



The Refractor

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

Volume 92
Issue 1

November
2015

EAS Lecture Meeting

Speakers: **EAS Members Terry Galloway, Dave Rodrigues, Fred Schumacher**

How Chabot Observatory and the EAS Saved Apollo 13

Date: **Saturday, November 7, 2015** Time: **7:30-9:30 PM**

Location: **Megadome Theater, Chabot Space & Science Center**

Forty-five years ago, in April of 1970, America's third attempt to land on its nearest neighbor in the Solar System, the Moon, went horribly wrong. A pair of damaged wires short-circuited in one of the Apollo 13 spacecraft's oxygen tanks, causing it to explode. In that instant, the mission goal changed from landing on the Moon, to getting the astronauts safely back to Earth despite their partially disabled space ship. Learn about the role that Chabot's telescopes played in providing the critical location coordinates to NASA to ensure a safe landing for the crew. You never know when a little amateur science will save the day!



View of the severely damaged Service Module after separation. 17 April 1970. (Source: NASA, image AS13-59-8500, <https://www.hq.nasa.gov/alsj/a13/images13.html>)

Mission Control during final 24 hours of Apollo 13 mission. April 16, 1970.

(Source: NASA, image S70-35368, <https://www.hq.nasa.gov/alsj/a13/images13.html>)



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Mission Statement of the Eastbay Astronomical Society

Increase the public's knowledge of astronomy and the space sciences, introduce the infinite wonder and intrigue of the night sky to everyone, and support the Chabot Space & Science Center.

The Refractor

EAS Monthly Newsletter

The newsletter is always looking for submissions from members of the society. Including, but not limited to:

- observing reports
- vintage photos of member telescopes, telescope astro photos
- vintage photos of member telescopes, telescope making, star parties and 'Old Chabot'
- star party announcements
- star party reports and photos
- astronomy lecture and museum show announcements
- outreach event announcements and reports
- astronomy equipment reviews
- astronomy & science book reviews
- reviews and recommendations of on-line astronomy resources
- astronomy and science equipment want-ads

Send submissions by e-mail to the editor, Susan Rambo, suieroo@comcast.net.

News 'n Views

by Don Saito

Howdy Astro Fans! Oy vey! It's November already?? The holiday season is upon us! Daylight Squandering Time is finally over and done with, and it's that time of the year when the weather becomes cold and wet. A real mixed-bag, if ever there was one.

Normally, for astronomy's sake, I'd say, "Rain, rain, stay away," but not this year. Perhaps if it would only rain between 4am–10am on Mon–Thu, that would work out just fine. Compromises must be made, and this super-drought needs to end, or our entire state will just dry up and blow away.

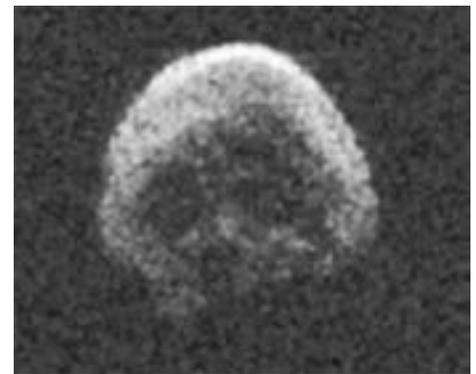
Wish-thinking aside: if you haven't already, please be sure to renew your membership in our awesome club. You can do it online via PayPal at <http://www.eastbayastro.org/index/application-1.htm>, or you can use (gasp!) snail-mail (details are on the back page of the newsletter). Your membership fees don't just go towards

long vacations to faraway places for the board members, you know (that's a joke, son) —we use your generous and altruistic dollars towards promoting amateur astronomy

and the space sciences here in the Bay Area, and for our annual events (the upcoming Christmas holiday party and the Annual Awards Dinner in Spring). We also, use your fees toward special projects, such as our Save the Zeiss campaign, which you can read all about elsewhere in this and last month's issue. So, please do re-sign-up, and together, we will save the world through public education and appreciation of science!

