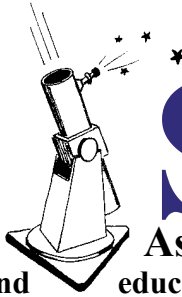


Sonoma Skies

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

www.sonomaskies.org



December 2007

Volume XXX No. 12

SCAS Board Elections Next Meeting, December 12

Dear fellow stargazers - Would you like to make your SCAS membership more fulfilling? Would you like to continue to have a vital club with its group of interesting star folk, and to meet new ones? How about considering getting yourself involved in your club? We really need your energies and good ideas, and you can see them going into action while knowing you're helping out. Besides the cozy board meetings are always nice get-togethers.

We could find a use for any of you, I'm sure. Just ask! We really need a secretary to take meeting notes and such, I wouldn't mind retiring as President, how about a Librarian or someone to help out with the newsletter? Please consider coming forward or contacting one of us to discuss what you can offer. Contact information is listed on Page 2.

We will have our annual elections at our next meeting. Proctor Terrace School, 7:30 pm on December 12.

—John Whitehouse

Striking Sparks Update

The Striking Sparks Telescope awards contest is moving along with the student essay letters to be submitted to SCAS by January 19, 2008. Some of the candidates have been attending the Young Astronomer meetings and programs at the Robert Ferguson Observatory.

In February 2003 we plan to award six telescopes like the Orion SkyQuest XT6 Dobsonian Reflector shown here.

We have four sponsors and will need to have two additional sponsors contributing \$200 to sponsor a telescope for a deserving Young Astronomer.

If you can assist with the upcoming 23rd year of the program, contact Larry McCune at llmccune@comcast.net.



Einstein's Universe and Beyond

Professor Lynn Cominsky, Sonoma State University
SCAS December 12 Meeting, 7:30 PM
at Proctor Terrace School

Einstein's most famous equation is $E=mc^2$ —but what does it really mean? When scientists observe the high-energy Universe, light from exploding stars, blazing galaxies and monstrous black holes illuminate Einstein's vision. Gamma-ray satellites such as the recently-launched Swift explorer mission and the



Gamma-ray Large Area Space Telescope (GLAST) are tools that allow us to explore the Universe in ways that Einstein could only imagine. Future NASA experiments will go "Beyond Einstein" to the edge of a black hole, will investigate the dark Universe and will study the driving forces behind the Big Bang.

Dr. Cominsky is professor and chair of Sonoma State University's Department of Physics and Astronomy. A graduate of

Brandeis University, she received her Ph.D. in Physics at MIT. She was scientific director for the PBS NOVA "Monster of the Milky Way" and accompanying planetarium show "Black Holes: The Other Side of Infinity." At UC Berkeley's Space Sciences Laboratory, she was project manager for NASA's Extreme Ultraviolet Explorer Satellite Project Management. She has authored over 60 research papers.

Prof. Cominsky is the founder and director of SSU's Education and Public Outreach Group, which supports NASA's Gamma-ray Large Area Space Telescope (GLAST), Swift and XMM-Newton missions as well as several future missions now under study. The group excels at K-12 teacher training, curriculum development, and the development of interactive web activities for high school students that teach math and science.

Cominsky's group also runs the NASA Educator Ambassador program, which selects and trains master educators to help

Young Astronomers See page 6

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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. Once you have received the discount rate, you may renew your subscription by sending your personal check with the renewal notice directly to Sky Publishing. 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

President: John Whitehouse 539-5549 jmw@sonic.net

Vice-President & Program Director: Len Nelson 763-8007
lennelsn@comcast.net

Treasurer: Larry McCune, (415)492-1426 llmccune@comcast.net

Secretary: Loren Cooper, 525-8737 lorenco@sonic.net

Membership Director: Walt Bodley 823-5268
membership@sonomaskies.org

Director of Community Activities: Lynn Anderson 433-1154
astroman@sonic.net

Publications Director: Cecelia Yarnell 569-9663
publications@sonomaskies.org

SCAS Appointed Positions

Young Astronomers Advisor: Gary Jordan 829-5288
SieraMolly@comcast.net

Striking Sparks Program Coordinator: Larry McCune
(415)492-1426 llmccune@comcast.net

