

The Refractor

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

Volume 82
 Number 2 & 3
 Dec 2005/Jan 2006

January 2006 talk:

Things That Go BOOM in the Lab

Saturday, January 14, 2006, 7:30 pm

Speakers: Raleigh McLemore &
 Dr. Jacques Guertin

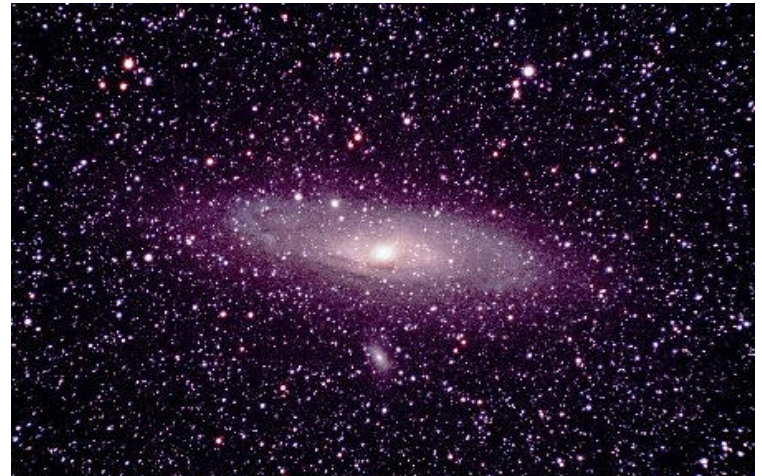
Chabot Space & Science Center
 Physics Lab, 2nd Floor, Spees Building

Start the New Year with a *Bang!*

Help us kick off the New Year with what should be a very memorable, fun and funny meeting. Remember those great demonstrations that Kingsley Wightman used to do at the old Chabot? No? Well, as Tony the Tiger would say, they were grrrrr-attt! And a LOT of fun. Kids would really remember the bangs and the surprises as well as the scientific principles behind them.

In that same spirit, EAS will have a bunch of fun, dramatic, explosive and loud demos of science principles! Our guests, **Raleigh McLemore**, pyro demonstrator extraordinaire and **Dr. Jacques Guertin**, Chemistry Professor and famous eclipse photographer will thrill and amaze you in what promises to be one of the most memorable EAS meetings *EVER!*

See the electrocution under high voltage of Dill Pickle (the word is out that the Governor *won't* pardon him). The yellow color you'll see are the famous Balmer Sodium lines. See the spectacular blue flame of the "Whoosh Bottle." Alcohol is for more than drinking! Dr. Guertin will do the famous Potassium and Sodium Demonstrations that we all remember and love from High School Chemistry, and there will be lots of other surprises. We'll pass around spectrometers so you can see the spectral lines that reveal the science behind what's happening. Even the AstroWizard may make an appearance. Everybody say **BIG BANG!** Isn't Science *fun*? ★



The Andromeda Galaxy, M31—Photo by Bill Drelling. Just one of the objects to see in the current night skies.

REMINDERS/NOTICES

- 1) There is no general meeting for the month of December, BUT, there's a Holiday Potluck Party AND a Members' Only View Night (weather permitting) on Sunday, January 1, starting at 6:30pm in the Soda Board Room. *Be sure to enter the building through the gate to Wightman Plaza, as the front door will be closed! Park in the staff parking lot.*
- 2) **HOLD DATE:** This year's Annual Awards Dinner will be held on the evening of Sunday, March 12. Details to come.

DINNER WITH THE SPEAKER

5:30 pm
 Saturday, January 14
HUNAN YUAN
 4100 Redwood Rd., #11
 (next to Safeway)
 Oakland
 (510) 531-1415
 No need to confirm—just show up!

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Improbable Bulls-Eye

by Dr. Tony Phillips

Picture this: Eighty-eight million miles from Earth, a robot spacecraft plunges into a billowing cloud almost as wide as the planet Jupiter. It looks around. Somewhere in there, among jets of gas and dust, is an icy nugget invisible to telescopes on Earth—a 23,000 mph moving target.

The ship glides deeper into the cloud and jettisons its cargo, the "impactor." Bulls-eye! A blinding flash, a perfect strike.

As incredible as it sounds, this really happened on the 4th of July, 2005. Gliding through the vast atmosphere of Comet Tempel 1, NASA's Deep Impact spacecraft pinpointed the comet's 3x7-mile wide nucleus and hit it with an 820-lb copper impactor. The resulting explosion gave scientists their first look beneath the crust of a comet.

That's navigation.

