

# The Refractor

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

Volume 85  
 Number 8

June 2009



**June 2009 talk:**

## *Exploring the Invisible Universe: The Past and Future of Radio Astronomy*

**Speaker:** *Peter Williams*  
*University of California, Berkeley*

**When:** Saturday, June 6th, 7:30pm

**Where:** Physics Lab, 2nd Floor, Dellums Building,  
 Chabot Space & Science Center

**V**isible-light astronomy has been practiced for millennia. Astronomical observations of radio waves are, in comparison, still a novelty. Over its short lifespan, however, the field of radio astronomy has still managed to produce some of the most impressive results of modern science, including the discovery of extrasolar molecules and the detection of cosmic microwave background radiation, the key piece of evidence for the Big Bang. In this talk I'll discuss the basics of radio astronomy, what can be seen in the radio sky, and the different ways in which astronomy is done at optical and radio frequencies. I'll also talk about what we can expect from radio astronomy in the near and not-so-near future: an exciting convergence of recent technological advances promises to do as much for radio astronomy as the invention of the CCD has done for visible-light astronomy. Special focus will be put on the Allen Telescope Array, a new telescope jointly operated by UC Berkeley and the SETI Institute, which exemplifies some of these advances.



Peter Williams hails from just outside of Boston, Massachusetts. After finishing his primary education there and then graduating from Harvard University, he finally moved away from his home turf to attend graduate school in the Bay Area in 2006. He's currently a third-year student at the UC Berkeley Department of Astronomy and works with Prof. Geoff Bower searching for transient events and studying star-forming galaxies with the Allen Telescope Array. When away from work he spends his time following the travails of the Red Sox and attempting to convince people that New Yorker cartoons are funny.

*Trifid Nebula Photo: Shot by Bill Drelling with Canon 20Da DSLR and Takahashi FSQ-106 refractor.*

**DINNER WITH THE SPEAKER**  
 5:30, Sat, June 6  
**HUNAN YUAN**  
 4100 Redwood Rd.,  
 #11 (next to Safeway)  
 Oakland  
 (510) 531-1415  
 No need to confirm,  
 just show up!

### Inside this issue:

-Telescope Maker's Workshop	page 2
-CSSC Volunteers	page 2
-The Saito Chronicles	page 3
-Who's Who	page 3
-Future conjunctions	page 3

## Chabot Telescope Maker's Workshop

Not long after the establishment of the Eastbay Astronomical Society in 1924 a subculture within the Society quickly surfaced. The group was obscure, basically non-political, its participants mechanically minded. They lacked a secret handshake or guarded password, however, they did share a common jargon less well known to the EAS membership at large. Words like parabola, rough grinding, Foucault testing, flint and crown. The members gathered in backrooms, working in shirt sleeve with messy slurries and clumsy looking mechanical devices. Each labored independently, at their own pace, but the group as a whole gained by their jointly acquired experience and knowledge. In 1926 the group was officially recognized by the EAS and Chabot Observatory as the Chabot Telescope Maker's Workshop (now TMW).

Today the TMW is headed by Richard Ozer and Dave Borosso, but for the past 30 plus years the TMW was under the guidance of Paul Zurokowski. Many EAS members may also recall Dennis Steele who directed TMW in the '60s and early '70s.

Of significant note; the Telescope Maker's Workshop has met every Friday night for the last 40 years, and, is the longest running workshop of its type in the United States. It remains the only telescope making class in the western states which may be attended each and every week. On any given Friday one to two dozen TMW students, CSSC visitors and members of the general public will attend the workshop, working on projects. Dozens more visiting CSSC stop by to observe and learn something about optics, mirror grinding and telescope making.

The Chabot Telescope Maker's Workshop is recognized internationally. TMW has been reported on in local and national news, a science portion of the Disney Channel, and numerous articles over the years in Sky and Telescope and Astronomy Magazine. TMW students and instructors, as a group, have won more awards at the Riverside Telescope Maker's Conference (RTMC) than any other attending group. And, many TMW members have won AANC, and Bruce Blair (WAA) awards for support of science education or public astronomy, and for telescope making.