Amateur Telescope Making: Steve Follett 542-1561
sfollett@sonic.net

Librarian: Joan Thornton 762-0594 johnjoanthornton@sbcglobal.net

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

December Observing Notes

- 12/1** Moon very near Saturn Moon v nr Saturn 5AM
Saturn Quadrature: Ring shadows are maximum and image appears most "3-dimensional."
- 12/6** Crescent Moon near Venus 5:30 AM
- 12/9** New Moon 9:30 AM
- 12/14** Geminid Meteors Peak 9 AM
- 12/19** Mars Closest Approach 10 AM, Magnitude -1.6; Disk 15.9"; in Gemini
- 12/21** Winter Solstice 10:08 PM. "Sol" refers to the Sun and "stice" means to stand still. Each day before the Winter Solstice the Sun appears a little lower in the sky at noon. The Sun's altitude at Noon on the Winter Solstice, as seen from Sonoma County, is just 28 degrees above the southern horizon. After the Winter Solstice the Sun appears a little higher each day at noon. This results in increased daytime hours each day (until the Summer solstice) and is considered the beginning of the natural new year.
- 12/23** Moon very near Mars 7 PM. This is nearly an occultation for us. Those from about Portland north will enjoy the occultation.
- 12/24** Mars Opposition 11:30 AM. Magnitude -1.6 in Gemini. (See closest approach on 12/19).
- 12/25** Comet 8P/Tuttle in Andromeda 6:30 PM
Mars near M35 7PM
- 12/26** Moon very near M44, 4 AM
- 12/27** Moon very near Regulus 10PM
- 12/28** Moon near Saturn 11PM

—Most of above courtesy of Jack Welch

2008 CALENDARS AND OBSERVER'S HANDBOOKS AVAILABLE

There are still a few copies of these gems available: the 2008 Royal Astronomy Society of Canada (RASC) Astronomy Calendars and Observer's Handbooks, and the 2008 Ottewell Astronomical Calendar. Price is \$9.50 for the RASC Calendar, \$17.00 for the Observer's Handbook and \$20.75 for the Ottewell Calendar.

If you're new to astronomy, at least get the Observer's Handbook. There's a great deal of information packed into that little book.

You can pick up your copies at the December meeting from Lynn Anderson and Len Nelson.

COMING TO SCAS IN 2008

January: "SCAS: What We Did, What We're Planning" with John Whitehouse, Lynn Anderson, Len Nelson

February: "Space Junk" with Linda Williams, SRJC

March: "Adaptive Optics" with Scott Severson, SSU

SCAS School Star Parties

Volunteer-Land

November star parties were batting .600. Star parties at Windsor High School and Rincon Valley Middle School were successful events—the sun was shining and the moon still above the horizon for my moon presentation for the Hidden Valley third graders. Thanks go out to Merlin Combs, Frank Siroky, Tim Slater, Loren Cooper, Alan Karbousky, John Whitehouse and Emilio Ricci for bringing their telescopes and enthusiasm to these events. I gave a slide show presentation to about 120 fifth graders at Healdsburg's Fitch Mountain Elementary on November 8 and Len Nelson did a similar presentation using the new Night Sky Network "Exploring the Solar System" toolkit for about 50 third graders at Old Adobe in Petaluma on November 13. Both of the star parties at these two schools were canceled due to the overcast skies.

Coming up in December we have school star parties scheduled for the first two Thursdays:

December 6—Old Adobe Elementary in Petaluma: Setup at 6:30, star party 7 PM.

December 13—Piner Elementary: Setup at 6:30, star party 7 PM (raincheck Dec. 14).