Credit the JPL navigation team. By sending commands from Earth, they guided Deep Impact within sight of the comet's core. But even greater precision would be needed to strike the comet's spinning, oddly-shaped nucleus.

On July 3rd, a day before the strike, Deep Impact released the impactor. No dumb hunk of metal, the impactor was a spaceship in its own right, with its own camera, thrusters and computer brain. Most important of all, it had "AutoNav."

AutoNav, short for *Autonomous Navigation*, is a computer program full of artificial intelligence. It uses a camera to see and thrusters to steer—no humans required. Keeping its "eye" on the target, AutoNav guided the impactor directly into the nucleus.

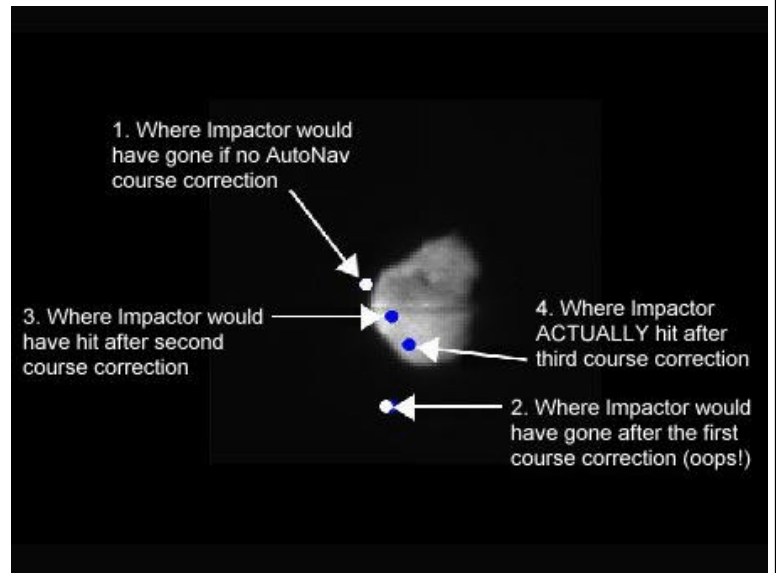
The system was developed and tested on another "Deep" spacecraft: Deep Space 1, which flew to asteroid Braille in 1999 and Comet Borrelly in 2001. The mission of Deep Space 1 was to try out a dozen new technologies, among them an ion propulsion drive, advanced solar panels and autoNav. AutoNav worked so well it was eventually installed on Deep Impact.

"Without AutoNav, the impactor would have completely missed the nucleus," says JPL's Ed Riedel, who led the development of AutoNav on Deep Space 1 and helped colleague Dan Kubitschek implement it on Deep Impact.

En route to the nucleus, AutoNav "executed three maneuvers to keep the impactor on course: 90, 35, and 12.5 minutes before impact," says Riedel. The nearest human navigators were 14 light-minutes away (round trip) on Earth, too far and too slow to make those critical last-minute changes.

Having proved itself with comets, AutoNav is ready for new challenges: moons, planets, asteroids and wherever NASA needs an improbable bulls-eye.

Dr. Marc Rayman, project manager for Deep Space 1, describes the validation performance of AutoNav in his mission log at <http://nmp.nasa.gov/ds1/arch/mrlog13.html> (also check [mrlog24.html](http://nmp.nasa.gov/ds1/arch/mrlog24.html) and the two following). Also, for junior astronomers, the Deep Impact mission is described at <http://spaceplace.nasa.gov/en/kids/deepimpact/deepimpact.shtml>



Comet Tempel 1, as seen by the Deep Impact impactor's camera. Three last-minute AutoNav-controlled impact correction maneuvers enabled the Impactor to hit the bulls-eye. ★

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



They're Here!!!

The Guy Ottewell Astronomical Calendar for 2006

This famous atlas-sized annual book is the most widely used and most attractive guide to what will happen in the sky throughout the year. ☞ Published since 1974, and is now used by 20,000 (amateurs, telescope-owners, clubs, teachers, planetariums, libraries, enjoyers of the sky) in over 100 countries. ☞ An introduction explains how to use the various components of the book and, if you are a beginner, what to look at first (since there are so many levels of information). For each month there is a large map of the evening sky; facing it, a diary of 40 or so events, many with paragraph-long descriptions. ☞ Other features on the monthly pages include: diagrams of where the planets are in their orbits, "Constellation Clues," "Telescopic Tour" (coordinates of selected objects findable in the month), "Observer's Highlights," and sketches of the most striking sky scenes. ☞ Supplementary sections include Highlights of the Year, The Sun, The Moon, Eclipses, Occultations, Conjunctions, each of the planets, Meteors, Asteroids, Comets, Spaceflight, Deep-Sky Profiles, Light Pollution, Glossary, Magnitude and Elongation, Rising and Setting, Quick Reference, and a colored centerfold all-sky map. ☞ 2006 special events include: tight groupings of planets; transit of Mercury; a naked-eye comet; favorable times for annual meteor showers; eclipse of the Sun, and more. ☞ We have a limited number for sale at \$25.00 each. Purchase one through our website, (at the bottom of the Membership page), or send your check or money order for \$25.00 payable to Eastbay Astronomical Society to our Treasurer, Don Stone at Eastbay Astronomical Society, 19047 Robinson Road, Sonoma, CA 95476-5517. We will also have them for sale at our lecture meetings, checks, money orders, or cash. ★

