

The Refractor

The Bulletin of the Eastbay Astronomical Society
 Founded in 1924 at Chabot Observatory, Oakland, California

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June 2006 talk:

Stardust—NASA's mission to study the origins of the Solar System and Life

Saturday, June 10, 2006, 7:30 pm

Speaker: Dr. Bryan Mendez, UC Berkeley

Chabot Space & Science Center

Physics Lab, 2nd Floor, Spees Building

On January 15, 2006, NASA's Stardust mission returned to Earth after nearly seven years in interplanetary space. During its journey, Stardust encountered comet Wild 2, collecting dust particles from it in a special material called aerogel. At two other times in the mission, aerogel collectors were also opened to collect interstellar dust. By studying this dust, we hope to learn about the origins of the Solar System. The Stardust Interstellar Dust Collector is currently being scanned by an automated microscope at the Johnson Space Center. When done, there will be approximately 1.6 million fields of view covering the entire collector, but we expect only a few dozen total grains of interstellar dust in the entire collector. Finding these particles is a daunting task. We are recruiting many thousands of volunteers from the public to aid in the search for these precious pieces of space dust trapped in the collectors. We call the project Stardust@home. Through Stardust@home, volunteers from the public search fields of view from the Stardust aerogel collector using a web-based Virtual Microscope. Volunteers who discover interstellar dust particles have the privilege of naming them.

Dr. Bryan Mendez is an Education and Public Outreach (E/PO) Specialist at the Center for Science Education at UC Berkeley's Space Sciences Laboratory (CSE@SSL). At CSE@SSL, Bryan develops programs for the public through the web and museums, develops classroom materials for students in K-12 classrooms, and conducts professional development for science educators. Bryan has served as an E/PO specialist for several NASA missions and projects including: RHESSI, STEREO-IMPACT, CHIPS, WISE, SPIDR, NVO, and Star-



Dr. Bryan Mendez



Clockwise from upper-left: Stardust space probe re-enters Earth's atmosphere on Jan 15, 2006; lands in eastern Nevada; helicopter transport of recovered probe; scientists remove captured samples

dust@home. He has a particular interest in teacher professional development and has conducted many workshops and short courses for teachers at CSE@SSL and at national conferences such as NSTA, CSTA, & SACNAS and in conjunction with the GEMS program from the UC Berkeley Lawrence Hall of Science.

Bryan hails from Traverse City, Michigan where the dark skies enthralled him from a very early age and inspired him to study astronomy. He graduated from the University of Michigan in 1997 with degrees in Astronomy, Physics, and Saxophone Performance. Bryan continued his education at the University of California at Berkeley, where he researched the distances of galaxies and their large scale motions in the nearby Universe. He received a Ph.D. in Astrophysics from UC Berkeley in 2002. ★

DINNER WITH THE SPEAKER

5:30 pm
 Saturday, June 10
HUNAN YUAN
 4100 Redwood Rd., #11
 (next to Safeway)
 Oakland
 (510) 531-1415
 No need to confirm—just show up!

Inside This Issue:

Not a Moment Wasted 2
Trip Report: SAS 2
Barcroft 2006 3
News 'n Views 4
The Ultimate Camera 5
Spare Shots 5
Directions & Schedule 8

Not a Moment Wasted

by Dr. Tony Phillips

The Ring Nebula. Check. M13. Check. Next up: The Whirlpool galaxy.

You punch in the coordinates and your telescope takes off, slewing across the sky. You tap your feet and stare at the stars. These Messier marathons would go much faster if the telescope didn't take so long to slew. What a waste of time!

Don't tell that to the x-ray astronomers.

"We're putting our slew time to good use," explains Norbert ScharTEL, project scientist for the European Space Agency's XMM-Newton x-ray telescope. The telescope, named for Sir Isaac Newton, was launched into Earth orbit in 1999. It's now midway through an 11-year mission to study black holes, neutron stars, active galaxies and other violent denizens of the Universe that show up particularly well at x-ray wavelengths.

For the past four years, whenever XMM-Newton slewed from one object to another, astronomers kept the telescope's cameras running, recording whatever might drift through the field of view. The result is a stunning survey of the heavens covering 15% of the entire sky.

Sifting through the data, ESA astronomers have found entire clusters of galaxies unknown before anyone started paying attention to "slew time." Some already-known galaxies have been caught in the act of flaring—a sign, researchers believe, of a central black hole gobbling matter from nearby stars and interstellar clouds. Here in our own galaxy, the 20,000 year old Vela supernova remnant has been expanding. XMM-Newton has slewed across it many times, tracing its changing contours in exquisite detail.

