



The Refractor

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

Volume 89
 Number 5
 February 2013

This month's presentation:

Quantum Mechanics

By Bill Levinson, Ph.D.

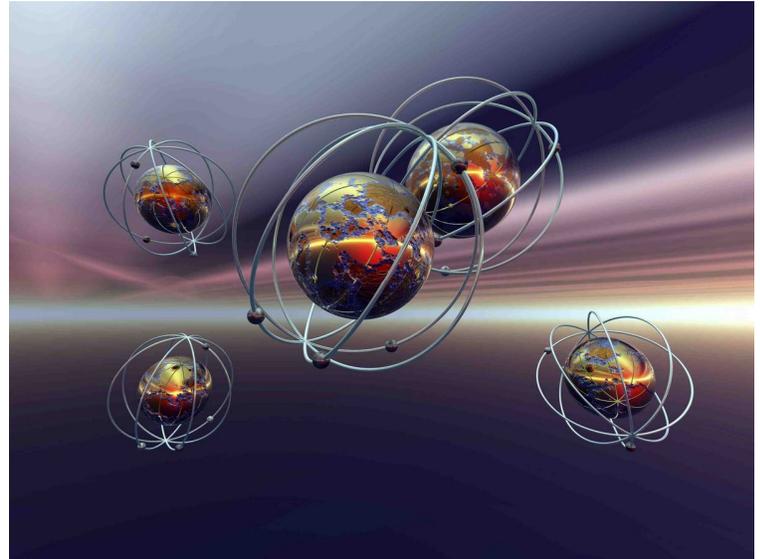
Saturday, February 16, 7:30 pm
 Chabot Space & Science Center
 Hauben Room, 2nd Floor, Spees Building

This talk explains in layman's terms just what the heck is "quantum mechanics." Why an electron in a hydrogen atom must have specific energy levels with specific distributions around its proton due to quantum mechanical laws. How light of a specific wavelength must be emitted when these electrons change their energy levels, and how this fact leads to the most powerful tool in astronomy: spectral analysis. When the spectrum of any element is different from its known spectrum on earth, some physical property of the emitter can be deduced, such as distance, temperature, chemical makeup, motion, and more.

Bill will attempt to debunk several myths surrounding quantum mechanics. The most common ones being that a person has to be a genius to understand or to discover it, or very bright to use it. When, in fact, understanding the concept requires only high school math and a basic desire. He will also explain the so called "wave/particle duality" as well as "spooky action at a distance." Bill will also show how quantum mechanics applies to not only very large systems but also to very small ones, and he will provide examples of every day experiences involving quantum mechanics.

For attendees in the audience who might have forgotten what a mathematical function is, what a second derivative is, and how to calculate probability, Bill will present several everyday examples. From these mathematical concepts it can be deduced what a wave function is - which is the essence of a quantum mechanical system. (The wave function allows a person to calculate all the usual properties of a quantum mechanical system, including the location of a bound electron.)

Bill will show how to calculate the probable location of the ball in the 1970's game of Pong both as a tennis ball and as quantum mechanical object, an electron. Once the electron/Pong problem is solved, it's an easy leap to deduce the electron charge distribution in a hydrogen atom, and from there the distribution in other atoms.



*I like to think the Moon is there even if I am not looking at it.
 ~ Albert Einstein's Zen-like comment on quantum mechanics*



Bill Levinson holds biophysics degrees from the University of California, Berkeley (BA, 1969) and the University of Michigan (Ph.D., 1979). He has obtained grants to research, study, write and photograph programs on reproductive biology at Woods Hole Marine Biology Lab, the University of Michigan, predator ecology in Colorado, and environmental science in Washington D.C.

Before retiring from the laboratory and starting his own business, he was employed by Michigan Cancer Foundation as a research associate and the Michigan State University as a Faculty Instructor. ☆

DINNER WITH THE SPEAKER

5:00 pm
 Saturday, February 16
HUNAN YUAN
 4100 Redwood Rd., #11
 (next to Safeway)
 Oakland
 No need to confirm—just show up!

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COMING UP SOON!