Richard Ozer reports that each year 10 to 20 telescopes are completed by TMW students. Most projects, typically 6 inch to 10 inch mirrors, will take about a year to complete. This says much about both the motivation of the student and the encouragement and assistance they receive in the workshop sessions.

Richard Ozer and Dave Borosso, both accomplished telescope makers, are assisted by several talented and dedicated volunteer

TMW instructors, each possessing considerable experience in those things both optical and mechanical. TMW instructors include:

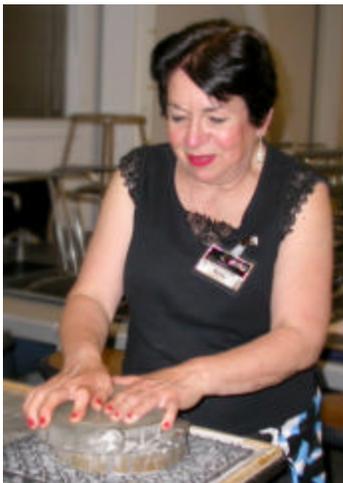
Barry Leska, who, in addition to being a skilled mirror maker, brings incredible patience and good humor to the table.

Bill Marriott, a professional optician that provides expertise in polishing techniques and optical testing.

Mark Thein, an electrical engineer that regularly consults for Mathis Instruments in the design of high-end telescope mount electronics. Along with assisting in telescope related electronics, Mark manufactures many of the grinding and polishing tools used by TMW students.

Mark VanDe Wattering, a long time telescope maker, and a programmer at Pixar Animation. He regularly introduces new students to the techniques of mirror making.

TMW also has a long history in maintaining Chabot Observatory telescopes. TMW students along with other volunteers were instrumental in the disassembly of Rachel, Leah and the transit telescope at the Chabot Science Center, Mountain Blvd., site, then the restoration and reconstruction of the instruments at the present Chabot Space and Science Center site. One of the TMW instructors is also involved with completing the optics in the CSSC Solar Telescope project.



Perhaps the most amazing part of all of this is the continued, unwavering interest in telescope making. In an age where economically priced telescopes of every description are available online and can be had with a simple click of a mouse (we won't go into the credit card thing here..), there are still those that choose the path less taken.

For those interested in the path less taken, you can find out more about TMW by contacting Richard Ozer at [rozer@pacbell.net](mailto:rozer@pacbell.net), or, simply drop by the Physics Lab, 2<sup>nd</sup> floor, Dellums Building, Chabot Space & Science Center, on any Friday evening. Entrance for TMW is the back door adjacent to the Building-1 loading dock. You can also gain entrance through the CSSC front entrance by telling the security/ticketing agent you're there for TMW.

### Chabot Space & Science Center Invites EAS Members to Volunteer with Us!

- Share your knowledge of and passion for astronomy with thousands of CSSC visitors
- Experience the unique opportunity to operate Chabot's historical telescopes
- Share your own telescope at Chabot\*
- Inspire young astronomers and future scientists by assisting students in our astronomy education programs

**Explore these opportunities at our next Volunteer Orientation!**

**For upcoming orientation dates, or for more information, please contact us at: [volunteers@chabot.space.org](mailto:volunteers@chabot.space.org) or, call our Volunteer Manager Megan Gray at (510) 336-7414**

- *EAS members who are only interested in sharing their own telescope at Chabot are required to attend a Chabot volunteer orientation and complete a self-guided training worksheet entitled "Getting to know Chabot." After completion, you may join us on deck and share your own telescope any Friday or Saturday night!*

**\*\*Full Chabot Volunteers must make the regular volunteer commitment and pursue official placement through the Volunteer Manager.**

## A Dusty Crater and Roaming Dobsonians....

Well, our intrepid Refractor editor, Don Saito, has sent along an update on his mega-tour by recumbent trike of these United States. Don reports that on April 8th he was 55 miles east of Flagstaff, Arizona, battling 30-40 mph winds, with occasional gusts of 50 mph(!!!), triking his way to Meteor Crater. Apparently the 6 mile long road from Hwy 40 to the crater visitor center took over an hour and a half to traverse due to blustery conditions. Had he been driving a car it would have taken only 10 minutes.... He further reports that upon reaching the rim of the crater, there were moments when the wind stirred up so much dust in the crater that the entire far side was completely obscured. You have to kind of wonder whether there is any paint left on his trike....