You don't need to have a telescope to share your enthusiasm for astronomy at these events. Sometimes it is nice to have one or two people assist with crowd control or giving sky tours. I have been encouraging the teachers to develop an astronomy "passport" or scavenger hunt list to be signed off as the student looks at a galaxy, globular cluster, open cluster or comet. Some of these extra credit assignments sheets ask the student to point out the north star, other things in the sky or explain why there is no moon in the sky tonight, etc. A non-telescope person could be available to sign off on these questions.

If you are not already on my volunteer email list and would like to join the fun, you can always just show up, but it is nice to have some advance notice. Email me at astroman@sonic.net.

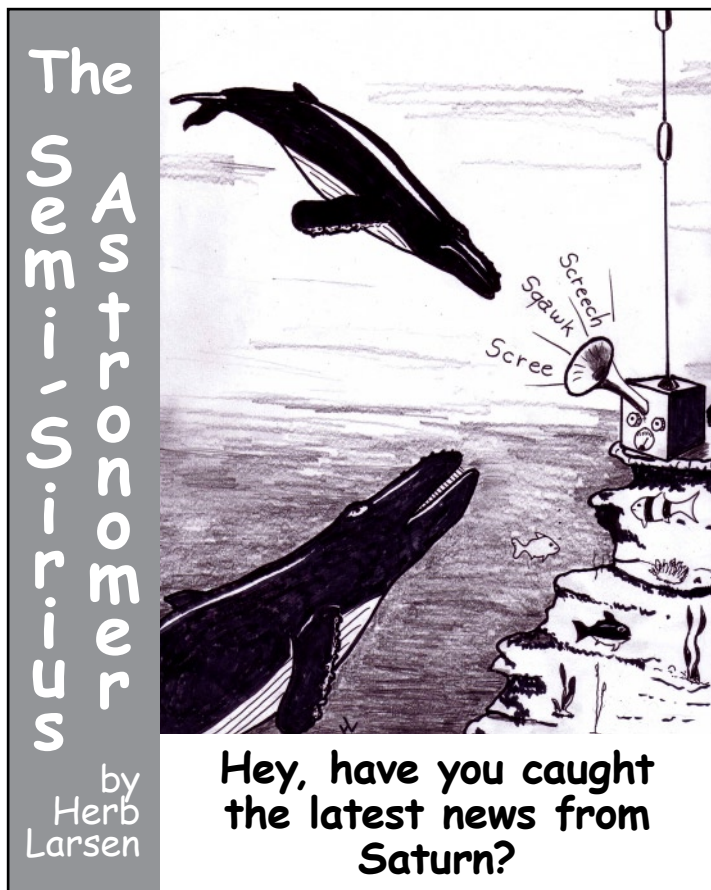
—Lynn Anderson

WELCOME NEW MEMBERS!

Welcome to new members Rob Koslowsky of Santa Rosa and Michael Stalcup of Pinole.

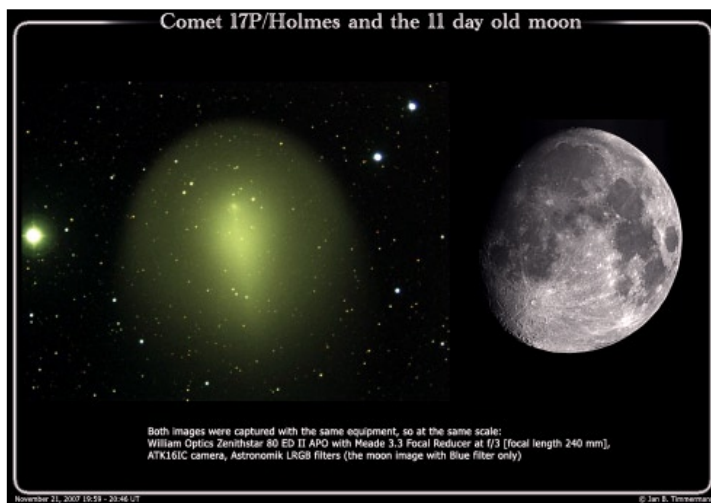
Scope City
New Member Bonus!