We had a bit of fun this month viewing creepy-looking asteroid TB145 the late evening and early morning of Fri/Sat October 30-31. EAS Members and Chabot Telescope Operators **Gerald McKeegan** and **Alan Roche**

found the asteroid using Chabot's 36" reflector, Nellie, and hooked-up a video camera to one of its finder scopes so people could see TB145 through both the main eye-piece, and on a computer screen. I say "creepy," because close-up photos of it make it look like a human skull—per-



Asteroid TB145 says to Earthlings, "Here's lookin' at YOU." =8^0

If it had been Earth-bound, there wouldn't have been enough time to get Bruce Willis up there to blow it up.

fect for Halloween! It was only viewable that one night, and it was nearly perfect weather for a change—calm, temperate and free of cloud or haze. Wow.

The really scary thing about this 600 meter-wide asteroid? It was only discovered 20 days earlier (Oct 10), and it came to within ~300K mi of Earth; still outside the Moon's orbit, but not by much. If it had been Earth-bound, there wouldn't have been enough time to get **Bruce Willis** up there to blow it up for us (that's another joke—ref. 1998 movie, *Armageddon*). That was a first, for me (I've never seen an asteroid with my own eyes, before), and it was pretty cool. Makes me want to go hunt down some of the bigger ones in the actual asteroid belt.

This year's Otsukimi (Japanese Moon Viewing Festival) went off

Cont' from page 2

excellently, as it usually does, thanks to mostly-cooperative weather conditions, and the volunteer efforts of **Deborah Gomez, Conrad Jung, Gerald McKeegan, Rich Ozer, Alan Roche, Don Saito, Jack Stone** with daughter **Mavis**, and our Outreach Coordinator, **Nate McKenna**. We've been doing these Otsukimi events for around twenty years, now, and it just doesn't feel like Autumn, anymore, without hearing some Taiko drums in the moonlight.

Our fabulous Programs Director, **David Prosper**, has now left the position due to a change for the better in his overall life situation, so we must bid a



fond farewell and a heartfelt THANK YOU. You really boosted attendance at our monthly meetings with your boundless enthusiasm and innovative ideas—well done my friend, well done!

Now, for us, that's a bit of bad news, but wait! Re-taking the position after several years, we are getting back the fabulous AstroWizard™, **Dave Rodrigues!!** Holy loquacity, Batman! This is great news. We will once again be regaled by Dave's highly extroverted personality and love of history and astronomy. Life is good.

And that's it for this month! Have a wonderfully rain and star-filled November, and as always, we'll see you, IN THE FUTURE!

—Don Saito

EAS Miscellaneous Telescope donated

Thanks goes out to Jonie Sipiora of Antioch for donating a Mead UTLC 12" lens Tube Ass'y 2384 Mounting 20 Optics 2021. EAS will use the telescope for outreach events and on Chabot's telescope desk. The telescope has already made its outreach debut at Montclair Elementary earlier this month.

Barcroft 2016

We are now accepting reservations for the 2016 Barcroft High-Altitude Star Party. Dates are Tuesday, Aug. 30–Sunday, Sept. 4 at \$60 per person, per night. Cutoff date for sign-ups this year is July 31st. For full info on the 2016 Barcroft High Altitude Star Party, go to <http://www.eastbayastro.org/index/Barcroft.htm>.

Check out EAS's booth at Bay Area Science Festival, Nov. 7.

<http://www.bayareascience.org/>

For sale

One 12" blank that has been worked. The tool needs to be resurfaced and the grinder will almost be starting from the beginning. Blank was purchased at the gift shop of the old Chabot Observatory. Asking \$250.00, open to offers. Contact Clarence at (925) 597-0365 between 6-8pm Mondays.



Dave Rodrigues—he won't shut up, but you don't want him to—that's his gift.



