

The Refractor

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

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June 2007 talk:

Advanced Student Astronomy Projects at Deer Valley High School

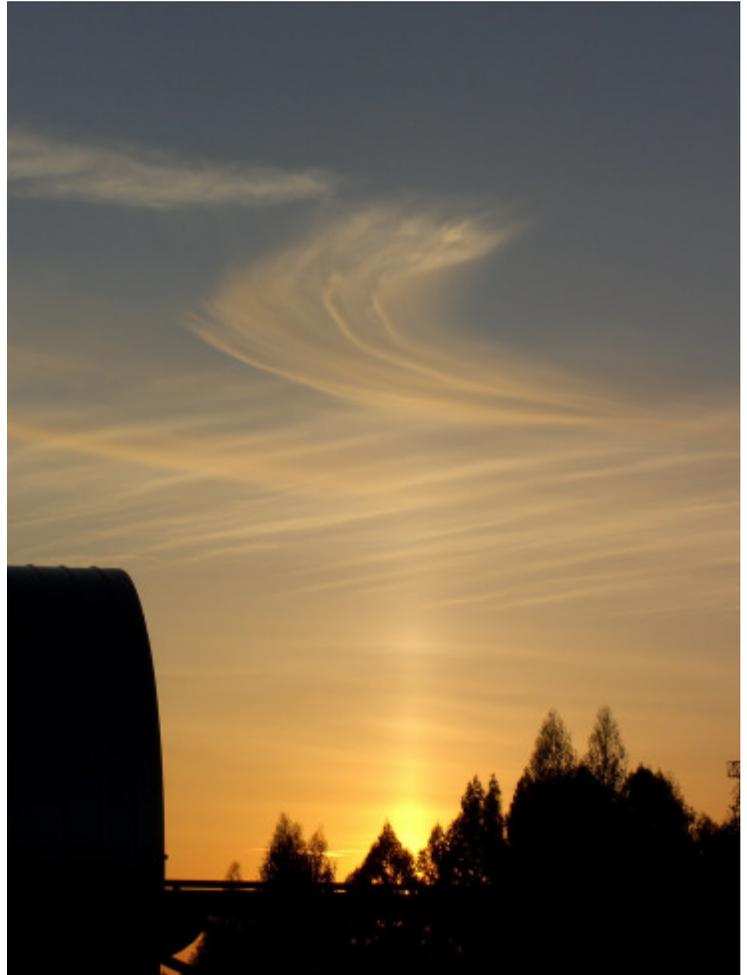
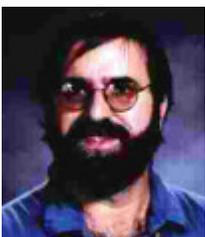
Saturday, June 2, 2007, 7:30 pm

Speaker: Jeff Adkins, and students

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

“Everything I teach is over your head,” Jeff Adkins likes to tell his high school students. With 35 years of experience studying and teaching astronomy and physics — including the use of the Spitzer Infrared Space Telescope and telescopes at Kitt Peak National Observatory, as well as participating in Space Camp for Teachers — Adkins guides his students as they work independently on advanced projects. Adkins established the *Earth, Space and Astronomy Center for Education* at his school after winning a California Department of Education grant. He was the Antioch Unified School District’s *Teacher of the Year* for 2004-2005, *California’s Computer-Using Educators’ Teacher of the Year* in 2006, and he received the Astronomical Association of Northern California’s *Special Award* in 2006. As a child, Adkins loved to copy star charts on poster boards at the library and take them home to study. He earned his astronomy degree from the University of Arizona. Most recently he was awarded a \$10,000 grant from Amgen for the *Amgen Award for Science Teaching Excellence* (AASTE), which is awarded to 30 teachers from around the country each year. He is a NASA Astrophysics Education Ambassador hosted by Sonoma State University.

Jeff will outline his experiences with authentic science research with students and describe several of the award-winning projects his students have completed through the ESPACE academy. He will describe resources for research projects and explain what sorts of things are needed for amateur astronomers to provide assistance with science fair projects for students. He will also describe his involvement with the GLAST education and public outreach office at Sonoma State University. For more info about Jeff and his students’ projects go to www.astronomyteacher.com ★



A spectacular sun pillar seen from Wightman Plaza at the Chabot Space & Science Center. The silhouette of the 36” reflector telescope building is seen at the left edge of the picture. Photo by Don Saito

DINNER WITH THE SPEAKER

5:30 pm

Saturday, June 2

HUNAN YUAN

4100 Redwood Rd., #11

(next to Safeway)

Oakland

(510) 531-1415

No need to confirm—just
 show up!

