Solar Viewing: 11:00 AM - 3:00 PM
Night Viewing: Begins 6:00 PM

Public Viewing Friday, November 25
Solar Viewing: 11:00 AM - 3:00 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

Nov. 1 Night Sky Fall Series, 7:00 PM
Nov. 22 Night Sky Fall Series, 7:00 PM
Nov. 29 Night Sky Fall Series, 7:00 PM

Classes are held at the Observatory. Reservations recommended. (707) 833-6979, *http://www.rfo.org* or *nightsky@rfo.org*

Morrison Planetarium Dean Lecture Series

Nov. 28, 7:30 PM: "The SuperMACHO Project"—Dr. Doug Welch, McMaster University

The nature of dark matter is still unknown. Our best hope for understanding it is to find it in our own galaxy, the Milky Way. In this talk I will describe results from the most ambitious dark matter search to date, the so-called SuperMACHO Project.

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: 415/750-7141, *http://www.calacademy.org/planetarium/dean.cfm*

UC Berkeley Astrophysics Club

Institute for Particle Astrophysics Journal Club Seminars

Nov. 4—Paul Kalas, UCB Astronomy Dept., speaking on his observation of Fomalhaut's dust belt

Nov. 11—Elena Guardincerri, Genova Univ., "CUORE/CUORICINO: A double beta decay experiment at Gran Sasso"

Nov. 18—Lawrence Wai, SLAC, speaking on Dark Matter Searches with GLAST

Lectures: 12:00 Noon. Location: Bldg. 50, room 5026, Lawrence Berkeley National Laboratory, 1 Cyclotron Rd., Berkeley. Info: Vitaliy Fadeyev *VAFadeyev@lbl.gov*.

SCAS Public Star Parties

These are public events—all are invited. Members with scopes are encouraged to attend. Great for planetary astronomy with fellow observers at an easily accessible site.

Saturday, November 5
Sunset: 5:06 PM PST
End Astronomical Twilight: 6:37 PM PST
Moonset: 7:51 PM PST

Santa Rosa: Youth Community Park in Santa Rosa, on the west side of Fulton Road, between Guerneville Road and Piner Road, just opposite Piner High School. Contact: Bruce Lotz, Coordinator (707) 576-7833, *ablotz@sonic.net*

The Geysers Star Parties

Excellent dark sky observing at ~2700' for members and guests. **Location:** Palmieri Observatory, Mercuryville (near The Geysers). Longitude: 122° 49', Latitude: 38° 46'.

Saturday, November 5
Sunset: 5:06 PM PST
End Astronomical Twilight: 6:37 PM PST
Moonset: 7:51 PM PST

Dress warm. If it's your first time to the Geyser site, go with someone who has gone before, or contact Mario Zelaya at (707) 539-6423, *zelayadesigns@sbcglobal.net*

Chabot Space & Science Center

Nov. 6, 7:30 PM: "Hunting for Worlds Around Other Stars"—Debra Fischer, Ph.D, Professor of Astronomy at San Francisco State University

The first planet orbiting a star other than the Sun was discovered in 1995. Since then, well over 100 planets have been detected around other stars. Debra Fischer will present an overview of how they are being detected, how our solar system compares, and the implications for the possibility of life in the galaxy.

Fee: $65 members, $75 non-members; reservations required. Limited space—register early: Call 510-336-7311 or email *ngillespie@chabotspace.org*

Silicon Valley Astronomy Lecture Series

Nov. 9, 7:00 PM: "Revealing Titan: What the Cassini Mission Has Discovered about Saturn's Giant Moon"—Planetary Scientist Chris McKay of NASA-Ames

Saturn's huge moon Titan is the only satellite in the solar system with a substantial atmosphere. Dr. McKay, a co-investigator for the Cassini experiment, will fill us in on current discoveries.

Arrive early—seating is limited. Location: Smithwick Theater, Foothill College, Los Altos Hills. Free and open to the public. Parking $2. Info: 650/949-7888

Events

Sonoma State University Series "What Physicists Do"

Mondays at 4:00 PM

Schulz Hall Room 3001 (Coffee at 3:30 PM)

Nov. 7—First Look Inside a Comet
Dr. Karen Meech of the University of Hawaii will present highlights of what was learned when the Deep Impact spacecraft sent a probe into comet Tempel 1 in July 2005.

