The Refractor

The Bulletin of the Eastbay Astronomical Society

Founded in 1924 at Chabot Observatory, Oakland, California

Volume 70 • Number 4 • December 1993

What's at the Edge of the Solar System?

4 December, 8:00 p.m.
Administration Building of Chabot Science Center
4917 Mountain Blvd., Oakland

Dr. Jane Luu, *Stanford University*

Have you ever wondered what it is like at the edge of the Solar System? Our December meeting will have someone who has made some remarkable discoveries as to what's out there–Dr. Jane Luu, the young discoverer of two distant comets, each about 100 miles wide, out past the orbits of Pluto and Neptune. She may have just discovered the long-sought Kuiper Belt! On top of that, she'll show us that beautiful picture she took of Shoemaker-Levy 1993e, the String of Pearls comet.

As proposed by the late astronomer Jan Oort, there should exist a trillion or more comet nuclei in a spherical shell of radius perhaps two light-years. Yet this distribution would not readily give rise to the periodic comets, which manifest orbit inclinations not unlike those of the planets. Theorists consequently suggest the Kuiper belt, a ring of protocomets that lies closer than the Oort cloud. Gravitational effects caused by the proximity of massive Jupiter and the other outer planets would induce chaotic motion within such a group of objects, and ultimately comets would be perturbed into elliptical orbits extending into the inner solar system. Pluto's companion Chiron is believed to be such a Kuiper object.

The "String-of-Pearls" comet, 1993e, Comet Shoemaker-Levy, was found on films taken in March of this year with the Schmidt camera at Palomar. However, it is the image created by Jane Luu and David Jewitt with a high-resolution CCD camera on the University of Hawaii's 2.2-meter Mauna Kea telescope that has made this comet so newsworthy. The break-up of this comet into its many fragments is attributed to a close encounter with Jupiter in May 1992, and it is now predicted that this unique and spectacular celestial object may well complete its journey next July in a final encounter with the huge planet.

Join us for
DINNER WITH THE SPEAKER
prior to the meeting at
5:30 p.m., 4 December
EVE'S HUNAN RESTAURANT
5620 College Avenue (510 / 658-5608)
Oakland (½ block from Rockridge BART)

It would be nice if you would confirm your place at dinner by calling Betty Neall before Friday 3 December at 510 / 533-2394. But come anyway, you'll want to get aquainted with our speaker, a rising star in Astronomy, Jane Luu.

Welcome to the Club

EAS would like to greet the following members who have joined us in recent months. We hope you will find the meetings and other activities helpful and pleasurable, and that you will unreservedly agree that you have made a wise decision in complementing our numbers.

Dave Anderson, Neil André, Jack Carlson, Bryan Carroll, Tony Catsimatides, Jerry Fisher, Kim Grau, Bob Hoyle, Paul Reid, Lance Shaw and Robert C. Smith.

We also acknowledge the *in gratis* membership of Rena Rickles, awarded in appreciation of her *pro bono* legal services in bringing about the Joint Powers Agreement that led to the realization of Chabot Observatory and Science Center.

Let us also recognize the current Life Members of EAS. They are:

Terry Galloway, Wes Hearther, Arnold S. Leonard, Walter C. Marion, Betty Neall, Joe Perrault, and Kingsley Wightman. Leonard has been a member of the Society since 1929.

We still have room for a few more members. Tell your friends and colleagues about the astronomical advantages of membership.

Helen Pillans Award

At the December Board meeting we will consider nominations for the Helen M. Pillans award which is given by the Eastbay Astronomical Society for "distinguished meritorious service to the amateur astronomical community."

Previous winners have been:

1983 Dr. Helen Pillans–Long-time teacher of astronomy.

1984 Kingsley Westholt Wightman–Teacher at Chabot 1948-present, and first Director of the Rotary Chabot Planetarium

1985 Walter C. Marion–Founded the EAS telescope maintenance group.

1986 Elizabeth Neall–Long-time EAS Boardmember, serving the EAS in many capacities for over fifty years.

1988 John Dobson–Popularizer of the Dobsonian Tele scope which he designed.

1989 Wes Hearther–Long-time ATM and developer of many unusual telescope designs that preceded those in use today.

1990 Anne Creese–Long-time Librarian of EAS library.

1991 Don Stone–Long-time EAS treasurer and AANC President.

1992 Conrad Jung–Accomplished astrophotographer and teacher of young people at Chabot Observatory.

1993 Paul Zurakowski–Long-time leader of the Telescope Makers' Workshop.

Anyone who would like to suggest who the next recipient should be, please either bring your suggestion to the next lecture or Board meeting or call Carter Roberts at (510) 524-2146. The award will be presented at the EAS Annual Dinner on 26 February. EAS Board Meetings are held in the Chabot Library on the 2nd Friday of each month at 8 p.m. The December meeting will be on the 10th and the January meeting on the 14th. Members are encouraged to attend.