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The Ions of Dawn

by Patrick L. Barry

This summer, NASA will launch a probe bound for two unexplored worlds in our solar system's asteroid belt—giant asteroids Ceres and Vesta. The probe, called Dawn, will orbit first one body and then the other in a never-before-attempted maneuver.

It has never been attempted, in part, because this mission would be virtually impossible with conventional propulsion. “Even if we were just going to go to Vesta, we would need one of the largest rockets that the U.S. has to carry all that propellant,” says Marc Rayman, Project System Engineer for Dawn at JPL. Traveling to both worlds in one mission would require an even bigger rocket.

This is a trip that calls for the *unconventional*. “We’re using ion propulsion,” says Rayman.

The ion engines for the Dawn spacecraft proved themselves aboard an earlier, experimental mission known as Deep Space 1 (DS1). Because ion propulsion is a relatively new technology that’s very different from conventional rockets, it was a perfect candidate for DS1, a part of NASA’s New Millennium Program, which flight-tests new technologies so that missions such as Dawn can use those technologies reliably.

“The fact that those same engines are now making the Dawn mission possible shows that New Millennium accomplished what it set out to,” Rayman says.

Ion engines work on a principle different from conventional rockets. A normal rocket engine burns a chemical fuel to produce thrust. An ion engine doesn’t burn anything; a strong electric field in the engine propels charged atoms such as xenon to very high speed. The thrust produced is tiny—roughly equivalent to the weight of a piece of paper—but over time, it can generate as much speed as a conventional rocket while using only about 1/10 as much propellant.

And Dawn will need lots of propulsion. It must first climb into Vesta’s orbit, which is tilted about 7 degrees from the plane of the solar system. After studying Vesta, it will have to escape its gravity and maneuver to insert itself in an orbit around Ceres—the first spacecraft to orbit two distant bodies. Dawn’s up-close views of these worlds will help scientists understand the early solar system.

“They’re remnants from the time the planets were being formed,” Rayman says. “They have preserved a record of the conditions at the dawn of the solar system.”

Find out about other New Millennium Program validated technologies and how they are being used in science missions at <http://nmp/TECHNOLOGY/infusion.html>. While you’re there, you can also download “Professor Starr’s Dream Trip,” a storybook for grown-ups about how ion propulsion enabled a scientist’s dream of visiting the asteroids come true. A simpler children’s version is available at <http://spaceplace.nasa.gov/en/kids/nmp/starr>. ★

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



Artist’s rendering of Dawn spacecraft, with asteroids. Largest are Vesta and Ceres. Credits: Dawn spacecraft—Orbital Sciences Corporation; background art—William K. Hartmann, courtesy UCLA.

The Las Positas College Astro-Imaging Contest Judges hard at work evaluating images for the contest. Results on next page





Editor's News 'n Views

Howdy, Astro Fans! We managed to get a few decent nights of public viewing at the telescopes this month, and for our own MOVN (Members Only View Night). We looked at a beautiful crescent Moon, Venus waning to almost half

phase, the last dregs of Saturn as it continues its slide into the Sun, globular cluster M3, and an ultra-faint galaxy (at least in the light-polluted Bay Area), M65, in Leo. We tried to also find its companion, M66, and wound up losing both (how embarrassing)! We even got an early look at Jupiter, still somewhat low above the SE horizon, but couldn't see much due to the thicker atmosphere and turbulence. (Soon, my

pretty, soon!)

Also, during MOVN, the EAS Astrophoto Group got together and judged images from Las Positas College students for their Spring 2007 Astrophoto Contest. After due consideration and careful analysis, they came up with a winner and a runner-up. See the info on it, below.

Carter Roberts, Dave Rodrigues, and Paul Hoy had fun doing an outreach star party at Bort Meadows for 200 Boy Scouts going for their Astronomy Badge. There's quite a fairly long list of requirements to achieve one, and we help them to reach their goal. How nice!