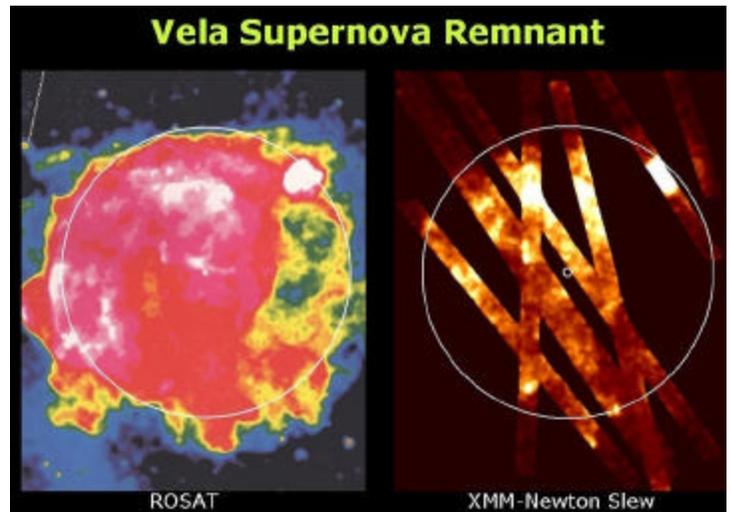
The slew technique works because of XMM-Newton's great sensitivity. It has more collecting area than any other x-ray telescope in the history of astronomy. Sources flit through the field of view in only 10 seconds, but that's plenty of time in most cases to gather valuable data.

The work is just beginning. Astronomers plan to continue the slew survey, eventually mapping as much as 80% of the entire sky. No one knows how many new clusters will be found or how many black holes might be caught gobbling their neighbors. One thing's for sure: "There *will* be new discoveries," says ScharTEL.

Tap, tap, tap. The next time you're in the backyard with your telescope, and it takes off for the Whirlpool galaxy, don't just stand there. Try to keep up with the moving eye-piece. Look, you never know what might drift by.

See some of the other XMM-Newton images at <http://sci.esa.int>. For more about XMM-Newton's Education and Public Outreach program, including downloadable classroom materials, go to <http://xmm.sonoma.edu>. Kids can learn about black holes and play "Black Hole Rescue" at The Space Place, <http://spaceplace.nasa.gov/>, under "Games."

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



The image above is the Vela Supernova Remnant as imaged in X-rays by ROSAT. On the right are some of the slew images obtained by XMM-Newton in its "spare" time.

Trip Report: SAS Symposium

by Bruce Skelly

I had the pleasure of attending the 25th Annual Conference of the Society for Astronomical Sciences (SAS) at Big Bear Lake, CA from Tuesday May 23rd to Thursday May 25th, 2006. As they did last year, a day of workshops was held on Tuesday before the actual start of the Symposium. In the morning session, I chose to attend Brian Warner's workshop on the operation of his program, *PhotoRed*, part of MPO Canopus (<http://www.MinorPlanetObserver.com>), which produces photographic reductions of CCD images. The software goes beyond finding calibrated magnitudes for stars; it also corrects for extinction, and produces a set of color transformations from instrumental to standard magnitudes. There is more, but that is another article.

I also attended a workshop by Tonny Vanmunster, from Belgium, on his software *Peranso* (<http://www.peranso.com>); it finds periodicity (recurring patterns) in data. It is really an amazing program for the analysis of light curve data, and includes about a dozen different methods for finding periods. The software is very user friendly, accepting input via file or the Windows clipboard. You can also play with the results to see the various curves that would be produced if you chose a different period.

The next day was the actual start of the Symposium, lead by Rick Fienberg, the editor of *Sky and Telescope* magazine, who spoke on Professional-Amateur Collaboration. This was the start of 24 presentations, including an additional six poster presentations. This year the meeting was held in conjunction with the Center for Backyard Astrophysics (CBA),

Continued Page 3

This August Come to One of the Most Remarkable Star Parties Anywhere!