Asteroid '2012 DA14' Flyby Friday, 15 February 2013

By Gerald McKeegan

Overview: On Friday, 15 February, an asteroid called '2012 DA14' will pass very close to the Earth. *It will not hit the Earth*, but will miss us by only about 17,230 miles. The size of the asteroid is estimated to be in the range of 118-265 feet across. Closest approach will be at 11:25 a.m., Pacific time, over the southern hemisphere. If the weather cooperates, the asteroid will be visible from Chabot that evening, and we will attempt to track it with Chabot's 36-inch telescope, Nellie.

Answers to Specific Guest Questions:

What is the asteroid called? - The official International Astronomical Union (IAU) designation is "2012 DA14." That's a code indicating when and in what sequence it was discovered. It doesn't have a "name" but some people call it DA14 for short.

When will it pass closest to Earth? - Closest approach will be Friday, February 15, 2013, at approximately 11:25 a.m. Pacific time. At that time, the asteroid will be over Indonesia.

Will it hit the Earth? - NO! There is no chance of impact

with the Earth. The asteroid will miss the Earth's surface by about 17,230 miles. That's more than twice the diameter of the Earth, but closer than the orbits of the geosynchronous TV satellites.



How big is this asteroid? - We don't know exactly, but we estimate it to be 36-80 meters (118-265 ft) across. NASA will be taking radar images during close approach, and that will give us a better sense of the size.

When was it discovered? - Asteroid 2012 DA14 was discovered last year, on February 23, 2012, by the La Sagra Sky Survey telescope in Spain.

Where did 2012 DA14 come from? - It probably came from the main asteroid belt, between Mars and Jupiter. But millions of years ago, Jupiter's gravity, combined with other forces, caused the asteroid to leave the main belt and move to an orbit closer to the sun.

What kind of orbit does 2012 DA14 have? - Right now, the asteroid orbits the sun at approximately the same average distance as the Earth, but the asteroid's orbit is inclined (tilted) about 10 degrees to the Earth's. Its orbit will change as it passes the Earth, but we won't know how much until after the flyby.

Can we see it from Chabot? - Yes, if the weather cooperates, but not until after dark. If the weather is good that evening, we will attempt to track 2012 DA14 with Chabot's 36-inch telescope, Nellie, and guests will be invited to take a look. ★

Report:

The Mid-Winter Meeting of the WAA

The Western Amateur Astronomers organization is comprised of eleven different astronomy clubs located west of the Rockies, including:

Astronomical Society of the Desert (ASD)
Astronomical Association of Northern California (AANC)
Telescope Makers' Workshop (TMW)
China Lake Astronomical Society (CLAS)
Denver Astronomical Society (DAS)
Eastbay Astronomical Society (EAS)
Los Angeles Astronomical Society (LAAS)
Mount Diablo Astronomical Society (MDAS)
Mount Diablo Observatory Association (MDOA)
Orange County Astronomers (OCA)
Tri-Valley Stargazers (TVS)

The EAS Reps, Rich Ozer and Don Saito, shared Rich's car with MDOA's Rep Jon Wilson to attend the mid-winter meeting held at Griffith Observatory in Los Angeles. One of

the main functions of the WAA is determining each year who will be awarded the prestigious G. Bruce Blair Award for "outstanding contributions to amateur astronomy." This year's recipient was nominated by Rich Ozer, and was ultimately selected out of several other excellent candidates. Said recipient has accepted the nomination, and will be announced shortly. Rich also made an interesting proposal—that the WAA and the AANC merge to become a single organization, as the basic goals of each are similar.



Lrg - Sm: Tim Thompson, Jon Wilson, Rich Ozer, Don Saito

Don, having experience as the EAS newsletter editor, has also agreed to do the WAA newsletter, which will start out as a bi-annual publication, but may become a quarterly, if it is deemed appropriate.

★



Editor's News 'n Views

Howdy Astro Fans! Well, our annual holiday party last month was a success! It was fairly well attended, the food was great, we had fun with the door prizes, the Crazy Gift Exchange game, and the conversations were lively.



Did you know that the EAS now has a Facebook page?! Our newest, youngest and most energetic board member, **David Prosper**,

set it up, and you get to it by clicking the link from our main web page, or by searching for it from Facebook's own interface. Even more amazingly, David has also somehow managed to find a handful of club members who are willing to take on EAS board positions, which in and of itself is a *miracle!* Well done David!

