



The Refractor

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

www.eastbayastro.org

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★ EAS MEMBERSHIP RENEWALS DUE AT END OF OCTOBER – PLEASE SEE ENCLOSED FORM FOR RENEWALS AND CONTACT INFORMATION FOR QUESTIONS! ★

This Month's Event:

Sierra Starlight: Dark-Sky Astrophotography

Speaker: Tony Rowell
When: October 19th, 7:30 PM
Where: Chabot Space and Science Center
Room: Hauben

Topic Highlights:

Intrepid astrophotographer and EAS member Tony Rowell will present a short astronomy slideshow followed by his 24-minute narrated astronomy timelapse film "**Sierra Starlight**" which was featured in the February 2012 issue of Astronomy Magazine. Tony will discuss his adventures in astrophotography at Dark-Sky sites, answer your questions on how to improve your pictures of the night sky, and how to get started!

We look forward to seeing you soon!



Rowell is a well-established lover of all scenes nature, photographing the Earth from the Arctic Circle to the mountain tops of Tibet. Check out more of Tony's photos and biography at <http://www.tonyrowell.com> ★

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DINNER WITH THE SPEAKER

5:30 PM
October 19th
HUNAN YUAN
4100 Redwood Rd, #11
(next to Safeway)
Oakland
(510) 531 - 1415

No need to confirm—just show up!

Share Your Astro-Love With Us!

For additional information or to provide feedback regarding this presentation, or to solicit consideration as a guest speaker for a future presentation, or to offer suggestions regarding any EAS program, please contact **David Prosper**, Program Director, via email at david.prosper@gmail.com, or by phone at **(510)-457-8346**.

Recap: Khayyam: A Tunable Spatial Heterodyne Spectrometer for Broadband Observation of Diffuse Emission Line Targets

David Prosper

Sona was an incredibly engaging speaker and easily broke down the very technical project into something everyone could understand. Her project at Lick Observatory was to both create and utilize the instrument herself; as she explained, most professional astronomers use what engineers give them, and often these tools are not always a proper fit for what the scientist needs. In Sona's case, she wanted to get very accurate, fast, wide-field samples of spectra from objects such as planets and comets. However, spectrometers at observatories are designed to take spectra of the pinpoint light of stars, which presents difficulties in getting the spectra across a wider field of view that a planet or comet represents. She is getting ready to get her first returns of science after many years of (literally!) living at the observatory and hopes to have it ready in time for Comet ISON.



Many folks stayed afterwards and had an excellent post-meeting chat with our speaker. Photo credit: David Prosper.

While Sona does not have a website yet, she has made her papers available to EAS members. She also welcomes feedback and suggestions at the e-mail address listed in her papers. You can access them by using the following link:
<http://bit.ly/GAvA1t>

Penumbral Eclipse Ahead!

Turn your eyes to the sky on October 18th, fellow stargazers, we are in for a treat – a penumbral eclipse! Visible to the trained eye, a penumbral eclipse occurs as the moon passes through the Earth's shadow. Look for a dimming shade to the moon as it travels across our night sky, though it may be difficult to see. If you happen to have your camera along, please share!

Happy Skywatching! ★



Penumbral Eclipse, 2012. Photo Credit: @starinskygazer, Instagram.

Check Us Out at First Friday!

Come and visit us at First Friday On November 1, hosted in Oakland, around Telegraph Avenue from West Grand to 27th Street, where many delightful activities await!

We've been working on increasing our presence and audience, and look forward to seeing you there! ★



High Energy Experience at CERN in More Ways Than One

Linda Lazzeretti

This summer's astronomical adventures took me to the amazingly diverse city of Geneva and the even more amazing happenings at CERN (European Organization for Nuclear Research) where I met with University of Rutgers researcher Vladimir Rekoic. After I attended the 3 hour public tour (above ground these days) Vladimir took me on a private tour 'behind the scenes' to places like CERN's director general's large office and then to the very small office and commemorative plaque where Tim Berners-Lee developed the World Wide Web in 1989 to promote faster communication between scientists scattered around the world working on CERN data.