EAS Outreach: Upcoming Star Parties

- Nov. 4, Random Acts of Science (RAS)*: **Need EAS volunteers!**
- Nov. 7, BASF- Bay Area Science Fair at AT&T park in S.F.
- Fri. Nov. 13th. Glenview Elementary star party. **Need EAS volunteers!**

Note! New RAS dates:

- Nov. 18, RAS. **Need EAS volunteers!**
- Nov. 19, RAS: **Need EAS volunteers!**

*2015 Random Acts of Science:

RAS is an outreach program coordinated by Chabot, Random Acts (Oakland firefighters), and Eastbay Astronomical Society to bring astronomy and star gazing to local, under-served schools. Read more about Random Acts of Science in [Oct 2015 Refractor](#).

Mentions:

“After dark, the crowd then walked towards Lake Merritt, guided down a path illuminated only by glowsticks. They were met by members of the East Bay Astronomical Society, a group of astro-enthusiasts who were standing beside their telescopes and with binoculars, ready to show off craters and moon rays to the group.”

From “Hundreds gather at Lake Merritt for Japanese Moon Viewing Festival” by Luisa Conlon, OaklandNorth website.

Read article:

<https://oaklandnorth.net/2015/10/27/hundreds-gather-at-lake-merritt-for-japanese-moon-viewing-festival/>

Connect with EAS Outreach

Get your name on the outreach pool list by e-mailing EAS Outreach Coordinator Nate McKenna at swamproot@comcast.net. (No obligation to participate, no equipment needed) Already on the list? Stay tuned for requests.

Crowdfunding site now open for Chabot's Zeiss



The Eastbay Astronomical Society kicked off a crowdfunding campaign to save the Zeiss Universarium optical-mechanical star projector in the Chabot Space & Science Center. The Zeiss Universarium is one of the finest planetarium projectors in the world, and one of only four located in the United States. (The others are in New York City, St. Louis, and Los Angeles.) Chabot's Zeiss, when restored, will far outperform the digital projector used at the Cal Academy, giving Chabot a competitive marketing advantage. The Zeiss will also give Bay Area residents a pristine view of the night sky, a view we can no longer see due to light pollution.

Help save the Zeiss:
<https://www.youcaring.com/eastbay-astronomical-society-455628>

Chabot's Zeiss has not been in regular use since 2006. We need \$25,000 for a full diagnostic survey to determine what needs to be done to return the star projector to full working order. Restoration costs may total as much as \$350,000.

Please consider making a tax-deductible donation to help restore Chabot's beloved star projector.

—Cynthia Patton

Why we need Zeiss: light pollution, page 8.

Zeiss Universarium in situ.

Thanks goes to the Zeiss Planetarium Division of Zeiss, who donated \$1,000 to our save the Zeiss fund!



Club Viewings

Public observing opportunities

Free telescope observing at Chabot Friday and Saturday evenings from 7:30 to 10:30pm. Come on out and see the moon, planets and more through Chabot's historic telescopes, and various amateur instruments on the observing deck.

Chabot also offers solar observing to center visitors Saturday and Sunday afternoons from 12:00-4:00pm. See sunspots, prominences and occasional flares through several dedicated solar telescopes.

Members Only Viewing Nights (MOVN)

EAS members get private access to viewings through Chabot's telescopes on the following nights:

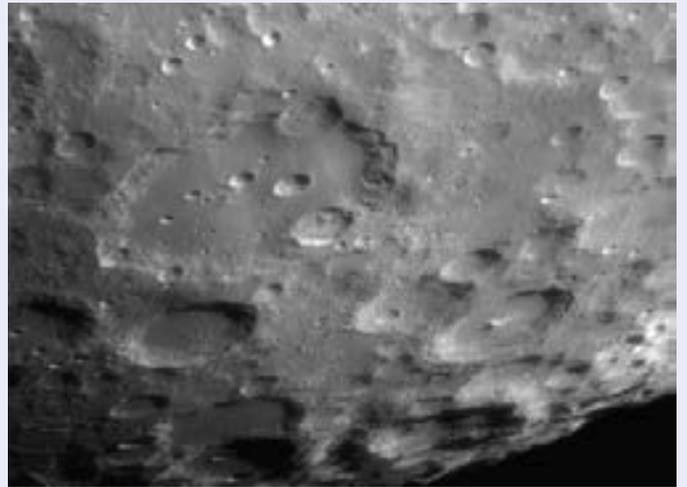
2015

November 15, 2015, 7:00 p.m.
December 20, 2015, 7:00 p.m.

