FIRST LIGHT

Journal of the South Bay Astronomical Society - December 2004
on line at www.geocities.com/sbas_elcamino

Monthly General Meeting: Friday, December 3rd, 7:30 PM

Guest Speaker : Dr. Leon Palmer

"Spectroscopy"

Night Sky Network News

Our club belongs to "The Night Sky Network", an organization sponsored by the Astronomical Society of the Pacific and supported by JPL and NASA. It is essentially an outreach group to give the public an appreciation of astronomy and space exploration. From time to time they supply us with kits of resource materials to help us make presentations to the public. We are committed to making four presentations a year. So far we have made two that were written up and officially submitted, a presentation by Ken Munson at Narbonne High School and our star party for the Boy Scouts at El Nido Park. Every month the names of clubs that held events are placed in a lottery to win a green laser pointer. Well guess what – we won! We received a beautiful laser pointer ($100.value). The pointer will be made available at club events and to those borrowing the club's scope. Thanks to Ken and all those who participate in our club outreach activities.

We've also received a second kit from NSN. It's subject is "Our Galaxy Our Universe"; it deals with ways to explain, in terms easy to visualize, the vast distances involved in the scale of our solar system and universe. From what I've seen it does a good job. The training CD they supplied has some good ideas for spicing up our star parties. I would like to show it at one of our meetings and get your comments. They also sent a CD about the Hubble Telescope, its discoveries and accomplishments including some beautiful photos. The first kit they sent to us was about the discovery of planets outside of our solar system, a very hot topic nowadays. In fact, before I started to write this article I checked my e- mail and found a request from a Girl Scout group for help during their visit to Santa Monica. It seems that JPL has set up a kiosk on the mall in Santa Monica that has to do with space exploration and the search for planets. The scouts are going to visit it and are asking for help in explaining what they see. So, here's a good way to put the resources of this first kit to good use. A date has not been set yet, but it will be sometime during the first two weeks of December. If you are available and would like to support this effort give me a call. It's fun and rewarding; you will be surprised at how much you learn trying to teach others.

- Joe Fierstein

Observing Reports

@Ridgecrest School – **November 6th** the weatherman was predicting clouds and rain, but that didn't stop a near record turnout for our in town observing session at Ridgecrest School. In addition to many of our regular members: Greg Benecke, Craig Gates, Ken Munson, Al Fader, Tim Moore, Bea Collu, Ken & Jo Ann Lehmer & kids, Ken Rossi & son Tony, and myself; we had several new members and visitors including Brian Dumaine, Mataki Nagai, Merrel Tucker, & Jessica. The Nixon Family of Gerald, Amy & Steve with guests Shawn & Millie came all the way from Riverside. There were about a dozen other visitors whose names I did not get. Despite the dire weather prediction, the sky was clear and we enjoyed a variety of sights provided by the November sky; including the Andromeda Galaxy, Globular clusters such as M15 & M13, double stars, and red giants. There was some new equipment put into service that night also. Brian was trying out his 8 inch Orion Dob for the first time. He didn't opt for the fancy "Push To" type because he wants to learn the sky – way to go Brian! Ken Rossi was trying out his new

Orion refractor on an equatorial mount and learning that Polar alignment is an art form. Around 10PM it started to get a bit damp, whenever I sat on my observing chair I came up with a wet tush. The corrector plate on the NexStar was dewing up so I called it quits at about 10:30. - ***Joe Fierstein***

It was my first time to use my laptop PC in the field for my sole source for observing targets. It worked remarkably well and I used not only Starry Night but also the Nexstar Observing List software written by other Nexstar users. They have generated a number of great deep-sky object lists that are great. I used the Carbon Star list to find a number of nicely colored red stars. Most are variables and so range from faint, barely discernable red dots to bright, cherry red stars It is just such a pretty sight to see a deeply red star in a field of white stars. It's like a ruby among diamonds. Another thing I did for the first time that night was to finally locate some of my very own satellites. My company operates a large fleet of geostationary satellites around the world, many of which are over the US. Early in the evening, I was able to locate 3 of mine, which I later identified as Galaxy 9, Galaxy 11 and Directv 3. I even managed to get a picture of them! Al Fader used a piece of software that I introduced to him called Satellite Tracker. You can download the orbital parameters for satellites and then use the software to drive your scope (provided it's a GOTO scope) to find and track the satellite across the sky. Al spent a lot more time working with it than I did and was getting it adjusted about right when his laptop ran out of power. - ***Ken Munson***