Nov. 14—Black Holes: The Science Behind the Science Fiction
Dr. Eliot Quataert of the University of California at Berkeley will describe what black holes are, how they are discovered, and how they give rise to some of the most energetic and remarkable phenomena in the universe.

Nov. 21—Nanoparticles in Earth's Atmosphere
Dr. Susanne Hering of Aerosol Dynamics Inc. will talk about a new instrument for determining the concentration of nanometer-sized airborne particles, and why these particles are important to urban air pollution and global climate change.

Nov. 28—Testing Einstein: The Gravity Probe B Relativity Mission
Bruce Clarke of Stanford University will describe the 18-month general relativity satellite experiment and the 40-year development effort that went into it.

Contact *http://phys-astro.sonoma.edu/wpd/*

SSU Observatory Public Viewing

Nov. 11, 7:00 PM: Moon, Mars, Andromeda Galaxy

Dec. 2, 7:00 PM: Mars, Mottled Ring Nebula

Observatory located inside the football field at the SE corner of campus (E. Cotati Ave. and Petaluma Hill Rd., two miles east of US 101 at Cotati). 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*

Lawrence Hall of Science

Nov. 5, 1:00-5:00 pm: "Latest Theories About the Universe & Its Governing Laws" Seminar—"The World as a Hologram," Prof. Raphael Bousso, UC Berkeley. "Finding a Home in the Multiverse," Prof. Anthony Aguirre, UC Santa Cruz. "Extra Dimensions," Prof. John Terning, UC Davis.

The seminar is aimed to educate the public about the latest theories in theoretical physics. Please check the following link for more details about the seminar. *http://www.multiversaljourneys.com*

LHS is on Centennial Drive below Grizzly Peak in the Berkeley Hills. General information: (510) 642-5132. $8.50/adults; $6.50/youth (5-18), full-time students, senior citizens, and the disabled; $4.50/children 3-4; and free for children two and under. For more information visit *www.lawrencehallofscience.org*

SCAS School Star Parties

The fall school star party season is now in full swing and the SCAS fully supports astronomy outreach to our local Sonoma county schools. However, to do this, your help is needed. If you can volunteer in any capacity at these functions, email me, Len Nelson, at *lennelsn@comcast.net*. I'll then add you to my volunteer roster and contact you about the details of upcoming events. Here's the schedule:

2005

Nov. 10 Mary Collins Elementary in Petaluma, Thurs. at 6:45 PM
Nov. 30 LaTercera Elementary in Petaluma, Wed. at 6:45 PM
Dec. 5 Riebli Elementary in N. Santa Rosa off Mark West Springs Rd., Mon. at 6:45 PM

2006

Jan. 19 Meadow Elementary in Petaluma, Thurs. at 6:45 PM (alternate Jan. 20)
Jan. 24 Austin Creek Elementary in Santa Rosa, Tues. at 6:45 PM
Feb. 23 Windsor Elementary "Science Night," Thurs. at 6:45 PM
Mar. 7 Miwok Elementary in Petaluma, Tue. at 6:45 PM
Mar. 22 Evergreen Elementary in Rohnert Park, Wed. at 6:45 PM (alternate Mar. 23)

There is no obligation to commit yourself to anything other than those events that you wish to assist at. You do not even have to have a telescope. Come and see what it is about and help those who do have scopes. Contact me with any questions. These are fun events and very educational for *all* that go to them!

SRJC Planetarium

"Life and the Universe"—Through November 20

Among the most challenging questions in astronomy today are those asking about life beyond Earth. In this show we will learn what scientists and astronomers know about the requirements for organic life, where in the universe these conditions exist, and the possibilities of finding extra-terrestrial life.

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/*

Young Astronomers

Fall Constellations

YA *November 18* Meeting, 7:30 PM
at Apple Blossom School

What constellations are visible during the fall months? How can I find them and what are the interesting objects in those constellations? These questions and more will be answered at the next YA meeting! There will be a presentation on all of the exciting things the fall night sky has to offer, so make sure to attend and learn how to put that telescope to good use. If weather permits, we will be taking the presentation outside for a real hands-on experience! As always, be sure to bring along a friend.