Each year, sometime in the late summer, the Eastbay Astronomical Society and the Tri-Valley Stargazers put together a star party that's literally "above the rest!" For as long as a



Center of the Milky Way Galaxy as seen from Barcroft Photo by Carter Roberts

week, you can buy room and board up at the Barcroft High Altitude Research Station, which is at 12,435 feet above sea level (ASL) in the White Mountains, east of the Sierra Nevada moun-

tains. This is the home of the Bristlecone Pines, the World's oldest living things. There you will see some of the most pristine dark skies available anywhere in the continental US! The scenery is spectacular and the ride there is incredibly beautiful; there are many wonderful side trips along the way.

Room is still available for anyone who wants to experience the fabulous night skies of Barcroft. It's HIGH. It's incredibly dark! Limiting Magnitude is very conservatively estimated at 6.4. The stars and Milky Way will blow you away (see Carter's image)! It's an outstanding place for astro-imaging since imaging devices aren't dependent on oxygen.

Barcroft is also one of the most comfortable deep sky sites anywhere (if you can take the high altitude reasonably well). There are bunk beds, showers, flush toilets, TV and videos, an oxygen tank in the dining room, a well-equipped workshop for tinkering and the highest pool table and library in the continental U.S. It's an immensely fun place to hang out, learn how to observe, and Astro-bond. The food is terrific!

Here's the schedule:

Thursday, August 17, we acclimate to thinner air with an overnight stay at Grandview Campground (8,600 ft ASL) or in Mammoth at the Swiss Chalet (8,000 ft ASL). If you're at Mammoth with us, we go out to dinner that night and breakfast the next morning before heading out.

From Friday, Aug 18 to Thursday, August 24 we'll be at the University of California's, Barcroft High Altitude Research Station. We leave Friday, August 25.

You don't have to stay the whole time but the longer you stay the more preference you get. Another benefit of staying longer is that you will acclimatize better and are more likely to have great weather. I strongly recommend at least one day spent at about 8,000 feet for acclimatization.

Due to the level of research at Barcroft we are limited in the number of participants (usually about 20 but sometimes fewer). Priority will be given to those staying 3 nights or more. Send your check for \$55 per person per night at Barcroft, payable to:

Dave Rodrigues, (A.K.A. the AstroWizard)
1633 Graff Ct.
San Leandro, CA 94577-3938

If you have questions or are interested, please call me A.S.A.P. at (510) 483-9191 or Email me at davev-rod@aol.com. I have a write-up that gives more info. I prefer and respond more quickly to phone calls or voice mail. ★

SAS

Continued from Page 2

so we had presentations by attendees from all over the world; New Zealand, South Africa, Finland, Belgium, and, of course, the US.

Day three wrapped up the presentations, with a dinner, and a keynote speech by Dr. Donald K. Yeomans, JPL Senior Research Scientist, Supervisor for the Solar System Dynamics Group, and Manager of NASA's Near-Earth Object Program Office on "Finding Near Earth Objects Before They Find US".

Without going into too much detail, the various papers presented were a balance of professional and amateur, of projects completed and ongoing. In short, I was amazed by the amount of science that can be done with small telescopes. Often the observers presenting papers have a single passion, such as asteroidal light curves, cataclysmic variables stars, eclipsing binaries, or dwarf novae; but, as with much of science, new discoveries are made when you least expect it. For example, Brian Warner related his discovery of a new variable star while trying to capture the light curve of an asteroid.

Don't have a telescope? That needn't stop you. Aaron Wolf presented a program he wrote called *Systemic*. When a star with multiple extra solar planets is discovered, the professionals are in a hurry to fit the data to orbits that will incorporate all of the data. They do this as quickly as possible so that they can publish their results; their periods are not always the best fit to the data. With *Systemic*, you can download the data from the professional survey, and then play around with it to see if you can get a better fit than what the pros achieved. In a few minutes, Aaron is able to get a better result than that published in the peer-reviewed article. The software is in Java, and runs on PC/Mac/UNIX operating systems. It can be downloaded at <http://www.oklo.org>.

Christopher Watson spoke on the Variable Star Index (VSX) which can be accessed at <http://vsx.aavso.org>. This new variable star repository is designed to keep track of all data about variable stars in one place. Instead of having to go to multiple web sites for different surveys, the plan is to have one place that all of the data can be stored.

More information on SAS, as well as proceedings from previous years can be obtained at their website, <http://www.socastrosci.org/> ★



Editor's News 'n Views

Howdy, Astro Fans!