'Twas the night before solstice

By Jane Houston Jones

Inspired by the poem *A Visit From St. Nicholas*, written by Major Henry Livingston, Jr.

*Twas the week before Solstice, when all through the city,
Not a planet was shining, now isn't that a pity.
The telescope was stored in the garage with despair,
In hopes that the weather would soon turn to fair.*

*The astronomers were nestled all snug in their beds,
While visions of nebulae danced in their heads.
And Mojo with his laptop and I with my starmap,
Had just settled down for a cloudy night nap.*

*When out on the lawn there arose such a clatter,
I sprang from the bed to see what was the matter.
Away to the window I flew with a flash,
Tore open the shutters and threw up the sash.*

*The moon shone brightly, no clouds hid the glow,
A bright waning luster on objects below.
When what to my wondering eyes should appear,
But Pleiades, Orion, and Ursa Major, the bear.*

*With our trusty old telescope, the setup was quick,
I knew in a moment we had objects to pick.
More rapid than eagles, the targets they came,
We aimed and we pointed and called them by name.*

*"Now, Procyon, now Pollux, now Castor and Capella!
On Aldebaran, on Rigel, on Sirius, and Betelgeuse, the red
fella :-)
To the top and around the winter circle of stars,
Now a fond look at Saturn and magnificent Mars.*

*As fireflies that before the dawns morning light,
Brilliantly flicker and soon are a memory bright,
A new wonder would paint the dark sky to pale blue,
The sunrise was nearing and morning twilight was too.*

*And then in a twinkling, I heard on the roof,
The prancing and pawing of each little hoof.
As I stepped from the telescope and was turning around,
Down the chimney the stranger came with a bound.*

*He looked like an astronomer, bundled from head to his foot,
Like a stargazer his clothes were tarnished with ashes and
soot.
A bundle of toys he had flung on his back,
Looked just like our telescope accessory pack.*



*His eyes - how they twinkled! his dimples how merry!
His cheeks were like roses, his nose like a cherry
He looked like we do after a cold winter starshow
Freezing but happy from the Milky Way glow*

*The stump of a flashlight held tight in his teeth
Its soft red glow encircled his head like a wreath
We asked him if he'd ever looked closely at Mars
"I'm working at night, I have no time for the stars".*

*He stepped up to the eyepiece, a right jolly old elf,
And I smiled as he gasped, in spite of myself.
A wink of his eye and a twist of his head,
Soon gave me to know I had nothing to dread.*

*He spoke not a word, but took in view after view,
Then he spoke with a sigh he had more work to do.
And laying his finger aside of his nose,
And giving a nod, up the chimney he rose.*

*He sprang to his sleigh, to his team gave a whistle,
And away they all flew like the down of a thistle.
But I heard him exclaim, ere he drove out of sight,
Happy stargazing to all and to all a dark night.*

My apologies to Major Henry Livingston Jr. 1748 - 1828,
author of *'Twas the Night before Christmas* or *Account of a
Visit from St. Nicholas*. <http://www.henrylivingston.com> ★

Carter W. Roberts: The Man, the Mystery

In recognition of Carter's lifetime achievements in and for amateur astronomy, the Eastbay Astronomical Society Board of Directors nominated Carter W. Roberts for the prestigious Western Astronomical Association G. Bruce Blair Award. Much of the information for the proposal was supplied by EAS Treasurer, Don Stone.

★ ★ ★ ★

Carter Worth Roberts (b. 1946 -)
Asteroid (10683) Carter = 1980 LY - MPC 41030 2000
JULY 26, discovered June 10, 1980 by Carolyn S. and Eugene M. Shoemaker at Palomar Observatory.