The turnout right around sunset seemed light, but that would change as the night went on. There were no clouds and although there was quite a bit of moisture in the air, the seeing was fairly good. Unfortunately the school has installed a new vending machine that brightly illuminates the area where we set up. Fortunately, we were able to come up with items to cover up the machine and block the light. Ultimately we had a good turnout of scopes. Several families came through with their kids. Craig Gates took advantage of the fair seeing and was going through a list of double stars. The Andromeda Galaxy looked pretty good through my 15 inch. The dew started to become a problem early on. My heat gun came in handy for several of the dewed up scopes. I had to use it on both the primary and secondary mirrors of my scope. I also had to use it on the back element of my 31mm Nagler, something I had never had to do before. This was probably the wettest, cloudless night I have ever experienced.

@Redrock-Inyokern Road **– November 13th** I did not go out for the dark site observing session since the cutoff low that brought a small amount of rain to the L.A. basin predicted poor seeing. - ***Greg Benecke***

Annual Membership Renewal

Renew your SBAS membership – Keep this amazing newsletter coming plus meetings and observing trips! Now would be a great time to renew your membership in the group that brings you great monthly programs, the company of fellow observers, and many chances throughout the year to share the excitement of the night sky with students and new friends. If you just joined us this year, then you can renew your membership on a pro-rated basis to adjust your membership term to the standard calendar-year schedule. What a deal: you renew for less than full price. The renewal cost, as a function of when your membership expires, is as follows:

Membership	**Renewal Fee Due Now**	
Expiration	**Individual/Family**	**Student**
Dec. '05 or later	$ 0.00	$ 0.00
Nov. '05	$ 2.50	$ 2.08
Oct. '05	$ 5.00	$ 4.17
Sept. '05	$ 7.50	$ 6.25
Aug. '05	$10.00	$ 8.33
July. '05	$12.50	$10.42
June '05	$15.00	$12.50
May '05	$17.50	$14.58
Apr. '05	$20.00	$16.67
Mar. '05	$22.50	$18.75
Feb. '05	$25.00	$20.83
Jan. '05	$27.50	$22.92
Dec. '04 or before	$30.00	$25.00

To renew, check your membership expiration date in the upper right corner of the mailing label on the back page of this newsletter. This is what our records show for your membership expiration date. Please renew, according to the schedule above, by check to: South Bay Astronomical Society, P.O. Box 1999, Redondo Beach, CA 90278. (Payments will also be accepted at our general meetings!)

Our SBAS Committee

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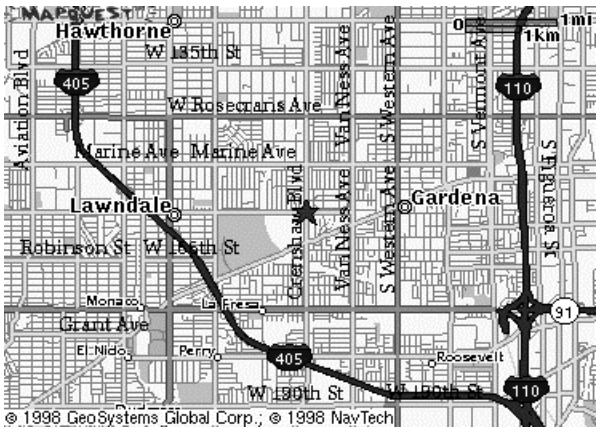
	Mark Braden	540-2810	Bradenm@fnic.com

Monthly General Meetings



We normally meet on the first Friday of each month at 7:30 p.m. in the Planetarium at El Camino College. If the first Friday is on or close to a holiday, we usually defer the meeting until the second Friday of the month.