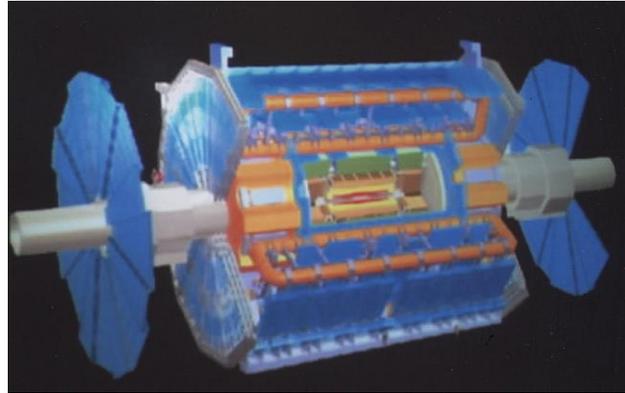


Energy sculpture in front of reception building with Globe in background. Photo credit: Linda Lazzeretti

Other places on the tour included the general conference room where UCB Professor Peter Higgs himself in attendance on July 2012 of the Higgs-Boson field particle discovery. As best I can understand and explain the discovery, it appears the Higgs field interacts with itself as energy gets tangled in the small space created by the LHC (Large Hadron Collider), the field dragging on the energy in a type of vacuum friction process to create a new particle with mass appropriately named the "Higgs-Boson" particle.

According to the Higgs theory, protons acquire mass in proportion to the intensity of interaction with the Higgs field which is constant. In Professor Gianotti's talk at I-House this spring, she noted that next steps will include

development of higher energy usage by the LHC and detectors so that further exploration of the Higgs-Boson particle can occur in order to determine if it and particle variations fit completely into the Standard Model or are some exotic element of a more general theory such as Super Symmetry that could have greater predictive power.



Visual representation of general purpose detector that analyzes particles in different layers produced in collisions. Photo credit: Linda Lazzeretti

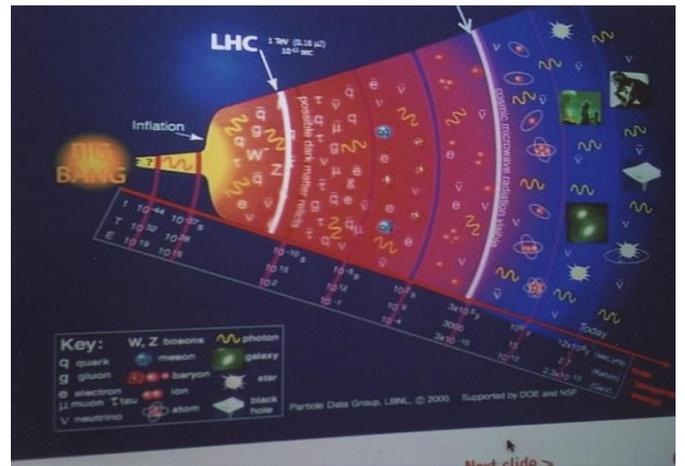
Vladimir Rekoic's participation in all this 'Higgs-Boson stir' is with the CMS (Compact Muon Solenoid) general purpose detector that analyzes the particles in different layers produced in the collisions, a very long, tedious, complicated process that for the Higgs field collision data of 2010 took all of 2011 to accurately analyze. A few facts to describe this mammoth detector include the cavernous tunnel it sits in, which is large enough to contain all the inhabitants of Geneva, is 15 meters high by 21 meters long by 15 meters wide, producing a magnetic field of 4 teslas.



A view within the tunnel that contains the LHC which is 27 km in circumference and buried 50-150m below ground. Photo credit: Linda Lazzeretti

The underground tunnel is known as ‘The Lord of the Rings’ and the LHC as the ‘battering ram’ that creates collisions of protons accelerated to 99.99% the speed of light before being injected into the LHC producing the first freed particles since the Big Bang with temperatures 100,000,000X higher than the sun.

As for CERN itself, a few facts regarding it include its founding in 1954 with much encouragement from former UCB Professor Robert Oppenheimer who felt strongly that the Europeans needed their own facility for physics research so they would not be dependent upon or drained off to the USA or USSR for particle physics advancements. Switzerland was selected as the locale based on its long history of neutrality that would support an atmosphere of genuine scientific inquiry and cooperation. As a result, some 100 countries and thousands of scientists are now involved with CERN activities and experiments. Over the years, many discoveries have been made here that include the electroweak force and carriers, particle physics origins for PET cancer detection scanners, discovery of antihydrogen atoms, W & Z particles and the creation of new states of matter like quark-gluon plasma.



Visual representation of particles produced by the Big Bang and where the LHC is focused in the production of them. Photo credit: Linda Lazereti.

In addition, mission options to explore in the next 20 years include the possible development of an international linear collider with Japan as a host nation, higher 50-100km diameter LHC's and possibly WIMPS (Weak Interactive Massive Particles) that interact with dark matter...by way of pun here, no 'wimpy matter' when all is said and done!

Live reporting from the field, we thank you for your wonderful contribution, Linda!



Come check out the Bay Area Science Festival October 24th – November 2nd this month hosting a slew of lectures, discussions, experiments, and all things science in general! On its 3rd year, this festival was created to bring together a multitude of scientific, cultural, and educational communities under a common goal – generating interest in science. For more information, please go to: <http://www.bayareascience.org/schedule/> for more information, a schedule of events and location, and much more!