- 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



SOCIAL AMENITIES

Many thanks to Ron Tietz for providing cake, cookies and coffee at the November meeting.



Comet 17/P Holmes

It's been a remarkable month watching this comet explode into view and then grow bigger than our Sun. The above comparison was made by Jan Timmermans of Holland using the same equipment for both objects on November 21. You may know Jan as the moderator of QCUIAG, The QuickCam and Unconventional Imaging User Group, which I suggest you join if you want to do astrophotography with a webcam.

See the back cover for photos taken by SCAS members.

Events

ROBERT FERGUSON OBSERVATORY PUBLIC VIEWING

No Public Observing in December, but join us

Saturday, January 12

Solar Viewing: 11:00 AM - 3:00 PM

Night Viewing begins 7:00 PM

The Observatory features three telescopes: A 14-inch SCT with CCD camera in the East wing, an 8-inch refractor under the dome and a 24-inch Dobsonian in the West wing. 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.

Fees: No admission fee for the solar viewing, but donations are appreciated. The Park charges \$6 per vehicle for entry. A \$3 donation is requested from adults 18 and over for admission to the observatory during night viewing sessions.

NIGHT SKY FALL SERIES

Session #6—Dec. 4

Classes held Tuesdays at 7PM. Each class includes a lecture on the constellations of the season, their history and mythology, and how to find objects within them. **Fees:** \$75 for the series of six presentations. (Single session fee is \$23). 10% discount for VMOA members. Classes are held at the Observatory.

For information or to register: (707) 833-6979,
<http://www.rfo.org> or nightsky@rfo.org

DOCENT'S NEW YEAR'S EVE

Monday, Dec. 31, beginning 2PM

The observatory is reserved for docents and their guests to observe the heavens and to celebrate the New Year.

EXPLORATORIUM

Watch online as the Exploratorium Ventures to the Bottom of the World Jan. 4, 11&12, 18 and 25

In celebration of the International Polar Year (2007-2008), the Exploratorium's webcast crew will be talking with scientists at McMurdo Station and the South Pole about the myriad of research being done there. Meet scientists pulling giant cores of ice from miles down, watch as penguins dive under the ice, and see scientists reach for the sky with their weather balloons! Learn about the giant trap under the ice that catches the tiniest particles from outer space, and a new 10-meter telescope at the South Pole.

These programs and webcasts will be shown online at www.exploratorium.edu/icestories and at the Exploratorium's Phyllis C. Wattis Webcast Studio in San Francisco. Past webcasts can be found at the above link.

SRJC PLANETARIUM

**"The Star of Bethlehem"
Ends December 16**

For years astronomers have been asked about the possibility of astronomical events being responsible for what has been called the star of Bethlehem. In this show we will consider various possibilities such as: comets, super novae, bright meteors, planetary alignments, etc.

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/>



MORRISON PLANETARIUM DEAN LECTURE SERIES

Dec. 18, 7:30 PM: "The Orion Nebula: Where Stars are Born"—Robert O'Dell, Vanderbilt University

In the heart of the constellation Orion lies the famous Orion Nebula. This is only the most visible part of the process of star formation that occurs in this region. During the last 15 years observations of the nebula with the Hubble Space Telescope and ground-based infrared sensitive telescopes have revealed that star formation there has extended to within the last 100,000 years, a mere instant as compared with the 13 Billion year age of the universe. This talk will draw heavily on Hubble images made by the speaker and will feature a simulated flying tour through the Orion Nebula and its cluster of young stars.

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.php>

"Reality is that which, when you stop believing in it, doesn't go away." —Philip K. Dick

ASTROPHOTOGRAPHERS: YOUR PHOTOS MAY FURTHER THE STUDY OF PROPER MOTION

—by *Dave Mosher, Staff Writer, Space.com*

A new search engine will soon turn your night sky images into powerful research data and identify the twinkling objects in them with just the click of a button.