October Meeting Update

At the October YA Meeting, our own president Melissa Downey gave an excellent presentation on the fascinating moons of Jupiter. From the volcanically active to the dry and barren, Melissa gave everyone who attended a unique and informative glimpse into the nature of these intriguing satellites.

Articles for the Newsletter

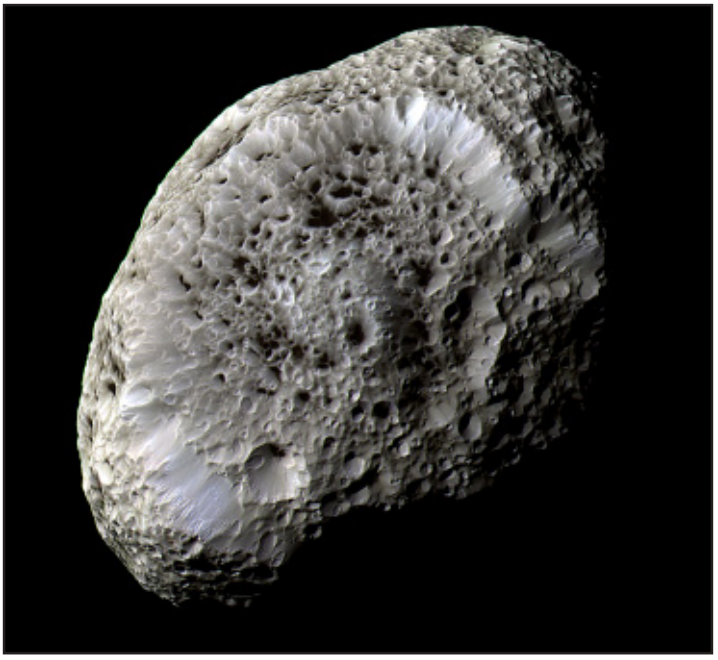
Have you done a research project on something to do with astronomy and would like to share it with other YA members? Have you observed a particularly interesting object in your telescope recently and would like to let the rest of us know? Would you just like to see your name in print? If you can answer yes to any of these questions then you may see your article appear in the newsletter next month! If you would like to submit something or have any questions, then be sure to email YA Editor Scott Grubb at *fivegees@sonic.net* and let him know.

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, turn west onto Bodega Ave. Continue on Bodega Ave. almost two miles to Water Trough Rd. Turn left and go about 1/3 mile to the school, on your right. From Hwy. 12, go straight through Sebastopol, past Main Street, and continue as above.

YA Elected Officers

President: Melissa Downey 632-5661
VP/Program Director: Olivia Turnross *jtec@sonic.net*
Recorder: Marie-Pierre Frigon 773-3206
Newsletter Editor: Scott Grubb *fivegees@sonic.net*
Librarian: Jacob Gaynor
Adult Adviser: Gary Jordan 829-5288



Close-up images of Saturn's moon Hyperion show a spongelike surface dotted with craters. This photo was taken when the spacecraft was 62,000 kilometers (38,500 miles) from the moon. —NASA/JPL/Space Science Institute

Saturn's Spongy Moon

Saturn has a lot going for it. The planet's spectacular rings are pretty cool. It has 31 moons, maybe more. Its largest moon, Titan, even has its own atmosphere. One of its smaller moons, Hyperion, looks like a potato and tumbles strangely as it orbits the planet.

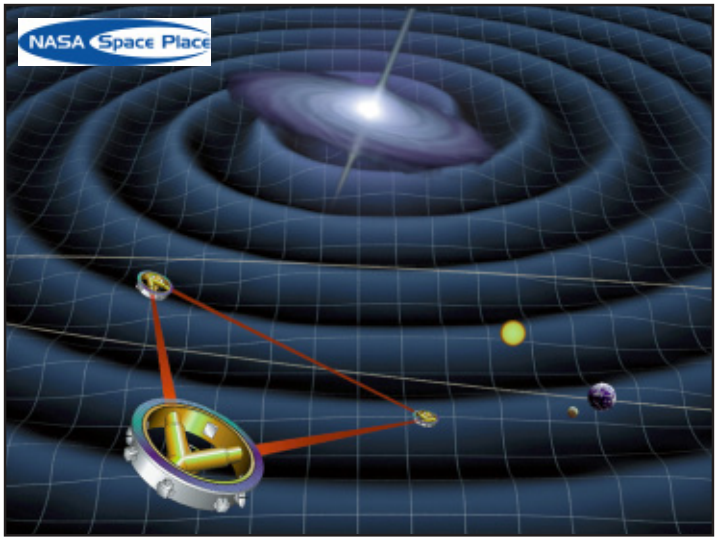
Now, the Cassini spacecraft, which is in orbit around Saturn, has taken the first close-up pictures of Hyperion. And the view is surprising.