The Planetarium is on the south side of Manhattan Beach Blvd., one block west of Crenshaw Blvd. (near the center of the map at left). Click on the map to get a display that can be zoomed out for a regional view. The zoom display appears in a separate browser window, which can be closed to return to this page.

The domed roof of the planetarium is visible from the street. There is on-street parking, and we can often use campus parking: check inside to see if you need a FREE parking permit for your car. Park in northeast corner lot, temporarily, due to the construction project.

We enjoy the planetarium facilities through the courtesy of the El Camino College Administration, and have several faculty members of the Astronomy Department as members of our Club. Our meetings always include an informal opening, when new attendees are invited to introduce themselves and let us know about their interests in astronomy. Members share their latest news and observations at this time. The rest of the evening is devoted to guest speakers, who range from amateur astronomers to professional astronomers to representatives from local aerospace companies to college professors. We are fortunate to have all these talented people in our area, willing to come and talk to us.

Monthly Planning Meetings

Committee members (and anyone else with an interest in Society activities) meet each month, usually on the Monday following the general meeting. Meetings are sometimes rescheduled due to travel and other circumstances. Exact date and time of each month's meeting will be announced in the schedule of events in *FIRST LIGHT* each month, and should also be verified with a committee member by any member or visitor wishing to attend. All are welcome!

We will meet on Monday, December 5th at 7:30 PM at the home of Ray Grace, 2706 Spreckels Lane in Redondo Beach (310) 370-1913. Take Hawthorne Blvd to 190th St., turn West to Inglewood Ave., then turn North (right) and proceed two blocks to Spreckels Lane and turn Right. If driving South on Inglewood Ave., Spreckels Lane is two blocks south past the light at Ralston Ave., and turn Left, to the 4th house on the right (South side). Parking is available on both sides of the street.

SBAS Membership Benefits

Contact John Collins for magazine subscriptions at club rates: "Sky & Telescope" $32.95 and "Astronomy" $29.00! Make your check payable to SBAS and mail the payment and your subscription / renewal form directly to South Bay Astronomical Society, P.O. Box 1999, Redondo Beach, CA 90278.

Part of your SBAS membership dues goes toward membership in the Astronomical League. All paid members should be receiving the "Reflector", the league's newsletter, four times a year. As a member organization, we can participate in a number of award programs they offer. These are based on completing various observing challenges. Check out the Astronomical League website at **www.astroleague.org**

NexStar 8 Available to SBAS Members

All members in good standing (with at least six months of continuous membership) can borrow the club's Nexstar8 for up to 7 days. The fee of $5 for a weekend, or $10 for an entire week, is nonrefundable and will be added to the club's Accessories Fund "Wish List" for future purchases. A fully refundable deposit of $200 cash or check is required. Loss or damage is the responsibility of the borrower. A copy of the complete South Bay Astronomical Society Nexstar 8 Borrowing Rules and Agreement is available upon request. The **Accessories Fund "Wish List"** – Member contributions of any amount or donations will be appreciated, as will any suggestions for new purchases!

Notice: The club's NexStar has a new addition, a 9x50 right angle finder scope which takes the back strain out of doing an alignment. Try it you'll like it!

❖ ***FREE!***

Sky & Telescope Magazines – Seven years of issues covering Feb. 1997 through Dec. 2003. If you are interested in the collection or would like to donate it to your local school's science classes, call Estelle Rapp at (562) 531-7621.

December - Comets & Asteroids

Comets Visible:

Name	Magnitude	Constellation
2003 K4	5.5 – 5.6	Cen-Vel
Macholz (2004 Q2)	6.0 – 4.2	Eri-Tau

Comets at Perihelion:

Date	Identification	Magnitude

No visible comets at perihelion.

Near-Earth Asteroid Flybys:

Date	Identification	Magnitude	Distance

No visible near-earth asteroids.