- President, Eastbay Astronomical Society from 1988 (18 yrs)
- Chabot Observatory Historian
- Astro, wildlife, and EAS/Chabot/AANC event photographer
- Eclipse chaser since 1965, attending more than a dozen over the last 40 years
- Board Member, Chabot Space & Science Center
- Worked 2 years on the restoration of 20" aperture, 28-foot long, 90 year old, antique Brashear/Warner & Swasey refractor, and its rolling observation platform
- Worked one year on the restoration of 8" aperture, 8-foot long, 122 year old, antique Alvan Clark refractor
- Worked on several, physically demanding projects to protect an endangered species of Manzanita, and clear a fire break to protect the new Chabot Space & Science Center.
- Did original field survey of the new CSSC site in the early 1980s; worked to map and number all the trees around the new site.

Carter Worth Roberts, born in 1946, was raised in Berkeley, California, and attended UC Berkeley and San Jose State University. He has been employed by the U.S. Geological Survey since 1974, and is a geophysicist working with gravity and magnetic data.

He has been to 18 total solar eclipses and is an avid photographer and astrophotographer. He joined the Eastbay Astronomical Society in 1973 and became one of the volunteer instructors in the Telescope Makers' Workshop. He has been Archivist for the society since the mid-1980s and is also the Historian for the Chabot Space and Science Center. He was Astronomy Day Coordinator for the Astronomical Association of Northern California from 1985-1998, was one of the builders of the Fremont Peak Observatory in 1986, has been President of the EAS since 1988 and on the Board of the Riverside Telescope Makers Conference since 1998. He has been honored by Minor Planet (10683) Carter.

Appointed to the Chabot Board in 1994, he was very active in the Architecture Committee where he was the expert on the new Chabot site, having made the first map of it in 1982, and was the one most responsible for positioning the

telescopes on the site. Having been very active with Chabot outreach and having run the Chabot Observatory booth at the Festival at the Lake for 8 years, he is now active in marketing and helping with the public astronomy programs. He has also been one of the most active members of the "Rachel Restoration Team" that has been restoring the three original Chabot Observatory telescopes and the two clocks.

Carter also regularly volunteers for various public outreach events throughout the year for both the EAS and CSSC, including the Chinatown Street Festival, the Japanese Moon Festival, the Alameda County Fair, the EAS Bort Meadows Star Party, and school science fairs throughout the East Bay. He has also been an active participant in ProjectAstro for the last two years, a program which teams amateur astronomers with local teachers to enrich space science learning.

The Board of Directors for the Eastbay Astronomical Society wholeheartedly nominates Carter W. Roberts as the next recipient of the Western Amateur Astronomers' G. Bruce Blair Award. ★



◀ Carter with his 18" Litebox at Barcroft Station in the White Mountains

▶ Carter with his 3.5" Questar doing a star party at Fruitvale Elementary School



◀ Carter hauls a log away in Chabot's fire break clearing project

▶ Carter has handed out so many awards over his 18 year tenure as EAS President, he should have developed tennis elbow by now!





Editor's News 'n Views

Howdy, Astro Fans! Well...how are you surviving this year's holiday season? It's odd: I never usually feel so *tired* after taking so much time off. Must be the cold air and/or the loss of funds... ;-)

We had a string of outreach events this month at various schools, and though November/December aren't noted for their consistency with suitable astronomical viewing, almost all turned out just fine! We had a *very* nice MOVN (Members Only View Night) with pleasant, not-even-close-to-freezing temperatures, still, clear air, and a combined EAS/Astrophoto/CSSC event that let us see Mars, M42 (Orion nebula), M31 (Andromeda galaxy), NGC 404 (galaxy), M45 (Pleiades), the Double Cluster in Perseus, and more; even the Moon. The views in these great conditions were wonderful, and the Astrophoto Group were as happy as bugs in a rug. Probably happier, because bugs don't get to see much in the way of deepsky objects. Mars was particularly nice, with lots of fine detail visible, despite its reduced size from its close pass in early November. I'm amazed more of our club members don't show up for these; usually less than a handful. With the Astrophoto group, plus the CSSC members, it filled-out a little better than usual, which made things even more fun.

As mentioned prominently on the front page of this combined (December/January) issue, we've got the EAS Annual Awards Dinner coming up quick like a Spring bunny. We have *some* details (the caterer will be Harry's Hofbrau), but the exact cost per attendee, or even where, exactly, it will be, are still up in the air. You can still mark your calendar, though, and save that date Sunday evening, March 12, 2006. Oh, we also know who our speaker will be: Dr. Charles Townes of UC Berkeley, to speak on the subject: Religion and Science. Great topic!