Astronomy Day went well (as usual) this year, with **Carter Roberts**, **Dave Rodrigues**, **Linda Lazzaretti**, and **Gerald McKeegan** doing the Oakland Zoo from 10 - 4, and **Paul Hoy** and **myself** working Jack London

Square from 11 - 9. The Sun cooperated wonderfully, with lots of neat prominences to amaze the public with. Paul had his Coronado PST H α (H-alpha) solar scope, and Dave loaned us his H α Coronado SolarMax 40, and I had my 3.5" Questar with white light solar filter to show a small-to-medium sized sunspot, for which we were grateful, seeing as this is a solar minimum year. And, later in the day, Paul brought out his 5" Celestron Schmidt-Cassegrain, and we were able to look at the moon and, eventually, Saturn, as well. We all talked-up CSSC and the EAS, handed out literature, and had a great time with the public.

This just in: Chabot's Assistant Programs Director, **Ryan Diduck**, has decided to go back home to Canada. We will miss Ryan; he was ever an advocate for astronomy at Chabot, and a cool dude, to boot (*not* a cool dude to boot). Chabot is not looking to replace him, immediately, so most of his functions will be absorbed by other staff. However, Ryan's unique blend of capabilities as an astronomer, technician, writer, producer, presenter, administrator, and his bulldog determination to get things done, and done right, will be a real challenge to cover. Take care and fare thee well, Ryan!

Since the weather *finally* let up, the EAS Astrophotography Group has really gotten into gear and begun to produce some wonderful results! **Bill Drelling**, the group's organizer, went to the Texas Star Party, and took shots of nebulae, star clusters, and star trails. **Paul Hoy** took and processed pictures of Jupiter, and the Whirlpool Galaxy. Here's a few of their shots (below), but for best views, go online to our website (www.eastbayastro.org/) and click on the Astrophotos link to see these pictures and more, by all our contributing astrophotographers. You will be amazed and delighted!

Speaking of astrophotographers, one of our own has recently become, well, without *bragging* or anything, **WORLD FAMOUS!** Yes, **Conrad Jung**, CSSC staff and longtime EAS member, has three of his astrophotos on display at the Smithsonian's Air & Space Museum *Explore the Universe—First Light* exhibit (mid-April thru June), where potentially *millions* of visitors will see his work and know his name. Wow. And, the local papers have picked up the ball, and several have written articles on Conrad—The Contra Costa Times newspaper, and its sister publications, splashed him on their front page, with picture, interview, and article. See which pictures were displayed at the following web link: <http://www.nasm.si.edu/exhibitions/gal111/universe/firstlight/feature.cfm?ID=94> Way to go, Conrad! (That's it for now!) ★

Upcoming Events

For the outreach events, we can always use more volunteers to operate the scopes, run demos, hand out literature, answer questions, provide security (watch our stuff for bathroom breaks), and share in the fun! Contact any club officer for more information.

- 6/11 11am—3pm Dreyer's Grand Ice Cream at Chabot; ice cream eating contests, carnival games, special guests.
- 6/25 (Sun evening)—June Members Only View Night (**MOVN**) Call (510) 482-2913 *first*, before heading up to Chabot, to verify this event will be held as scheduled.
- 6/28 (Wed evening)—**EAS Astro outreach** event for the American Assn of University Women, Tech Trek Camp, Mills College.
- June 21-26 www.shingletownstarparty.org
- 8/18—8/24 Annual **Barcroft High Altitude Star Party**.
- 8/26 & 27 (Sat/Sun daytime)—**EAS/Chabot outreach** event at Oakland's Chinatown Streetfest, 2006.



◀*Lagoon and Trifid Nebulae (M20 and M8), 20 min exp with Takahashi FSQ (f/5 530mm fl) piggybacked to Meade 8" 200GPS, guided w/SBIG STV thru 8"*



◀*Omega Centauri globular cluster, 5 min exposure. Both: Camera a manual Nikon FM10 using Fuji Provia 400 color slide film. By Bill Drelling*



◀*M51, the Whirlpool Galaxy; 5 images combined, 4 min exps, ea.; 3 taken at 3200 ASA; 2 at 1600 ASA. Used Chabot's 20" refractor; digital camera: Canon 20DA—by Paul Hoy*

The Ultimate Camera

Photo and article by Terry Galloway



This is the \$50,000 Apogee 16 Megapixel CCD camera (as seen mounted to Chabot's 20" refractor, *Rachel*), donated to Chabot by Merrill and Lillian Martin of Oakland—the same people who donated the money for Chabot's 36" reflector, *Nellie*. It has a filter slide and adapter built by the ExoPlanets group that allows it to be mounted on either *Rachel* or *Nellie*. The computer control system to drive it is in both the rack of electronics in *Rachel*, and in the computer in *Nellie*. This allows the camera to be used easily on both scopes. The PC interface boards and computer upgrades were funded by donations from the ExoPlanet Group through corporate and individual donations. The EAS Astrophoto group also plan to donate an additional \$800 in personal funds to obtain a color filter set to enable the camera to take color pictures.