Check the JPL Ephemeris Generator page for coordinates of the objects at:
http://ssd.jpl.nasa.gov/cgi-bin/eph

- ***Ken Munson***

Observer's Handbooks Available

There will be a total of 8 copies of the Royal Astronomical Society of Canada's Observer's Handbook 2005 available on a first come first served basis at a price of $17 each. Please E-mail ahead of the meeting to reserve a copy if you are interested. Any unclaimed copies will be available at the meeting for purchase.

New Images Reveal Clouds on Planet Uranus

New images of the planet Uranus, from the Keck Telescope in Hawaii, provide insight into some of the most enigmatic weather in the solar system. "The cloud features range from small to large, from dim and diffuse to sharp and bright, from rapidly evolving systems to stable features that last for years," said Lawrence Sromovsky of the University of Wisconsin-Madison's Space Science and Engineering Center. A large storm in the southern hemisphere seesaws over 5 degrees of latitude over several years. "It's weird behavior that hasn't been recognized before on Uranus," Sromovsky said. "It's similar to what's been seen on Neptune, although there the oscillation is much more rapid. Spotted in the northern hemisphere, the 18,000-mile-long complex of clouds dissipated completely over the span of a month. "These more dynamic systems seem to develop at northern latitudes where they rise to even higher latitudes, apparently using up energy and dissipating relatively rapidly," Sromovsky said. The cloud features are being used to trace and help define wind patterns and predict the motions of the large storm systems that sweep across the pale blue planet. "The large, longer-lived cloud features of Uranus may be underpinned by giant hurricane-like vortices, as we've seen on Neptune," says Sromovsky, "but it's unlikely that they are as violent as the hurricanes that routinely batter Florida, for example." Terrestrial hurricanes are all about taking energy from tropical water and dissipating it farther north or over land. Uranus, which is 19 times as far from the sun as the Earth, has far less solar energy to dissipate. Uranian storms seem to survive and thrive because the atmosphere is "slippery," providing less of the atmospheric resistance that help storms on Earth dispense their energy. "There is very little temperature contrast and very little energy to drive the weather in Uranus," says Sromovsky. "Whatever is happening has to be well lubricated; it has to be a low-friction environment."

- ***Space.com***

Quantum Astronomy: The Double Slit Experiment

By Laurance R. Doyle, SETI Institute

This is a series of four articles each with a separate explanation of different quantum phenomena. Each of the four articles is a piece of a mosaic and so every one is needed to understand the final explanation of the quantum astronomy experiment we propose, possibly using the Allen Array Telescope and the narrow-band radio-wave detectors being built by the SETI Institute and the University of California, Berkeley. With the success of recent movies such as “What the &$@# Do We Know?” and the ongoing -- and continuously surprising -- revelations of the unexpected nature of underlying reality that have been unfolding in quantum physics for three-quarters of a century now, it may not be particularly surprising that the quantum nature of the universe may actually now be making in-roads into what has previously been considered classical observational astronomy. Quantum physics has been applied for decades to cosmology, and the strange singularity physics of black holes. It is also applicable to macroscopic effects such as Einstein-Bose condensates (extremely cold conglomerations of material that behave in non-classical ways) as well as neutron stars and even white dwarfs (which are kept from collapse, not by nuclear fusion explosions but by the Pauli Exclusion Principle, a process whereby no two elementary particles can have the same quantum state and therefore, in a sense, not collapse into each other).

Well, congratulations if you have gotten through the first paragraph of this essay. I can’t honestly tell you that things will get better, but I can say that to the intrepid reader things should get even more interesting. The famous quantum physicist Richard Feynmann once said essentially that anyone who thought he understood quantum physics did not understand it enough to understand that he did not actually understand it! In other words, no classical interpretation of quantum physics is the correct one. Parallel evolving universes (one being created every time a quantum-level choice is made), faster-than-light interconnectedness underlying everything, nothing existing until it is observed, these are a few of the interpretations of quantum reality that are consistent with the experiments and observations. There are many ways we could go now in examining quantum results. If conscious observation is needed for the creation of an electron (this is one aspect of the Copenhagen Interpretation, the most popular version of quantum physics interpretations), then ideas about the origin of consciousness must be revised. If electrons in the brain create consciousness, but electrons require consciousness to exist, one is apparently caught in circular reasoning at

best. But for this essay, we shall not discuss quantum biology. Another path we might go down would be the application of quantum physics to cosmology -- either the Inflationary origin of the universe, or the Hawking evaporation of black holes, as examples. But our essay is not about this vast field either.