2016

January 17, 2016, 7:00 p.m.
February 14, 2016, 7:00 p.m.
March 13, 2016, 7:30 p.m.
April 10, 2016, 7:30 p.m.
May 15, 2016, 8:00 p.m.
June 12, 2016, 8:00 p.m.
July 10, 2016, 8:00 p.m.
August 7, 2016, 8:00 p.m.
September 11, 2016, 7:30 p.m.
October 9, 2016, 7:30 p.m.
November 6, 2016, 7:00 p.m.
December 11, 2016, 7:00 p.m.

Share your astrophotography



EASImaging is a Yahoo Forum for members of the Eastbay Astronomical Society to post astrophotos of all variety, from snapshots of a sunset to multi-channel color images of deep sky objects. Photos by beginners to the most advanced are welcome. Discussion of imaging equipment and techniques is also encouraged. Since EAS has a number of advanced astrophotographers, this is also the place for beginners to get input on starting out in astro-imaging. CCD cameras, DSLRs, point & shoot, and various digital and analog video cameras are of interest along with camera control software, image processing software and telescope mount control systems.

[lunar photo above was shot with 'Leah' by Jim Ferreira]

<http://tech.groups.yahoo.com/group/EASImaging/>

The EAS also has an ASTROPHOTOGRAPHY GROUP. For information on the groups activities contact, Jim Ferreira at bakerst@comcast.net

Volunteer at EAS outreach star parties

Share your love of astronomy with kids & their parents. EAS volunteers take their telescopes to local schools and events to give people a first-hand view of the heavens. Contact Nate McKenna, outreach coordinator, swamproot@comcast.net.

Borrow a telescope

EAS Loaner Scope Program has telescopes available for rental by EAS members. Scopes include 60mm and 80mm refractors, a C-90, two 10 inch Dobsonians, and, 4- and 8-inch Schmidt-Cassegrains. Scope rental is \$15 a month, with a \$50 deposit. Monthly rental fee is waived if rented scope is brought to outreach events. Contact Barry Leska at b.leska@comcast.net