URGENCY ALERT! Our annual **EAS Awards Dinner** is practically here, and we need you, our members, to start signing up for it yesterday. You can sign up online now at our website www.eastbayastro.org/ (click the PayPal **Donate** link on the home page, center column), or you can use the attached form. It's still \$35 per person, which includes a wonderful dinner of roast beef, turkey w/gravy, mashed potatoes, veggies, salad, rolls, coffee, tea, sodas, ice water, and dessert. We'll present our awards, have door prizes, and listen to an amazing speaker, Seth Shostak, the Lead Astronomer at SETI!! This is definitely one you're not going to want to miss.

As mentioned on Page 2 (*Report: The Mid-Winter Meeting of the WAA*), Rich Ozer and I went down to Griffith Observatory in L.A. Every time I go there, I am all at the same time impressed, overwhelmed and just plain *jealous* of their facility. *All* of their exhibits are astronomy or space-science

oriented (well, except maybe the large Tesla coil, which is just plain *fun*). It also helps to be located a short drive from one of the largest urban population centers in the world, and associated with the multi-billion dollar Hollywood entertainment industry. The place was crowded with people of all types and ages, and their exhibits are just plain awesome. I hate them. During this visit, I verified a theory of mine concerning one of the best but least-noticed exhibits there: the Gottlieb Transit Corridor. It's quite remarkable—when the Sun passes or *transits*

the meridian (passing from the east to the west half of the sky), it shines through this hole down onto this solid brass track that forms an uprising arc. The track has light sensors built into it, so when the sun shines on one of the sensors, a huge metal map of the ecliptic lights up the Sun's position amongst the constellations of the Zodiac. My theory was: if you couldn't be there at noon to observe the

actual solar transit, you could still activate the light-up map by shining a bright LED flashlight onto the sensors. I tried it, and it *worked*. Boy, they don't call me good for nothing!

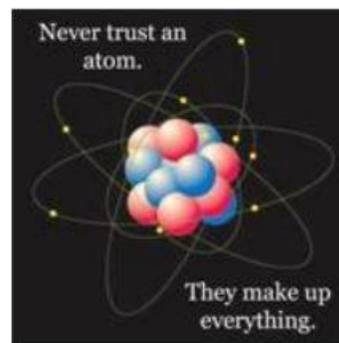
In other news: The February issue of Astronomy Magazine has an article in it entitled, *Sharing the stars with a new generation*, and it was written by our very own former director of Chabot Space & Science Center, **Dr. Mike Reynolds**.

Other than that, let's see...we've got the year's MOVN (Member Only View Night) schedule planned-out. This month's will be Sunday the 17th (the day after the club meeting). It always kind of amazes me that more members don't take advantage of this opportunity. Not many astronomy clubs can boast regular access to three large telescopes! These days, we're getting some amazing views of Jupiter, and on the 17th, the Great Tan Spot should be just about dead-center in view. (It's not really that red, anymore.) Plus, we'll look at whatever anyone else wants to see; galaxies, nebulae, star clusters, double-stars, carbon stars, but we will NOT look for any stars purchased from that huckster, Rocky Mozell (a curse be onto his head). Anyways, come join us (weather permitting). Be sure to always call

Gerald McKeegan
(925) 926-0853 before heading up, though—MOVNs can sometimes be cancelled if Chabot needs the scopes.

That's it for now! ☆

◀ Submitted by Harry Betancourt





Eastbay Astronomical Society

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

February 2013

RETURN SERVICE REQUESTED

Eastbay Astronomical Society

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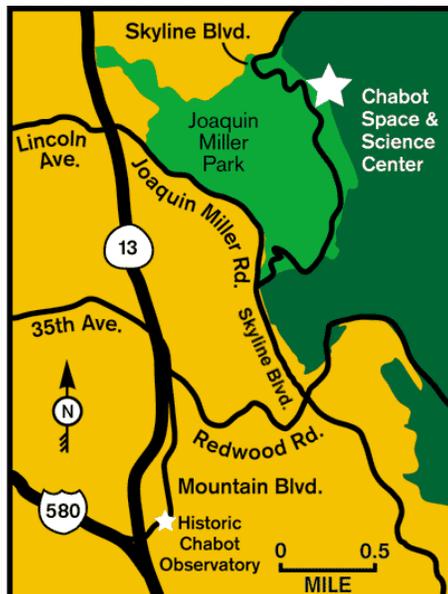
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Membership Reg: Rod Simmons - wileycoyote-genius@earthlink.net