Don goes on to say the visitor center was full of cool displays and information on craters, meteors and asteroids, along with lots of stories and info on the discoveries and exploits of friends Eugene and Carolyn Shoemaker. He also mentioned something about failing to bring along Dutch Apple pie....but the E-mail transmission began to break up at that point.



Don further reported some days later he did some serious partying with EAS board member and Astrophotography coordinator, Bill Drelling....and a few hundred other like minded folks at some fort in Texas. Well, that's what the E-mail said... Don had made it to Fort Stockton, some 100 miles from the party and Bill drove all the way out to Fort Stockton to pick up Don and his sandblasted trike to bring him to the party. Turns out it was some obscure star party held annually at Fort Davis, Texas called TSP. Bill apparently knew all about it. Anyway, Don took in some lectures, talked shop with other amateurs, enjoyed the many amenities there at Prude Ranch like showers and great meals, and, indulged in some serious dark sky observing with a marvelous array of telescopes. Being farther south than Don's usual viewing sites, he was treated to some splendid views of lesser seen objects in Sagittarius and Scorpio. Did I mention he spent some time hanging out at McDonald Observatory? Didn't think so.

Don's final comment on TSP went as follows:

"Yes, it's a long ways away, but we don't have anything like it here in California - with all its extra amenities and advantages. In fact, I don't think there's anything quite this good anywhere in the USA, or even the world. The Texas Star Party: Where the CCDs and big Dobsonians roam."

Now you need to keep in mind Don's been spending a lot of time pedaling a trike and eating energy bars.... Keep up on Don's most excellent adventure by visiting his blog site, Cycle America, at <http://cycleamerica2009.blogspot.com/>

## ...WHOS WHO

Dr. Terry Galloway is a Caltech PhD with decades of energy and environmental research and development to his credit, including the founding of several energy, environmental, and toxic waste management companies, but, you will seldom hear anyone at Chabot call him Dr. Galloway. To those that know him, and have

worked with him, he is simply Terry. One gets the feeling he prefers it that way.

When I first became involved with Chabot and EAS in the mid 70's, Terry was already a fixture at the Mountain Blvd., observatory. On any given Friday or Saturday night you would inevitably see Mr. Wightman and Terry Galloway. He recalls at age 5 having trouble climbing the steep hardwood stairs to reach Leah, that's how far back his relationship with Chabot actually goes. In 1967 Terry came to know Kingsley Wightman and Betty Neal, and in 1969 started the Chabot Observatory relocation project with Dr. Kent Friel of Oakland Unified School District (OUSD), and, the Eastbay Astronomical Society. Terry probably doesn't remember how many times he has been president of EAS, but it is a given he has been an active EAS board member since the late 60s.

Terry has been behind much of the research science that has been conducted at Chabot. In the 70's he and his team monitored T-Tauri stars using a very large, very heavy brass sheet-film camera on Rachel to photograph candidate stars. Photometric measurements of the resulting negatives were then made with a photoelectric photometer built by the team. Measurement reductions were done by mechanical teletype on a telephone acoustic coupler modem dial-up connection with a mainframe computer in downtown Oakland at OUSD running Fortran. During the same period, working with high school students, Chabot Observatory was an official tracking station for Apollo 7 thru 17, including Apollo 13. Fast forward to Chabot Space and Science Center and, amazingly, incredibly, very little has changed. Except now Terry and team members are monitoring candidate stars with Rachel looking for Exoplanets using a state of the art CCD camera.