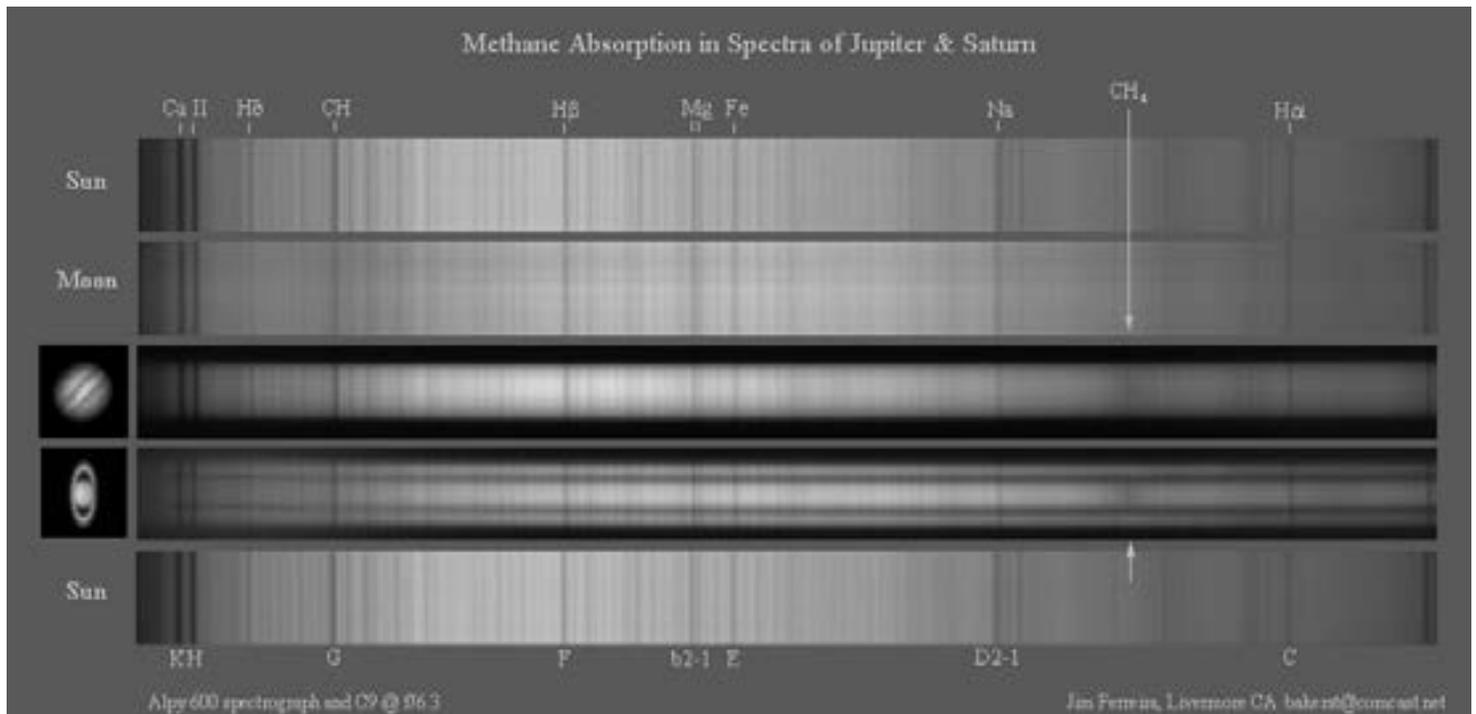


Chabot Observatory, Lafayette Square, 1894

Detecting Methane in Jupiter & Saturn's Atmospheres

by Jim Ferreira, EAS member

Here's how an amateur astronomer can see methane in the spectra of the solar system's largest planets.



The Moon and the planets of our solar system, as a rule, reflect the Sun's light, so their spectra recorded with a low-resolution spectrograph look essentially the same as a solar spectrum. The spectra consist of the familiar 'rainbow' continuum gradient background (displayed above in black & white) and dark, narrow vertical lines caused by absorption of sunlight at the photosphere by various elements, such as hydrogen (H), sodium (Na), calcium (Ca), magnesium (Mg) and iron (Fe).

A major exception to this rule is the giant gas planets, their atmosphere's composed primarily of hydrogen and helium, have an upper atmosphere layer containing, in part, methane gas in the form of ice crystals. The methane absorbs the sunlight in the visual light spectrum at 6190 Angstrom, producing a dark, diffused band that can be seen in the spectra of Jupiter and Saturn.

Note in the spectrum of Saturn that the rings, which are made up primarily of rock, do not show absorption of sunlight at 6190 Angstrom indicating the absence of any significant amount of methane (ice). Spectra of the Sun and Moon are included for comparison.

Instrumentation: Spectra of the Sun, Moon, Jupiter and Saturn were recorded with a commercially available low-resolution slit spectrograph on a Celestron C9.25 SCT using a

f/6.3 focal reducer. The spectrograph, an Alpy 600 by Shelyak Instruments, uses a 600 line/mm transmission grating and prism combination (referred to as a GRISM). It is fitted with an off-axis mirror slit (23 micron) for guiding on the star or planet being recorded. The camera used is an Atik 420M monochrome CCD camera with a 1620 x 1220 resolution detector with 4.4 micron pixels. The spectrograph and camera combination produce a spatial dispersion of 2.3 Angstrom per pixel. Realistic resolution with the spectrograph-telescope-camera combination with good seeing conditions is 10 Angstroms....give or take a few Angstroms. Telescope, spectrograph and camera are carried on a Losmandy G11 mount. All the spectra and planet images were recorded from my suburban (read: light polluted) Livermore backyard.