The Astrometry.net database will hunt down and name celestial objects in any amateur photo, pinpoint the region of night sky that was photographed and use the image to expand a detailed database of the cosmos for use by scientists



A view of the constellation Orion, prior to being inspected by Astrometry.net's new star image search engine.

David Hogg, an astronomer at New York University and leader of the project, showed off the still-in-development tool at the recent Astrophysics 2020 conference here at Johns Hopkins University's Space Telescope Science Institute.

"Any individual can take a picture of the sky, plug it in and learn what stars, galaxies or other objects are in their image," Hogg told SPACE.com. "It's fun for people to do this, but more importantly it'll provide data we need to make that image searchable and useful to scientists."

'Wiki' the sky

The project's driving force is astrometry: a branch of astronomy that relies on star positions to explain how they got there. Although stars may look stationary, they move in a slow "proper motion" from our Earthly vantage point.

"To understand the physics of a star cluster, you need to know the proper motions of stars in it," Hogg said, mentioning the Beehive Cluster in the constellation Cancer as an example. "When you run the clock back, you see the stars came out of some huge formation event."

The best way for astronomers to pin down the celestial motions—as well as keep tabs on the latest supernovae—is to take many images over time, Hogg explained. Problem is, monitoring the sky tedious and expensive.

Meanwhile, armies of amateurs scour the sky every minute of every day around the world. But most don't tag their images with "meta-data" scientists need, such as the exact time the photo was taken and location of the photographer on Earth at the time.

Hogg wants to change that.

"Amateurs with first-class equipment could really revolutionize how we think about doing this kind of science," he said, noting the search engine's ability to automatically tag random celestial images with the crucial meta-data.

How it works

The Astrometry.net process begins with an image and software that performs "the most idiotic star identification possible" on

it, Hogg said: circling stars and other points of light.

Computer code then connects the dots between four stars at a time and compares the pattern to those in a massive celestial database. When a good match appears, the Web-based tool not only visualizes what section of the night sky was photographed, but also lists the constellations, objects of interest and precise celestial longitude and latitude.

"If an amateur takes an image, says, 'Wow, I have a super cool image, what do I do with it?'" Hogg explained, "we can take that image and turn it into science-grade data."

Hogg said developers are also working toward finding out when a photo was taken by reversing the proper motions of stars in the most up-to-date celestial catalogues. "We're building the catalogue at different times, because in principle there's also a best fit for year," Hogg said.

What's more, he explained, is that the database won't be a "greedy" repository that simply gathers images and gives nothing back to hard-working amateur astronomers—some of whom sell prints of their photographs for a living and worry about copyright issues.

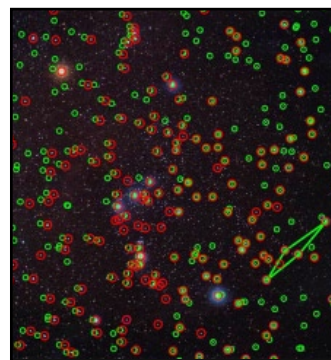
"We want to give back services in exchange for their help," Hogg said. Such services might include recognition in scientific studies that use the amateur's image, or perhaps linking back to the contributor's Web site when other users stumble upon the image with Astrometry.net's search engine.

Growing pains

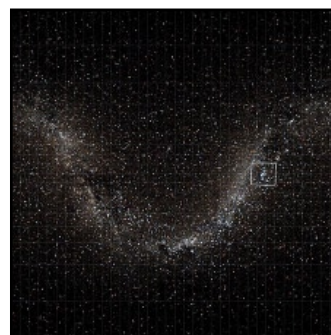
While computer scientists prepare the database for its public debut, tentatively set for spring 2008, Hogg said the entire operation currently is running off of a simple Web server. To handle the heavy traffic, Hogg said has been speaking with Internet companies that could host the service.

"We like the idea of a kid in a backyard looking up at the sky, asking 'What is that?' and having a parent be able to answer their question," he said. "All they would need is a decent shot of the part of the sky they're looking at."