What's Up

While many people may confine their observing to warmer months, December is a great time to view the Great Nebula in Orion and other winter objects. The Geminid meteor shower occurs in a moonless sky this year. Sky & Telescope suggests observing the nights of the 12th to 13th and 13th to 14th. The radiant is near Castor and will be high enough that one can begin observing as early as 10 p.m.

In recent years, the Geminid meteors have surpassed the familiar Perseids as the most dominant and reliable shower. This year is likely to be prime for this December spectacle, because the peak coincides closely with the New Moon, and so skies will be as dark as city lights and atmospheric pollution will allow.

The time at which Earth's orbit and the center line of the Geminid stream intersect this year is at 3 p.m. December 13, so you should have good luck in watching for the meteors between late evening Sunday and early morning on Tuesday. It is reported that the Geminids are associated with asteroid 3200 Phaethon, unlike other meteor showers that are linked to comets. The distribution of particles is somewhat diffuse, and as a result meteors attributable to this family can be observed over a period of perhaps five or six days before and after the peak date. Because the radiant is high in the sky, near Castor in Gemini, more meteors will be seen than if it were at a lower altitude and many of them would be below the horizon.

A prevalent misconception is that you are seeing a particle heated to incandescence because of friction with the atmosphere. This may not be untrue, as the particles do "burn up", but what is actually seen is the recombination of air molecules that have been ionized by the bowshock in front of the supersonic meteoroids. Because this mechanism takes a finite amount of time, the event is manifested by a glowing trail, which has length and intensity associated with the speed of the incoming particle. In turn, the speed of the particle is associated, among other factors, with the time of night, with times just before dawn generally showing more brilliance as the Earth's eastward orbit sweeps up the meteoroids in head-on collisions at higher velocities. Nonetheless, the Geminid shower is classified as one which is quite good before midnight.

Event Horizons

Save the date! Saturday, 26 February 1994, **EAS Annual Banquet.** We will celebrate our 70th anniversary (+ 2 days) with a repeat of last year's Chinese buffet at the same location in San Leandro which has yet another new owner and name!! For those who have lost count, this will be our 6th consecutive time in the same location but the 5th name and owner. It is now the Oriental Tea House. As of this writing, the speaker had not yet been determined. We plan to begin gathering at 5:30 p.m. and eat at 6:00 p.m. this time.

Astroimage, Saturday, 5 March 1994. This event combines the Astrophoto and Electronics Oriented Astronomy events that formerly took place on alternating years. It is to be an annual event, usually around the first Saturday of March with the date dependent on Moon phase. We have not been told exactly where this one will be located but it usually migrates between Fullerton and Thousand Oaks.

Astronomy Day, Saturday, 16 April 1994. Stay tuned for details.

SJAA Astronomical Auction will probably be either 23 or 30 April 1994.

November Meeting

Carter Roberts presented a synopsis of what to expect of the lunar eclipse, and he discussed the AANC workshops that will be held in March. Two topics likely to be featured will center on CCD and video imaging; and on telescope optical quality. Carter then presented a few slides he had recently taken, and Carl Trost gave a showing of the Galileo exhibit in the Museum of Science in Florence, Italy. Announcement was made of gifts received by our library: an impressive videodisk from Marshall and Dorothy Williams, and a number of scientific magazine issues donated by Glen Bailey.

Our speaker, Dr. Eric Norman, introduced his topic of Neutrino Astronomy, but most unfortunately had to interrupt his talk owing to an emergency. We want to express our thanks to him and our concern for his family's welfare. We will welcome him back at a later date.

Franklyn Creese stepped in to inform us of the proceedings of the Northern California Association of Physics Teachers. And Lew Epstein completed the evening presentations with discussions on how Galileo perceived that a telescope works, and also how to visualize the mechanism of a Foucault pendulum.