None of this is 'rocket science', mind you, but exciting all the same to be able to sort out methane in the atmospheres of Jupiter and Saturn, and confirm the absence of significant amounts of methane in Saturn's rings.....from my own backyard. Spectroscopy Rocks!

Should you have questions or comments, do feel free to contact me at bakerst@comcast.net.

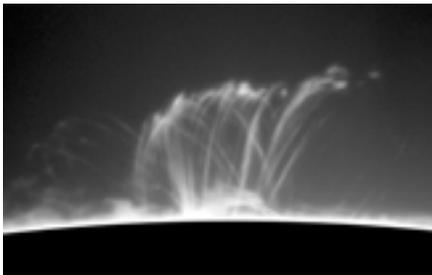
To see some of my other spectroscopy projects visit http://www.lafterhall.com/spectroscopy_shelyak_alpy_600_spectrograph.html

EAS Stuff



EAS / Solar Observing Group (SOG)

The Solar Observing Group (SOG) is intended for all EAS members interested in solar astronomy and solar astrophotography, from beginner to experienced to armchair aficionado. Topics of interest include: backyard solar observing (and solar safety), recent and current solar activity, the Venus transit and annular solar eclipse, high resolution solar astrophotography, solar eclipse chasing and photography, solar astronomy history, discussion of commercial solar observing equipment, building equipment such as white light filters, spectroscopes and spectroheliographs, solar astrophysics and EAS public solar outreach projects. A SOG Yahoo forum has been established http://tech.groups.yahoo.com/group/eas_solar_obsrv_group/ for discussion and to post photos. SOG members are encouraged to sign on to the Yahoo forum. For more information contact Jim Ferreira at bakerst@comcast.net.



Chabot Space & Science Center (CSSC) invites EAS members to volunteer at Chabot.

- Share your knowledge of and passion for astronomy with thousands of CSSC's 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 and find out about CSSC's next volunteer orientation: <http://www.chabot.space.org/adult-volunteers.htm>

*EAS members who are only interested in sharing their own telescope at Chabot (not a full volunteer commitment) are required to attend a volunteer orientation. After completion, you may join us on deck and share your own telescope any Friday or Saturday night! Chabot volunteers must make the regular volunteer commitment and pursue official placement through Chabot's volunteer manager.

Telescope Makers' Workshop at Chabot Space & Science Center — Every Friday Evening!

Chabot's TELESCOPE MAKERS' WORKSHOP (TMW) is one of only a handful of regularly scheduled telescope making workshops in the U.S., and probably the world. TMW meets every Friday evening throughout the year, except Memorial Day weekend (which is the annual Riverside Telescopes Makers Conference). It has been in operation since December of 1930, founded by Franklin B. Wright, and is currently run by Richard Ozer with help from EAS members Dave Barosso, Barry Leska and Wilson Yoshida-Ng.

The price of admission is FREE. All you have to do is show up, buy a mirror blank and a "tool" (typically \$100-\$200 depending on the size of the mirror) and start "pushin' glass!" TMW provides the instruction and optical testing expertise along with various grinding and polishing compounds you'll need. The mirror making process involves first grinding a curve, then polishing the curve to a mirror finish, and finally, figuring your mirror to optical perfection. Optical testing equipment is available to check the progress of your mirror each step of the way.

With determination, and a bit of luck, you can wind up with a telescope that costs 1/3 to 1/4 that of a commercially built instrument, while optically superior! The process does take time—depending upon how much effort you put into it, and other factors, it could take weeks to several months to complete a mirror. But, the process is fun, educational, and the camaraderie amongst fellow telescope makers in itself is worth the price of admission. Telescope making is a great activity for kids of all ages.