—All photos courtesy of NASA/Astrometry.net



Another view of Orion after being run through Astrometry.net's star image search engine. Red circles are stars found by the search software, whereas green circles show existing catalogue stars. A green quadrangle (right) is used to identify what region of the sky the image belongs to.



Astrometry.net shows where an image of the constellation Orion belongs in a full map of the night sky. A white box superimposes the image on the full map.



Orion shown with its famous stars circled and labeled after Astrometry.net's service processed the image.

Young Astronomers



Exoplanets!

*YA Meeting Friday, December 14, 7:30 PM
Apple Blossom School, Sebastopol*

Exo-what? Also known as extra-solar planets, exoplanets are planets that are orbiting stars other than our sun. Although the existence of extra-solar planets has been predicted for decades, this field of astronomy has really taken off in recent years, as our technology has improved to the level that allows us to detect them. In fact, astronomers have now identified over 200 exoplanets, with the list growing almost monthly. How do astronomers find such distant planets, and what have they discovered about them?

Join us at 7:30 PM on December 14 at Apple Blossom School in Sebastopol, when YA president Melissa Downey will give a fascinating presentation about these intriguing planets that are located light-years away from Earth.

Sadly, this will be Melissa's final meeting as our YA president, as she'll be moving on to complete her college studies at UC Santa Cruz. At this meeting we will be holding elections to fill vacant positions on the YA board. If you are interested in serving as a YA board member, please join us for these elections.

As always, there will be a star party after the general session, weather permitting. Don't forget to bring your telescope!

NEW ON THE SPACE PLACE WEB SITE: "SOLAR INDIGESTION"

Find out about what happens to Earth during bouts of "solar indigestion" at <http://spaceplace.nasa.gov>.

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: Geoffrey Knoll

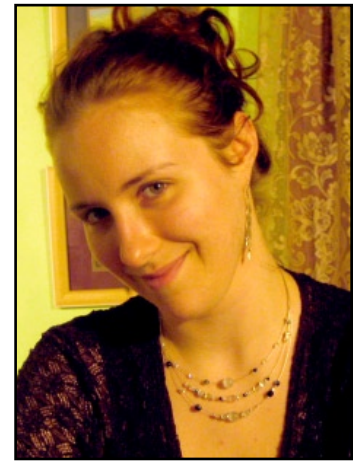
RECORDER: Open

NEWSLETTER EDITOR: Max Eliaser, Maxxedout@comcast.net

LIBRARIAN: Open

ADULT ADVISOR: Gary Jordan 829-5288, Sieramolloy@comcast.net

YA PRESIDENT MELISSA DOWNEY IS MOVING ON



"I'm transferring to the University of California, Santa Cruz for the Winter 2008 quarter. I move in on January 7th and start my classes January 8th. I've decided to major in physics and minor in biology, so I'll be taking three academic classes--Biology, Organic Chemistry, and Math Methods for Physics. I plan to graduate in the Spring of 2010, or just over two years from now. I am really excited about moving on to upper division classes!

"Let's see...it was the fall after I turned fifteen, so this would make it four years I've been president. I was the VP for three years (from 12-15) and joined the club when I was 11. I know, the years are a blur to me too! I wouldn't even know except that some of the pictures of me back then have the date stamped in the corner!"

She has been a wonderful President...providing at least half of the presentations to the YA in a most imaginative way.

Her PowerPoint presentations have been well thought through...very thorough...whether the subject was the nature of black holes or whether the existence of aliens.

She even gave a great presentation to the regular SCAS group.

She will leave shoes that are very hard to fill. However, whoever the next YA president is...he or she will bring his or her own style and imagination and we all look forward to that. The important thing is that the next president be able to relate to his or her audience and enjoy the experience....like Melissa Downey did.

We wish her all the luck in the world in her college endeavors but we know that she makes her own and has some incredible smarts to boot. We will sincerely miss her. Thank you, Melissa!