Hopefully you'll get this before New Year's Eve Day, because I wanted to remind everyone that Chabot is going to do their annual 00:00 UT New Year's Day Balloon Drop event, which is becoming a popular tradition at the facility. It's great, because 00:00 UT of the new year occurs locally at 16:00 PST (4pm to you landlubbers), and so those who don't want to, or can't, stay up until midnight, can still celebrate and still have it be "official" — how nice!

CSSC staff person, and EAS Board Member **Celeste Burrows** would like to put out a request for anyone who wants to be rid of their last two years' worth of Astronomy Magazine; she needs them for Chabot's library and if you're planning to recycle them, anyways, this would be a good way to do it.

Item of Note: As a token gesture of thanks for the free website support **Morris Jones** provides our club, the EAS Board of Directors has awarded both he and his wife **Jane Houston Jones**, free EAS memberships for 2006. Thanks Mojo!!! And that's all for now! ★

Spare Shots



◀ *In-Charge of the EAS Astrophotography Group, Bill Drelling's image of the M45 The Pleiades in the constellation Taurus, the Bull—a very bright group of new stars 440 light years from Earth*

▶ *Ryan Turner shares his scope with the students at the Orinda Intermediate School's Family Science Night (photo by Gerald McKeegan)*



◀ *Paul Hoy's astro-image of the Double Cluster in Perseus*

▶ *Volunteer Telescope Operator Gerald McKeegan fixes a linkage problem on Chabot's 20" refractor, Rachel. A tapered pin fell out of a joint, rendering one of the telescope's locks inoperative. Gerald donated two bags of different-sized pins so future "pin problems" won't be quite so painful. (Photo by Don Saito)*



That's it for now! ★



Eastbay Astronomical Society

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

December 2005 and January 2006

RETURN SERVICE REQUESTED

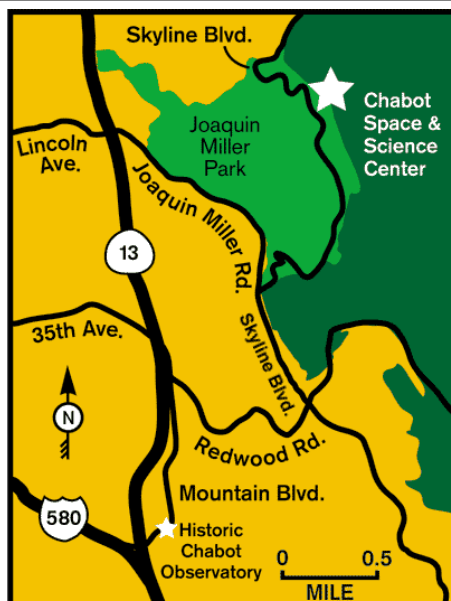
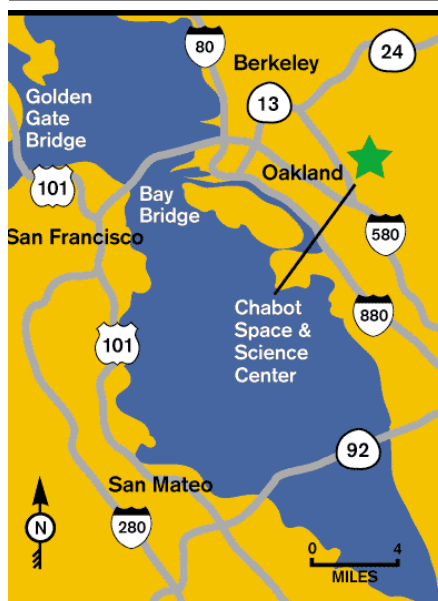
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Articles and photos for *The Refractor* are encouraged. Deadline for the February 2006 issue is January 20, 2006. Items may be submitted by mail to: Editor - 3514 Randolph Avenue, Oakland, CA 94602-1228. Internet email address: donsaito@comcast.net Hm: (510) 482-2913.



FUTURE CONJUNCTIONS

- | | | |
|-----|----|--|
| Jan | 1 | EAS Holiday Potluck & Members Only View Night, 6:30pm (enter from back gate) |
| | 12 | EAS Board Meeting, Chabot, Soda Board Rm, 7:30pm |
| | 14 | EAS General Meeting, Chabot, Physics Lab, 7:30pm |
| Feb | 9 | EAS Board Meeting, Chabot, Soda Board Rm, 7:30pm |
| | 11 | EAS General Meeting, Chabot, Physics Lab, 7:30pm |
| Mar | 12 | EAS Annual Dinner at Chabot |

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 Membership Registrar
Telephone: (707) 938-1667 Email: ddcstone@earthlink.net
Mail: 19047 Robinson Road, Sonoma, CA 95476-5517

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