I have to keep this short, so that's it for now! Remember: if you go anywhere, or see anything that might be of interest to our readers, please take pictures and/or let us know your experiences. It's really our members' contributions that really give this newsletter some spark, and I just know some of you are taking some space science oriented vacations. Have fun, and give the rest of us some vicarious thrills, too! ★

Las Positas College Astronomy Club Spring 2007 Astro-Imaging Competition



WINNER: M101

Student submission number: **W10283077**

Criterion for Judging:

- 1. Guiding accuracy:** Excellent--All of the stars are nice and round with no elongation to them.
- 2. Quality of exposure:** Excellent capturing of image data. There is a lot of depth to the data (number of photons per pixel). This dramatically improved the ability of the imager to process the image.
- 3. Quality/accuracy of color:** Good RGB color balance, with no over saturation of stars or of the galaxy's core. There is some black clipping that resulted in the background color to be jet black.
- 4. Contrast:** Very good. The core of the galaxy was not saturated, yet details in the spiral arms were captured and well defined.

5. Quality of focus: Excellent. The image has exceptional details in the galaxy. Even small stars are sharp indicating that the light from the telescope was properly focused to make the stars virtual point sources of light. Application of a slight unsharp masking may help draw out even more detail.

6. Framing: Good, although the fainter portions of one spiral arm are out of the field of view & the galaxy is slightly off center.

7. Absence of artifacts: No artifacts noted.

8. Overall aesthetics and image presentation: This is a beautiful image of M101 that was liked by all of the Judges. Galaxy images can be amongst the most difficult to process due to the fact that they typically have a bright core and faint extended spiral arms. M101 is no exception to this rule. The imager has done an exceptional job of preserving data in the bright core of the galaxy while at the same time drawing out details in the arms. Well done!! ★



Runner-up: M20, The Trifid Nebula

Student submission number: **W10234728**

Get high, see far!

Dear Astrogangs,

The dates this year for the Barcroft High Altitude Star Party are from **Tuesday, September 4** through the night of **Saturday, September 15** with folks leaving Sunday, the 16th. This is my attempt to keep everyone happy. This way, TVS folks have the option of going from Yosemite (they're up there Labor Day weekend for three nights) straight to Barcroft if they wish (being already substantially altitude acclimated, an effect

that has been much noted upon) OR (this is probably my case, due to my Mom's situation) they can come down, recover, and go up again when the Moon is more favorable.

New Moon is Tuesday, September 11. My guess is that the biggest crowd will be there the weekend of the 7th, 8th, and 9th.

Due to the larger number of dates, I am opening up the slots a little bit (but not too much). I have told SFAA folks that they can have a few slots (about 5). I find that Barcroft is much more fun if we have about 15 or so up there at any given time.

We got bumped from our usual August date by some physiological researchers from U. of Toronto. According to many reports, the weather is supposed to be better in September (we're out of the Monsoon season) and the nights are longer. We do lose some of the summer Milky Way, but gain the Winter Sky in the early morning. Wait until you see the Orion Nebula through a large aperture scope from Barcroft, especially in bino-viewers! You won't recognize it!

<=8^O. The weather is still pretty warm in September. For years, folks have urged me to try September.

Barcroft is especially good for astrophotographers because those little photons don't care one bit about how many Oxygen molecules are in your retina.

Barcroft is a wonderful excuse to explore the lesser-known but spectacular Eastern Sierra and see the Bristlecone Pines, the world's oldest living things. The food is great, the comradeship memorable, and the skies are *out of this world*. (as are you, almost). You get to sleep in real beds, and have access to flush toilets, showers, TV, library, workshop, and pool

table. The staff is congenial and very helpful.

I very much hope to see you up there!

Dave Rodrigues 24626 < 8^)

A.K.A....(reverb, please)...*the AstroWizard!* ★

ABOUT BARCROFT

GPS: N 37° 35' 01", W 118° 13' 13"

Altitude: 12,400' ASL



Carter's fisheye picture of the Milky Way at Barcroft. Note the Big and Little Dippers to the right edge of the image, Cassiopeia to the upper-right, Summer Triangle at the center.

Key Advice Points:
Acclimate 1-2 days at Mammoth (8,000' ASL) or Grandview Campground (8,600' ASL).