For more information contact Richard Ozer at (510) 532-5477 or rozer@pacbell.net



Sky Shots



Light pollution is encroaching on the Mt. Diablo observing site. To the west the lights from Oakland and San Francisco are overwhelming the light from the Milky Way, which would otherwise be visible in this photo. —Gert Gottschalk



Observers on Mt. Diablo with the Big Dipper above them. Some clouds were passing through and impacted astrophotographers. But visual observers navigated around them and got some great sites of planetary nebulae like the Saturn Nebula. —Gert Gottschalk



Light pollution has been encroaching on Bay Area night skies since Chabot Observatory opened.



The moonrise eclipse, taken from the White House Overlook at Canyon de Chelly, AZ. The trees below the moon are across the Canyon, about two miles away. Technical details: 9/27/15 at 8:14 PM MDT. Canon EOS Rebel Xs with Nikon 200mm lens. 1/60s at f/5.6, ISO 800. Image was cropped and processed with Windows Live Photo Gallery.

—Carter Mehl, EAS member

Looking for Berkeley stories of light pollution.

Photographer Gael McKeon (www.gaelmckeeon.com) is interested in finding people in Berkeley who are affected by light pollution. “I’m working with *Berkeleyside* on an essay about light pollution,” he told *The Refractor*. “But, I’m starting to think that a larger approach might be of interest, too.” If you have any ideas about who in Berkeley might be interested in light pollution/energy consumption (via light use), please let me know. If you have any other insights about the bigger picture, please let me know, too.”

Contact: Gael McKeon
(510) 684 7563
gaelmckeeon@gmail.com



Here is another picture of the Moon captured at the eyepiece of my GoScope by Orion, onto my iPad. It was taken June 18, 2015.

—Clarence Underwood, EAS member



In this image, the planets are about 1.6* apart. Picture taken with my iPad. Taken at about 6:40am PDT., October 24th.

—Clarence Underwood, EAS member

Above: The gathering on October 9th, of Jupiter, Mars, Venus and the Moon. The images were taken between 6-6:30 am., on an iPad.

—Clarence Underwood, EAS member



At Chabot Space & Science Center
 10000 Skyline Boulevard • Oakland, CA 94619
 November 2015
 RETURN SERVICE REQUESTED

Eastbay Astronomical Society

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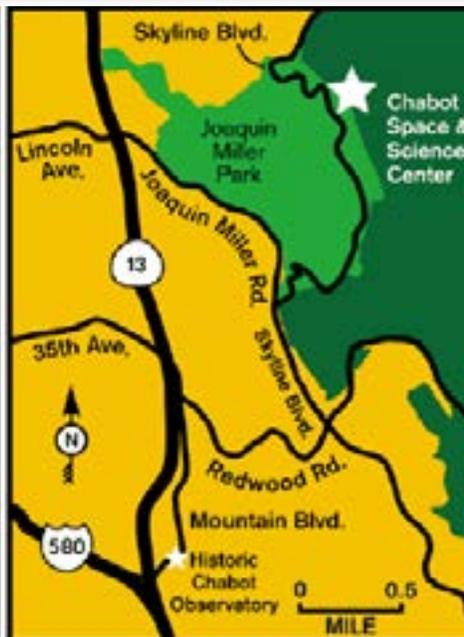
Articles and photos for The Refractor are encouraged. Deadline for the December 2015 issue is November 18.

Items may be submitted by E-mail to: Editor - Susan Rambo, suieroo@comcast.net

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Membership Reg: Rod Simmons steel.blue.rod@gmail.com

Program Dir: Dave Rodrigues daverod@aol.com



Future Conjunctions

2015

- Nov 7 General Meeting, TBA, 7:30
- 15 EAS MOVN, 7:00, Wightman Plaza
- Dec 12 Party, Cop/Kep, TBA
- 20 EAS MOVN, 7:00, Wightman Plaza

2016

- Jan 17 EAS MOVN, 7:00, Wightman Plaza

Join the Eastbay Astronomical Society

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

Contact: Richard Ozer, EAS Treasurer
 Phone: (510) 532-5477, email: rozer@pacbell.net
 Sign up online: <http://www.eastbayastro.org/>