Terry's project of the hour is the installation of the Swedish Vacuum Solar Telescope at CSSC. Like the telescope itself, the complexity of the project is immense, but as in the past, Terry enthusiastically pushes forward. An astute observer might conclude that much of Terry's success in managing complex projects is due largely to his contagious enthusiasm for the task at hand. That observer would be correct. That same enthusiasm is also quite apparent on Sunday afternoons and those nights that he shows the public the wonders of the skies through Chabot's Telescopes.

If you have never met Terry Galloway or would like to chat with him and hear a little about the 'Old' Chabot, come out to the CSSC observing deck any clear Sunday afternoon. Dr Galloway will be more than happy to show you the sun, maybe Venus, through one of Chabot's telescopes. Oh, and be sure to ask him about the 'great plasma screen disaster,' I have no doubt he'll have an enthusiastic account to share.

### FUTURE CONJUNCTIONS—2009

Jun	6	EAS General Meeting, Chabot, Physics Lab, 7:30pm
	11	Board Meeting, Chabot, Soda Board Rm, 7:30pm
	28	EAS MOVN*, 7pm-10pm, Wightman Plaza, Chabot
Jul	9	Board Meeting, Chabot, Soda Board Rm, 7:30pm
	11	EAS General Meeting, Chabot, Physics Lab, 7:30pm
	26	EAS MOVN*, 7pm-10pm, Wightman Plaza, Chabot

\*Please call Gerald McKeegan at (925) 926-0853 after 5pm on the date of the MOVN to verify that it has not been cancelled due to weather or other considerations.



# Eastbay Astronomical Society

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

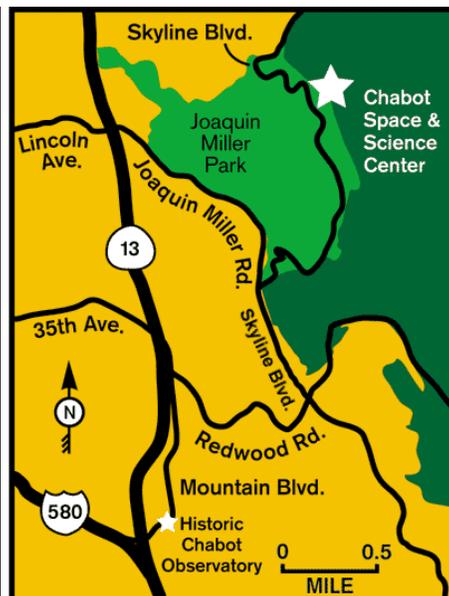
**June 2009**  
RETURN SERVICE REQUESTED

## Eastbay Astronomical Society

President: Paul Hoy (510) 553-1225 ahoy@aol.com  
Treas: Gerald McKeegan (925) 926-0853 geraldspace@earthlink.net  
Secretary: Linda Lazzaretti (510) 633-2488

Vice President: Alan Fisher  
Membership Reg: Bruce Skelly EastbayAstro@gmail.com  
Events Coord: Dave Rodrigues (510) 483-9191

Articles and photos for *The Refractor* are encouraged. Deadline for the July 2009 issue is June, 20 2009. Items may be submitted by mail or E-mail to: Interim Editor - Jim Ferreira, 753 Oriole Avenue, Livermore CA 94551 bakerst@comcast.net (925) 449-0107



### FUTURE CONJUNCTIONS

- June** 6 EAS General Meeting, Chabot, Physics Lab, 7:30pm  
11 Board Meeting, Chabot, Soda Board Rm, 7:30pm  
28 EAS MOVN\*, 7pm-10pm, Wightman Plaza
- July** 9 Board Meeting, Chabot, Soda Board Rm, 7:30pm  
11 EAS General Meeting, Chabot, Physics Lab, 7:30pm  
26 EAS MOVN\*, 7pm-10pm, Wightman Plaza

\*Always call 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: Gerald McKeegan, EAS Treasurer  
Telephone: (925) 926-0853 Email: geraldspace@earthlink.net  
Mail: 1760 1st Ave, Walnut Creek, CA 94597-2561

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