FILL YOUR GAS TANK WITH PREMIUM GRADE IN BIG PINE before heading up into the mountains. Grandview Campground has toilets and fire rings, but NO water. Bring your own water.

Driving instructions from the Bay Area:

- Take Interstate 580 east to Interstate 205.
- East on Interstate 205 past I-5 to Highway 120.
- East on 120 to Highway 99.
- North on 99 one mile to the Highway 120 exit.
- East on 120 towards Yosemite.
- Take 120 over the Tioga Pass to U.S. 395 (just south of Lee Vining).
- *If the 120-Tioga Pass Route is closed, take the Sonora Pass Route to the north via Calif. 108 to US 395.*
- South on Hwy 395 through Bishop to Big Pine. REFUEL THERE! Get premium grade.
- Hwy 168 east towards Westgard Pass.
- Approx 12.9 miles out of Big Pine, turn left onto White Mountain Road.
- Goes to Grandview Campground, Schulman Grove.
- Schulman Grove to Barcroft - approx 45 minutes .

More advice: It's a well-maintained dirt road, though it can get a little rough in spots. Most two-wheel drive vehicles in good shape can easily make it. Tire pressure should be

Continued on Page 5

checked at Grandview Campground to ensure the lower ambient air pressure at altitude isn't causing vehicle tires to become over-inflated. A good spare tire should be brought along. Make sure the air filter is in good shape, too. A few miles before you get to the lab, you'll come to a gate by a small parking area that looks locked but isn't. Open it and put it back the way it was before continuing on.

Facilities: Hot meals (they'll cook for us), satellite TV, videotape movie library, book and magazine library, fully equipped kitchen (w/microwave), radiotelephone, showers, bathrooms, tool shop for equipment emergencies, oxygen tanks, and helpful staff. They've got bunkbeds, but for maximum warmth, bring a sleeping bag.



Final approach to Barcroft Station. Mt Barcroft is above and behind the facility buildings.

Hypoxia: A real concern at this altitude. It helps to acclimatize (get used to it) by staying at somewhat lower altitudes for a day or two before coming all the way up. Spending a day at Schulman Grove, and a night at Grandview Camp-

ground, will work. Or, spending time at Glacier Point in Yosemite and lodging in Mammoth can help, too. They've got oxygen at the station, for anyone in any discomfort or distress. Symptoms include euphoria, irritability, erratic or irrational behavior, dizziness, and headaches. Please cooperate if someone asks you to use the oxygen. Notify staff if you notice these symptoms in others.

Hydration: Be sure to drink plenty of (non-alcoholic) fluids, as the air at altitude is especially dry.

Weather: Can be extremely variable. The longer your stay, the more likely you'll be able to view.

Temperature: Can get extremely cold. Bring lots of comfortable, loose-fitting (non-constricting), warm clothing. Layering works well. Don't forget your hands, head, and feet. Fingerless gloves, caps or hats w/ear or face covers, and extra socks are all helpful. Liquid rechargeable, or one-time use, powdered iron, heat packs are good to have, too.

Sunburn: Wear liberal amounts of SPF 30 sunblock on exposed skin, and a wide-brimmed hat.

Seeing: It can be outstanding (sub-arcsecond), if the weather cooperates, thanks to the relative lack of interfering atmosphere at that altitude. Solar viewing should be excellent. It can be especially good for astrophotography. White Mountain was the second choice for the Keck Telescope. You'll never forget your view of the Milky Way from Barcroft.

For those of you who are interested, just off this route, north

of Mono Lake, is the Bodie State Historic Park. Bodie was a legendary (or perhaps infamous is a better word) mining town that was famous for its bars, murder rate (at one point it had the highest per-capita murder rate in the world), and houses of ill repute. People used to say, "Goodbye God, I'm going to Bodie!" It's now a ghost town. Just thought I'd mention it.