Today we will discuss the scaling of the simple double-slit laboratory experiment to cosmic distances, what can truly be called, quantum astronomy. The laboratory double-slit experiment contains a lot of the best aspects of the weirdness of quantum physics. It can involve various kinds of elementary particles, but for today's discussion we will be talking solely about light, the particle nature of which is called the photon. A light shining through a small hole or slit (like in a pinhole camera) creates a spot of light on the screen (or film, or detector). However, light shown through two slits that are close together creates not two spots on the screen, but rather a series of alternating bright and dark lines with the brightest line in the exact middle of this interference pattern. This shows that light is a wave, since such a pattern results from the interference of the waves coming from slit one (which we shall call A) with the waves coming from slit two (which we shall call B). When peaks of waves from light source A meet peaks from light source B, they add and the bright lines are produced. Not far to the left and right of this brightness peak, however, peaks from A meet troughs from B (because the crests of the light waves are no longer aligned) and a dark line is produced. This alternates on either side until the visibility of the lines fades out. This pattern is simply called an interference pattern and Thomas Young used this experiment to demonstrate the wave nature of light in the early 19th Century.

However, in the year 1900, physicist Max Planck showed that certain other effects in physics could only be explained by light being a particle. Many experiments followed to also show that light was indeed also a particle (a photon) and Albert Einstein was awarded the Nobel Prize in physics in 1921 for his work showing that the particle nature of light could explain the photoelectric effect. This was an experiment whereby low energy (red) light, when shining onto a photoelectric material, caused the material to emit low energy (slow moving) electrons, while high energy (blue) light caused the same material to emit high energy (fast moving) electrons. However, lots of red light only ever produced more low energy electrons, never any high-energy electrons. In other words, the energy could not be saved up but rather must be absorbed by the electrons in the photoelectric material individually. The conclusion was that light came in packets, little quantities, and behaved thus as a particle as well as a wave.

So light is both a particle and a wave. OK, kind of unexpected (like Jell-O) but perhaps not totally weird. But the double slit experiment had another trick up its sleeve. One could send one photon (or quantum of energy) through a single slit at a time, with a sufficiently long interval in between, and eventually a spot builds up that looks just like the one produced when a very intense (many photons) light was sent through the slit. But then a strange thing happened. When one sends a single photon at a time (waiting between each laser pulse, for example) toward the screen when both slits are open, rather than two spots eventually building up opposite the two slit openings, what eventually builds up is the interference pattern of alternating bright and dark lines! Hmm, how can this be, if only one photon was sent through the apparatus at a time? The answer is that each individual photon must in order to have produced an interference pattern -- have gone through both slits! This, the simplest of quantum weirdness experiments, has been the basis of many of the unintuitive interpretations of quantum physics.

We can see, perhaps, how physicists might conclude, for example, that a particle of light is not a particle until it is measured at the screen. It turns out that the particle of light is rather a wave before it is measured. But it is not a wave in the ocean-wave sense. It is not a wave of matter but rather, it turns out that it is apparently a wave of probability. That is, the elementary particles making up the trees, people, and planets -- what we see around us -- are apparently just distributions of likelihood until they are measured (that is, measured or observed). So much for the Victorian view of solid matter! The shock of matter being largely empty space may have been extreme enough -- if an atom were the size of a huge cathedral, then the electrons would be dust particles floating around at all distances inside the building, while the nucleus, or center of the atom, would be smaller than a sugar cube. But with quantum physics, even this tenuous result would be superseded by the atom itself not really being anything that exists until it is measured.