As always, feel free to share and send along your adventures to: navbalsindersandhu@gmail.com

Friend Us on Facebook!

Stay up to date and in the know by liking our page on Facebook! You can find us under EastBay Astronomical Society – we won't spam you, only share awesome astro-related news!

Additionally, we do read all feedback and suggestions, so please let us know how we are doing and where we can improve!



EASTBAY ASTRONOMICAL SOCIETY MEMBERSHIP APPLICATION FORM

New Renewal (Just print this page, fill it out, and mail it in!)

NAME: (please print) _____

ADDRESS: _____

CITY, STATE, ZIP _____

DAY PHONE: (____) _____

EVE PHONE: (____) _____

EMAIL ADDRESS: (please print very legibly!) _____

MEMBERSHIP CATEGORIES:

Regular \$24 Family \$36 Contributing \$40

Sustaining \$60 or more \$_____ Student \$10 (digital newsletter only)

Optional discounted 12-month magazine subscriptions:

Note: Discounted magazine subscriptions are now handled directly with the publishers. You will need to be entered into our database as a current member before you can claim such discounts.

To take advantage of your discount, log into your EAS Night Sky Network account (new members should wait up to two weeks for their email invitation), click on "Links", and then select "New and Renewal subscriptions." From there you can choose the magazine of your choice.

Optional, tax deductible donation(s) to any of the projects of the Eastbay Astronomical Society:
Burns Library \$_____ Betty Neall Youth Award Fund \$_____ General \$_____ Other: _____ \$_____

EAS Lapel Pin \$3.00 +\$1.00 per pin for shipping and handling. # of pins _____

Total Amount for # of pins \$_____

(Tip: If you buy them at a club meeting or event, you can avoid the S&H fee.)

Total Enclosed: \$_____

Please mail this form and your check or money order payable to:

Eastbay Astronomical Society

PO Box 18635

Oakland, CA 94619-0635

For more information, please contact club Treasurer Richard Ozer at (510) 406-1914, rozer@pacbell.net, or write him at the address, above.

By default, (if you have an email address) you will be notified by email that the digital (.pdf) version of the club newsletter is ready to download off the club website. If you prefer to get the B&W hard copy, please check the box below:

I prefer the hard copy mailed to the address entered above.

And,

Are you interested in volunteering your time/equipment for public stargazing at Chabot?

Are you interested in doing other volunteer work for Chabot and/or the Eastbay Astronomical Society?

THANK YOU FOR JOINING US!

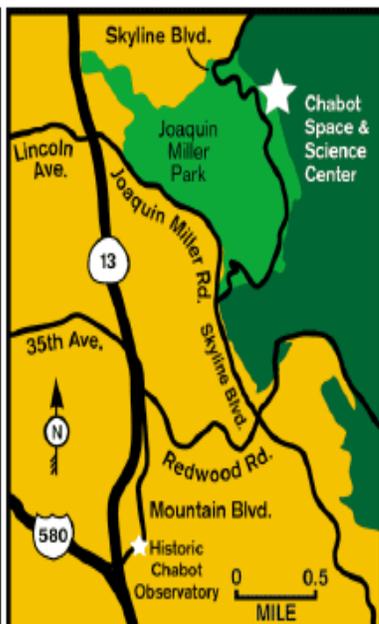


At Chabot Space & Science Center
 10000 Skyline Boulevard, Oakland, CA 94619
July 2013
 RETURN SERVICE REQUESTED

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Editor:		Navbalsindersandhu@gmail.com

Articles and photos for *The Refractor* are highly encouraged! Deadline for NOVEMBER issue is November 1, 2013. Mail to: Editor – 6907 Sessions Drive, San Jose, CA 95119. Email address: NavbalsinderSandhu@gmail.com HM: (408)-705-7417



FUTURE CONJUNCTIONS

OCT	10 EAS Board Meeting, Chabot, 7:30 PM 19 EAS Lecture: Tony Rowell, 7:30 PM
NOV	14 EAS Board Meeting, Chabot, 7:30 – 10:00 PM 16 EAS, Lecture: TBD, 7:30 PM

*Always Call Gerald McKeagan to confirm: (925) – 926-0853

JOIN THE EASTBAY ASTRONOMICAL SOCIETY

<input type="checkbox"/> REGULAR, \$24/YR	<input type="checkbox"/> FAMILY, \$36/YR
<input type="checkbox"/> CONTRIBUTING, \$40/YR	<input type="checkbox"/> STUDENT, \$15/YR
<input type="checkbox"/> SUSTAINING, \$60/YR, or more	

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