By the time you read this, they will try to get the first images using this research-grade camera, sky willing.

The 16 E has shutter in the camera that allows for images and dark fields to be taken sequentially automatically. It can be chilled down to 45 to 55°C below ambient temperature in order to reduce the electronic readout noise to very, very low levels. Once chilled down, it is maintained at constant temperature by automatic controller. The camera mounting system includes a huge focal reducer lens that fits up inside *Rachel's* drawtube to the camera-telescope system effectively becomes f/8 with a field size on the CCD chip of about 28 arcminutes. The CCD has an incredible 14 bit resolution in grey scale. The CCD data are automatically scanned and read out into the receiving computer over a period of 20 seconds. So for a series of 10 second images, they can be taken two for each minute or 120 per hour. These files are *Fits* standard protocol, so they can be read into our photometry programs that produce magnitude to a standard deviation of about 0.005 magnitudes. With experience, we may be able to get down to 0.002 magnitudes. These images can be taken

through 7 different colored filters, such as UBVRI plus H2 Alpha and H2 Beta, and maybe some others.

This new capability on *Rachel* and *Nellie* provides a very exciting future of professional astronomical work that can be done at Chabot such as exo-planets, supernova, accretion disks, near earth objects, planet transient detail, high resolution galaxies, nebular, clusters, etc. Stay tuned for some really spectacular results to come. ★

Spare Shots *provided by Gerald McKeegan*



◀A young visitor at the Oakland Zoo sees her first solar prominences through Carter's Coronado 40 (volunteer Linda Lazzeretti in the upper-left corner)



▶An even younger visitor! Carter and Linda also in shot.



◀Sometimes people get funny expressions when looking through an eyepiece. Here's one.



▶The Astro Wizard, Dave Rodrigues, having too much fun blowing things up in the name of public outreach!

And that's it for now! ★



Eastbay Astronomical Society

At Chabot Space & Science Center
10000 Skyline Boulevard ● Oakland, CA 94619

June 2006
RETURN SERVICE REQUESTED

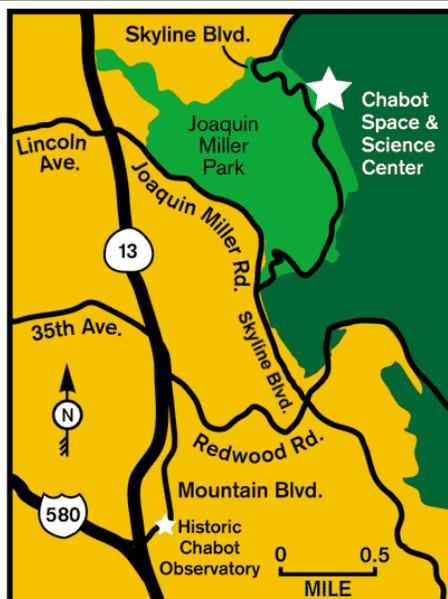
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Articles and photos for *The Refractor* are encouraged. Deadline for the July 2006 issue is June 17, 2006. Items may be submitted by mail to:
Editor - 3514 Randolph Avenue, Oakland, CA 94602-1228. Internet email address: donsaito@comcast.net Hm: (510) 482-2913.



FUTURE CONJUNCTIONS

June 8 Board Meeting, Chabot, Soda Board Rm, 7:30pm
10 General Meeting, Chabot, Physics Lab, 7:30pm
25 Members Only View Night @ Chabot*
July 13 Board Meeting, Chabot, Soda Board Rm, 7:30pm
8 General Meeting, Chabot, Physics Lab, 7:30pm

*Call 510 482-2913 after 5pm to confirm

Join the Eastbay Astronomical Society

- Regular, \$24/year Family, \$36/year
- Contributing, \$40/year Student, \$15/year (digital news-
- Sustaining, \$60/year or more letter, only)

Contact: Don Stone, EAS Treasurer
Telephone: (707) 938-1667 Email: ddcstone@earthlink.net
Mail: 19047 Robinson Road, Sonoma, CA 95476-5517

Sign up online at <http://www.eastbayastro.org/>