In an emergency, feel free to call Donna Shin or Denise or John Smiley (the station manager) at the White Mountain Research Station in Bishop at 760-873-4344. Make sure you take these numbers with you, just in case. The number up at Barcroft, if the phone is working, is at 760-937-5202. Ask for Dor

Often, one or more of the traditional roads up there is washed out due to weather or forest fires. For that reason, before heading up, it would be a good idea to call CalTrans at 800-427-7623 to confirm the roads are open. Even better, check their web site:

Caltrans - California Highway Information - Caltrans search engine allows users to enter the number of a particular highway or route and get the latest road conditions for it <http://www.dot.ca.gov/hq/roadinfo>

Also useful in this regard is:

Mono Basin Weather and Road Information Mono Basin Weather: Current Conditions - Local Forecasts Live weather from Lee Vining, Paoha Island, and Mono City Mammoth Lakes Weather and WebCam <http://www.monolake.org/visiting/roadinfo.htm> ★

FUTURE CONJUNCTIONS—2007

NOTE: Please note there are TWO meetings in June. We are switching from having our General Meetings from the early to the later part of the month, and it was thought that it would be too much time between the June 3 and July 28 meetings.

- Jun 2 **General Meeting, Chabot, Physics Lab, 7:30pm**
- 14 Board Meeting, Chabot, Soda Board Rm, 7:30pm
- 17 MOVN @ Chabot, Wightman Plaza*
- 30 **General Meeting, Chabot, Physics Lab, 7:30pm**
- Jul 12 Board Meeting, Chabot, Soda Board Rm, 7:30pm
- 22 MOVN @ Chabot, Wightman Plaza*
- 28 General Meeting, Chabot Physics Lab, 7:30pm
- Aug 9 Board Meeting, Chabot, Soda Board Rm, 7:30pm
- 25 General Meeting, Chabot, Physics Lab, 7:30pm
- (tba) MOVN @ Chabot, Wightman Plaza*
- Sep 4-15 Approx dates for Barcroft High-Altitude Star Party
- 13 Board Meeting, Chabot, Soda Board Rm, 7:30pm
- 22 General Meeting, Chabot, Physics Lab, 7:30pm
- (tba) MOVN @ Chabot, Wightman Plaza*
- Oct 11 Board Meeting, Chabot, Soda Board Rm, 7:30pm
- 27 General Meeting, Chabot, Physics Lab, 7:30pm
- (tba) MOVN @ Chabot, Wightman Plaza*
- Nov 15 Board Meeting, Chabot, Soda Board Rm, 7:30pm
- 24 General Meeting, Chabot, Physics Lab, 7:30pm
- (tba) MOVN @ Chabot, Wightman Plaza*

*Members Only View Night:

Always call 510 482-2913 after 5pm to confirm

NOTE: Dates and times may change. We will provide as much advance warning as possible.



Eastbay Astronomical Society

Post Office Box 18635 • Oakland, CA 94619-0635

June 2007
RETURN SERVICE REQUESTED

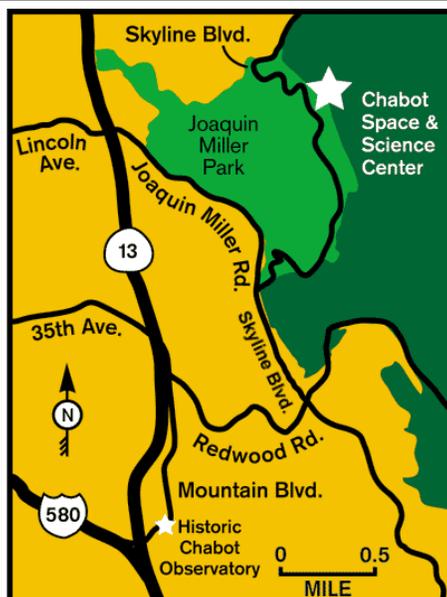
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Articles and photos for *The Refractor* are encouraged. Deadline for the July 2007 issue is June 15, 2007. Items may be submitted by mail to:
Editor - 3514 Randolph Avenue, Oakland, CA 94602-1228. Internet email address: donsaito@comcast.net Hm: (510) 482-2913.



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- Sustaining, \$60/year or more

Discounted Magazine Subscriptions:

- Sky & Telescope \$32.95 (order between July & December)
- Astronomy \$34 (order between July & December)

Note: Note: Each membership year begins November 1, and ends October 31. New memberships starting from July - October will be good through to the end of October of the next year

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Sign up online at <http://www.eastbayastro.org/> (click on the Membership link for PayPal purchasing options)