Events Coord: David Prosper (510) 457-8346 - david_prosper@gmail.com

Articles and photos for *The Refractor* are encouraged. Deadline for the March 2013 issue is March, 1 2013. Items may be submitted by mail to:

Editor - 2676 Poplarwood Way, San Jose, CA 95132-1083. Internet email address: donsaito@yahoo.com Hm: (510) 301-2570.



FUTURE CONJUNCTIONS

- Feb 14 Board Meeting, Chabot, Soda Board Rm, 7:30pm
- 16 EAS General Meeting, Hauben Rm, 7:30pm - 10pm
- 17 EAS MOVN, Wightman Plaza 7:30pm—10pm*
- Mar 14 Board Meeting, Chabot, Soda Board Rm, 7:30pm
- 16 EAS Annual Awards Dinner, Galileo Rm, 6pm
- 17 EAS MOVN, Wightman Plaza 7:30pm—10pm*

*Always call Gerald McKeegan (925) 926-0853 to confirm

Join the Eastbay Astronomical Society

- Regular, \$24/year Family, \$36/year
- Contributing, \$40/year Student, \$15/year
- Sustaining, \$60/year or more

Contact: Richard Ozer, EAS Treasurer

Telephone: (510) 532-5477 Email: rozer@pacbell.net

Mail: PO Box 18635, Oakland, CA 94619-0635

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

Eastbay Astronomical Society

Ninetieth Anniversary Dinner

Saturday, March 16, 2013

Galileo Room at Chabot Space & Science Center

10000 Skyline Boulevard, Oakland



The doors will open at 5:45 pm, with Dinner at 6:30 pm. Awards presentation, door prizes and lecture about 8:00 p.m.

When Will We Find ET and What Happens If We Do?

Presented by Dr. Seth Shostak

Senior Astronomer at SETI (Search for Extra-Terrestrial Intelligence)

The scientific hunt for extraterrestrial intelligence is now into its fifth decade, and we still haven't uncovered a confirmed "peep" from any cosmic company. Could this mean that finding aliens, even if they exist, is a project for the ages – one that might take centuries or longer?

New technologies for use in the Search for Extraterrestrial Intelligence (SETI) suggest that, despite the continued dearth of signals, there is good reason to expect that success might be just around the corner – that we might find evidence of sophisticated civilizations within a few decades.

Why this might be more than wishful thinking and what contact would mean are the subjects of this talk on the continuing efforts to establish our place in the universe of thinking beings.

For his years of commitment and devotion to the promotion of amateur astronomy through his volunteer work as an Instructor in the Eastbay Astronomical Society's Telescope Makers' Workshop, his participation in EAS star parties and outreach events for the Chabot Space and Science Center, and for serving as the Eastbay Astronomical Society President for the last two years.

This year's **Helen Pillans Award** goes to

Barry Leska



The dinner will be catered by **Harry's Hofbrau** featuring Roast Beef, Turkey, Vegetables, Salad, Rolls, and Coffee. This dinner always gets rave reviews!

Cost per person will be \$35.00. Mail your checks, payable to the EAS, as soon as possible with the form below, or bring it with you to the next meeting, or give it to Rich Ozer at the Telescope Makers' Workshop some Friday evening, or (easiest) register online by clicking the orange PayPal *Donate* button on the EAS home web page at www.eastbayastro.org/. Get your reservation in soon to guarantee a seat. We must give the caterer a final count by March 1st .

Questions?
Contact EAS Treasurer Richard Ozer at
(510) 406-1914
or email him at
rozer@pacbell.net

**EAS Banquet — March 16, 2013
Reservation Form**

Your name: _____

Address: _____

City/State/Zip: _____

Phone: _____ Email: _____

Number of guests: _____ x \$35.00 = \$ _____

Names of additional guests _____

Please make your check payable to the EAS and send it with this form to:

*EAS Treasurer
Post Office Box 18635
Oakland, CA 94619-0635*