Scientists would like to find out what the dark material is that fills parts of some craters on Hyperion's surface. NASA/JPL/Space Science Institute

Hyperion is 266 kilometers (165 miles) across, and it has an irregular shape. Much of its inside is probably empty space. Scientists describe the moon as a "rubble pile."

On Sept. 26, Cassini swooped to within 500 kilometers (310 miles) of the icy moon. The close-up images showed that Hyperion's surface is unlike that of any of the planet's other moons. They revealed a reddish surface dotted with craters and changed by some unknown process to give it a spongy look. (Click on the following link to see a video of Hyperion's details as photographed during the Cassini flyby: *http://saturn.jpl.nasa.gov/multimedia/videos/video-details.cfm?videoID=97*)

Some Cassini researchers suspect that the spongelike appearance is a result of closely packed craters that were never filled in. Usually, when craters form, debris falls back into the holes. The gravity from nearby Titan, however, may have prevented that from happening.—*E. Sohn*



LISA's three spacecraft will be positioned at the corners of a triangle 5 million kilometers on a side and will be able to detect gravitational wave induced changes in their separation distance of as little as one billionth of a centimeter.

A Wrinkle in Space-Time

by Trudy E. Bell

When a massive star reaches the end of its life, it can explode into a supernova rivaling the brilliance of an entire galaxy. What's left of the star fades in weeks, but its outer layers expand through space as a turbulent cloud of gases. Astronomers see beautiful remnants from past supernovas all around the sky, one of the most famous being the Crab Nebula in Taurus.

When a star throws off nine-tenths of its mass in a supernova, however, it also throws off nine-tenths of its gravitational field. Astronomers see the light from supernovas. Can they also somehow sense the sudden and dramatic change in the exploding star's *gravitational field*?

Yes, they believe they can. According to Einstein's general theory of relativity, changes in the star's gravitational field should propagate outward, just like light—indeed, at the speed of light. Those propagating changes would be a gravitational wave. Einstein said what we feel as a gravitational field arises from the fact that huge masses curve space and time. The more massive an object, the more it bends the three dimensions of space and the fourth dimension of time. And if a massive object's gravitational field changes suddenly—say, when a star explodes—it should kink or wrinkle the very geometry of space-time. Moreover, that wrinkle should propagate outward like ripples radiating outward in a pond from a thrown stone.

The frequency and timing of gravitational waves should reveal what's happening deep inside a supernova, in contrast to light, which is radiated from the surface. Thus, gravitational waves allow astronomers to peer inside the universe's most violent events—like doctors peer at patients' internal organs using CAT scans. The technique is not limited to supernovas: colliding neutron stars, black holes and other exotic objects may be revealed, too.

NASA and the European Space Agency are now building prototype equipment for the first space experiment to measure gravitational waves: the Laser Interferometer Space Antenna, or LISA. LISA will look for patterns of compression and stretching

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November Observing Notes

Nov. 1 **New Moon**

Nov. 3 **Mercury** at greatest elongation E (24° from Sun) 8AM. Nice twilight viewing, just above new Moon. **Venus** at greatest elongation E (47° from Sun) 11AM

Nov. 6 **Mars** at opposition Midnight (.47 AU from Earth), Mag. -2.3, 20" in diameter

Nov. 8 First Quarter **Moon**

Nov. 12 **Taurid** meteors N

Nov. 14 **Mercury** begins retrograde (westward) motion

Nov. 15 Full **Moon**

Nov. 17 **Leonid** meteors

Nov. 22 **Saturn** begins retrograde (westward) motion

Nov. 23 Last Quarter **Moon**

Dec. 1 **New Moon**

Observing Treats

Mars won't be this close to us for another 13 years. Consider spending time at the eyepiece and making drawings—you'll see much more detail by doing so. Mars will dim noticeably by the end of the month, so now's the time.