One might rightly ask, then, what does it mean to measure something? And this brings us to the Uncertainly Principle first discovered by Werner Heisenberg. Dr. Heisenberg wrote "Some physicist would prefer to come back to the idea of an objective real world whose smallest parts exist objectively in the same sense as stones or trees exist independently of whether we observe them. This however is impossible." Perhaps that is enough to think about for now. So in the next essay we will examine, in some detail, the uncertainty principle as it relates to what is called the measurement problem in quantum physics. We shall find that the uncertainty principle will be the key to performing the double-slit experiment over astronomical distances, and demonstrating that quantum effects are not just microscopic phenomena, but can be extended across the cosmos. (Note: the 2nd article has been posted by SETI at **www.space.com**).

Schedule of Coming Events

3 December Friday 7:30 P.M.	**Monthly General Meeting:** The speaker for this evening is Dr. Leon Palmer on the subject of "Spectroscopy".
4 December Saturday Evening	**In-Town Dark Sky Observing at Ridgecrest School** – Weather Permitting: If the weather conditions are marginal, contact Greg Benecke to confirm that he will be opening the gate! Take Hawthorne Blvd. south across Pacific Coast Hwy.; continue up the hill past Silver Spur and turn left at Highridge. Go one mile and turn left on Whitley Collins, up one block and turn left on Northbay Rd., the new parking lot is at the end on the left. Enter parking lot and turn left, the gate is at the east end (it should be open about 15 minutes before sunset) and a paved road leading into the playground where we have traditionally set up. If at all possible, drop your equipment off and park your car in the new parking lot (less than 200 feet away). If you are absolutely certain that your vehicle does not drip anything you can park with your equipment. *Drive with care* to avoid steel pillars supporting basketball nets…
6 December Monday 7:30 P.M.	**Monthly Planning Meeting** Refer to page 3 for directions.
9 JPL 10 PCC December 7:00 P.M.	**Von Karman Auditorium Lecture Series** – FREE "Peering into the Universe: Discoveries with the Keck Interferometer", presented by Dr. Rachel Akeson, JPL Research Scientist, Caltech Michelson Science Center. The Keck Interferometer links the two 10-meter Keck telescopes on Mauna Kea, Hawaii and has the resolving power to see a quarter in New York from Los Angeles. This presentation will describe the Keck Interferometer and present highlights of its astrophysical discoveries, ranging from observations of young stars to the centers of galaxies millions of light-years from Earth. For more information call: (818) 354-0112. Current and archived webcasts can be viewed at **http://www.jpl.nasa.gov**
12 December Saturday Evening	**Out-of-Town Dark Sky Observing Trip** – New Moon December 12th Contact Greg Benecke to confirm site location.
1 January Saturday Evening	**In-Town Dark Sky Observing at Ridgecrest School** – Weather Permitting. Refer to December 4th entry for directions to the site & instructions on weather conditions.
7 January Friday 7:30 P.M.	**Monthly General Meeting:** The speaker for the evening will be announced in the January newsletter.
8 January Saturday Evening	**Out-of-Town Dark Sky Observing** – New Moon Contact Greg Benecke to confirm site location.
10 January Monday 7:30 P.M.	**Monthly Planning Meeting** The location of this meeting will be announced in the January Newsletter.
29 January Friday	**"Einstein: A Century of Relativity"** UCLA Extension in association with the Skirball Cultural Center's acclaimed exhibition "Einstein", offers this program, designed for the educated lay public, looking back at his achievement, at how relativity has transformed astronomy, and ahead to future interpretations of relativity and our universe. The program includes three guest speakers, and concludes with a tour of the Skirball Cultural Center's exhibition "Einstein." Contact Linda Polin, Program Manager UCLA Extension (310) 825-7093 email: lpolin@unex.ucla.edu

South Bay Astronomical Society

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General Meeting at El Camino College Planetarium:
Friday, December 3rd at 7:30 P.M.

Guest Speaker: Dr. Leon Palmer

"Spectroscopy"

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South Bay Astronomical Society
P.O. Box 1999
Redondo Beach, CA 90278

❖ ***SBAS Membership Renewal - Follow instructions on page 2!***