The Telescope at the South Pole

*Adapted by Max Eliaser
from an article by Kathleen M. Wong*

Last December, UC Berkeley Professor of Physics Bill Holzapfel was focused on a new project. On Christmas Day, Holzapfel and his colleagues were assembling the South Pole Telescope. Since Antarctica is very arid, the atmosphere is as transparent as it is anywhere in the world.

The trip was hectic, as Holzapfel recalls. Everyone had just enough time to open their presents before they had to start packing. Their luggage ranged from long undies to supersensitive photon detectors and a cryogenic receiver the size of a Volkswagen bug.

By operating this gear at 90° south, Holzapfel and an international team of scientists from eight other institutions hope to gain insight into the ingredients that make up the Universe. The most familiar is regular matter, the kind that makes up everything we encounter on a typical day. But scientists have also found evidence of two more components: dark matter, which has mass but cannot be seen, and which we can only observe indirectly; and dark energy, which is inflating the universe faster and faster. The South Pole Telescope will help quantify their respective amounts and characteristics. To discern the answer, scientists are looking at the Cosmic Microwave Background, which consists of radiation that flooded the universe after the Big Bang. Today, they form a remarkably uniform backdrop throughout space. But every so often, a few CMB photons will collide with a galaxy cluster. Within that cluster, about one percent of them will slam into a superheated electron. The collision transfers energy to the low-energy CMB photon, boosting it to a higher frequency.

When the South Pole Telescope observes low-energy photons from that direction, the effect is like looking at x-rays that have been absorbed by bones: the background dims, leaving a hole in the CMB.

“If we can see these holes in the CMB, it tells us where the clusters of galaxies are,” Holzapfel says. “We can use the CMB as a backlight to illuminate the universe.”

The larger the photon hole, the more massive the galaxy cluster behind it. The South Pole Telescope will allow scientists to assemble a catalog of massive galaxy clusters. Even the oldest and farthest clusters can be counted because, unlike the light from stars, CMB hole visibility is the same for clusters near and far.

The relative proportions of matter, dark matter, and dark energy “radically affects the formation of structure in the universe. And the thing that’s most sensitive is the galaxy clusters,” Holzapfel says.

The team will compare the results of their galaxy cluster survey with computer simulations of the evolving universe. The new data will help identify the abundances and properties of the ingredients that could have produced the universe we see today. In particular, they hope to shed new light on the yet mysterious dark energy that appears to dominate the dynamics of the universe.

Holzapfel and his Berkeley colleagues designed and built the digital eyes that allow the South Pole Telescope to see the CMB. The heart of the system consists of a shiny silicon wafer roughly the size of a Frisbee. On it are etched 960 bolometers, supersensitive heat detectors capable of finding dim spots where the CMB is a few millionths of a degree colder.

The telescope was built in Antarctica because it has some of the driest skies on the planet. Water vapor in the atmosphere obscures CMB radiation. “If you were to take the atmosphere above Berkeley on a good day, and squeeze it dry, you would get a layer of liquid water that’s at least 1 cm deep. At the South Pole, in the dead of winter, you’ll get 50 times less,” Holzapfel says. The total darkness of the six month austral winter also minimizes the daily weather cycle, providing long stretches of dry, clear skies.

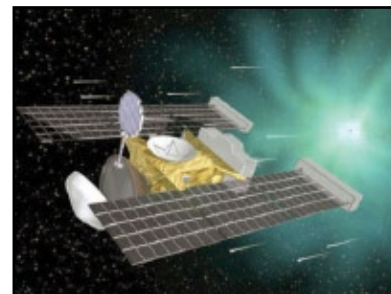
Upon landing at the bottom of the world, Holzapfel and colleagues got right to work installing, testing, and troubleshooting every piece of equipment they had brought with them. It turned out they hadn’t a moment to waste. “We got on the sky, were able to observe a planet...and the next day they told us we had to leave,” Holzapfel says. Temperatures were growing too cold to fly, forcing temporary visitors to leave or risk spending the winter in Antarctica. “We had all of an hour and a half to pack up our stuff and get on the plane,” he says.