This month the dark triangular marking, the high plain of Syrtis Major, will be near the center of the planet. The very light circular area to the west is Hellas Planitia, a large, low plain.

A nifty little program called "Mars Previewer" will show you the prominent markings for any time you plan to view, and it's free of charge. In the "Configuration" menu, be sure to enter our time zone as 8 (not -8) and set it as the default. Download it here: *http://www.skynewsmagazine.com/pages/mars2005.html*

Featured Links

Dust Devils on Mars—Animated movie clip prepared by NASA scientists: *http://marsrovers.jpl.nasa.gov/gallery/press/spirit/20050819a/dd_enhanced_568b-B558R1.gif*

NASA's Near Earth Object site: *neo.jpl.nasa.gov*

Steer a solar telescope from your web browser: *http://eyes-on-the-skies.org/*

Images and Texture Maps for your planetarium program from Celestia Motherlode: *http://www.celestiamotherlode.net/*

Get latitude/longitude for any street address, including aerial views, at TerraServerUSA: *http://terraserver.microsoft.com*

...And here's how to convert the results from decimal to sexagesimal (degrees). For example, Geyserville's longitude is 122.91721. Multiply the decimal (.91721) x 60 to get the minutes (= 55.0326). Then multiply the decimal remainder (.0326) x 60 to get the seconds (= 1.956). The resulting longitude in degrees is 122° 55' 02" (rounded up).

Allen Telescope Array Update from Page 2

This procession will continue until the 42nd antenna in Phase I goes up. After a short hiatus, the procession will continue as we proceed towards our full complement of antennas.

The new cryogenics on the log-periodic feed have been working flawlessly, cooling the small low-noise amplifiers that sit at the focus of each antenna to a very chilly 50 K, about 30 K lower than our design goal. Since these amplifiers are the first electronic components that the received electromagnetic waves have seen in possibly billions of years, we treat them gently with these amplifiers. The low temperatures assure that the thermal wiggles of the electrons in the device don't add much noise to the weak signal.

Once the signals have been amplified, we can treat the signal a bit more harshly, as we convert the microwave signals to optical signals and transport them back to the lab, where they are converted back to microwave signals and digitized. Once the signals are in the digital domain, we can treat them with impunity. In fact, we clone them repeatedly. In this way, we can send bit-perfect copies to several back-end processors that can individually handle the data, producing many types of data products useful for SETI researchers and astronomers.

So, from the large machines installing the big structures, which gently receive the incoming wave, to the small machines that pick and place the tiny-yet-powerful digital electronics, which manipulate the signals, the progress is tangible. We all look excitedly to the near-term and the burgeoning capability of this pioneering new telescope.

Meet Don Machholz! from Page 1

instruments at his home observatory, but with his "state of the art" 6" reflector (see photo) he has owned for 40 years he discovered C/2004. I said an astronomer was "lucky" to discover a comet, but I know Don would point out that the 10 comets he discovered were the result of 30 years spending lots of time at the eyepiece with modest equipment. Over and over his careful observing logs tell the tale of time, patience, and persistence leading to his discoveries.

Perhaps Don's best talent is his very personal accounting of his path through astronomy and his experiences as a discoverer of comets. Come meet Mr. Comet! He's really a very nice fellow.

—John Whitehouse

A Wrinkle in Space-Time from Page 7

in space-time that signal the passage of a gravitational wave. Three small spacecraft will fly in a triangular formation behind the Earth, each beaming a laser at the other two, continuously measuring their mutual separation. Although the three 'craft will be 5 million kilometers apart, they will monitor their separation to one *billionth* of a centimeter, smaller than an atom's diameter, which is the kind of precision needed to sense these elusive waves. LISA is slated for launch around 2015.

To learn more about LISA, go to *http://lisa.jpl.nasa.gov*. Kids can learn about LISA and do a gravitational wave interactive crossword at *http://spaceplace.nasa.gov/en/kids/lisaxword/lisaxword.shtml*.

—Article provided by JPL and NASA

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Sonoma Skies

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Don Machholz

Meet Mr. Comet!