In the hands of two overwintering scientists, the telescope was online and making observations. The South Pole Telescope should produce preliminary complete the planned cluster survey over the next several years. If all goes well, says Holzapfel, “we’ll gain new insights into what’s arguably the most interesting question in physics today.”

Comet explorers Deep Impact and Stardust: Still on assignment

Two old NASA missions, Deep Impact and Stardust, have been given new lives. Although their primary missions have been completed, these durable spacecraft will continue to collect data and add to our knowledge about other comets, as well as planets orbiting other stars (known as exoplanets.)

Two years ago the Deep Impact spacecraft smashed a projectile into Comet Tempel 1 and imaged the debris from the explosion. NASA is now sending it on to visit Comet Boethin. Although Deep Impact doesn’t have another bullet in its arsenal, it will fly to within 700 kilometers of Boethin on Dec. 5, 2008, so it can capture some close-up images. This year, while en route to the comet, the spacecraft will study several nearby, bright stars known to have massive, orbiting planets. Deep Impact will search for periodic variations in starlight as the planets pass in front of and behind their parent stars. The variations may reveal not only the size and composition of these Jupiter-size planets, but also whether they possess rings, moons, or Earth-size companions.



Meanwhile, the Stardust mission, which early in 2006 sent to Earth material that it collected from the shroud of Comet Wild 2, has also been given a new assignment. In 2011, the craft will fly past Deep Impact’s old target, Tempel 1. While there it will look for changes in the comet’s nucleus since the body’s last close passage to the sun, thereby providing scientists the opportunity for follow-up observations to Deep Impact’s initial visit.

These two missions are part of NASA’s ongoing efforts to use spacecraft for purposes beyond their primary mission designs. As long as the spacecraft themselves remain viable, there is no reason to abandon them to the cold of space. In this way NASA scientists are able to gain more data on a variety of subjects, for minimal additional cost.

—Adapted from an article by Ron Cowen in *Science News*.

Einstein's Universe (from Page 1)

develop, test and disseminate engaging educational materials for grades 5-12. Over 45,000 teachers have been directly trained through this program to date.

The group also built and operates a robotic telescope at the California Academy of Sciences' Pepperwood Natural Preserve, which is used to involve high school and college students in NASA science missions in order to increase the number of future scientists and engineers entering the workforce.

Dr. Cominsky hasn't visited us for five years, so take advantage of this great opportunity to meet her and learn more about Einstein's universe.

COMET PHOTOS BY SCAS MEMBERS



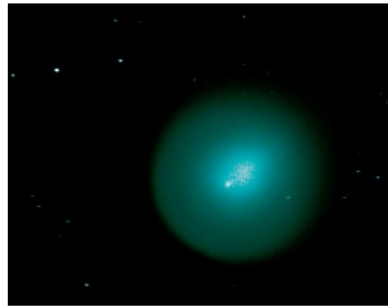
Len Nelson:

*Comet Holmes 11-2-07 2335 hrs PDT
20sec exposure. I used my Nikon D80
on my 130mm AstroPhysics refractor
on an OAG (off axis guider). ASA set
at 1000. I guided on a star just off the
field of view.*



Eric Swanson:

*I took this of Comet Holmes 11/3/07.
Equipment: 12.5" f4 Newtonian, that
still needs some fine collimation. ISO
1600 for 25 seconds.*



Jerry Telfer:

*Comet Holmes/17P from RFO 11/3/07.
Equipment: Meade LX200GPS
mounted Alt-Az, with Canon EOS
5D at prime focus for 30 seconds
at ISO800.*

**Sonoma County
Astronomical Society**

P.O. Box 183
Santa Rosa, CA 95402



Sonoma Skies

December 2007

DECEMBER 12

Dr. Lynn Cominsky
Einstein's Universe
and Beyond