MESSAGES FROM THE BEYOND

The following items are adapted from *Starry Skies,* Newsletter of the Astronomical Association of Northern California.

Chabot Observatory & Science Center is going to expand. Beginning next year Chabot College Astronomy/Physics Department Chair Dr. Larry Toy will take a year's sabbatical to work on design of the new facility with the architects, Gerson & Overstreet. Also added will be an administrative assistant, an education director, and an administrator responsible for handling day-to-day activities.

Two telescope and astronomical equipment and supplies dealers will close their doors forever at the end of this month. The Odd Assortment in Pacheco and Optica b/c in Oakland will both conclude long and dedicated service to amateur astronomers.

This year's Amateur Service Award went to **Conrad Jung** of the Eastbay Astronomical Society for his many years of volunteer work at Chabot Observatory. Conrad heads up the Astrophotography Group and spends many evenings with the Junior Astronomers Program. Conrad has won Merit Awards at both AANC and RTMC telescope judging contests. He has also been honored with the Eastbay Astronomical Society's Helen Pillans Service Award and the WAA Service Award.

Carter Roberts of the Eastbay Astronomical Society was given the Two Left Feet Award for having fallen not once, but twice, down the steps that he built on the east side of the observatory.

In the AANC Gastronomical Contest featuring interesting edibles with the most interesting astronomical themes, the winners included **Jeremy Reynolds** of the EAS, for his Divinity Moon Rocks, and **Kathy's Creative Cakes** (EAS) for Saturn Cake with Colorful Rings.

For AANC, **Don Stone** represents EAS; and he is both their Treasurer and Editor of their newsletter. **Alan Gorski** is President of the Association.

Deadline for the January issue of *The Refractor* is December 17, 1993. Items may be submitted by mail to the editor, Ellis Myers, 215 Calle La Mesa, Moraga, CA 94556 or by fax to (510) 841-1329. Files on disk should be ASCII PC format, for 3.5-inch 1.4M or 5.25-inch 360k. Internet e-mail address is emyers@crl.com. For further information please call (510) 841-5702 (days), or (510) 284-4103 (evenings).

Comet Comments By Don Machholz

Four comets are now visible in our skies, two more were recovered: Periodic Comet Urata-Nijima (1993q): Recovered by Jim Scotti of Kitt Peak, this comet will remain faint. The orbital period is 6.6 years. Periodic Comet Spitaler (1993r): Jim Scotti at first thought that this was a discovery of a new comet. However, upon his suggestion, this is now proven to be Periodic Comet Spitaler, lost since discovery in 1890. Its 7.1 year orbit has brought it to perihelion 13 times since then. It is expected to remain faint.

Date (00 UT)	R.A. (2000)	Dec.	Elong.	Sky	Mag.
Comet Mueller (1993a)					
11-29	20h31.8m	+46~30'	89~	E	8.8
12-04	20h41.5m	+41~54'	85~	E	8.8
12-09	20h50.2m	+37~39'	81~	E	8.9
12-14	20h58.3m	+33~46'	76~	E	8.9
12-19	21h05.7m	+30~15'	72~	E	9.0
12-24	21h12.8m	+27~04'	67~	E	9.0
12-29	21h19.5m	+24~13'	63~	E	9.1
01-03	21h25.9m	+21~40'	58~	E	9.2
Comet Mueller (1993p)					
11-29	22h54.4m	+10~49'	101~	E	10.8
12-04	22h52.4m	+07~41'	95~	E	10.7
12-09	22h51.3m	+04~45'	89~	E	10.6
12-14	22h51.0m	+02~01'	83~	E	10.5
12-19	22h51.6m	-00~30'	77~	E	10.5
12-24	22h52.8m	-02~50'	71~	E	10.4
12-29	22h54.7m	-05~00'	66~	E	10.2
01-03	22h57.1m	-07~02'	60~	E	10.1
Periodic Comet Encke					
11-29	22h40.4m	+07~29'	97~	E	10.9
12-04	22h36.3m	+06~36'	91~	E	10.8
12-09	22h33.3m	+05~51'	85~	E	10.6
12-14	22h31.3m	+05~12'	80~	E	10.4
12-19	22h30.2m	+04~38'	74~	E	10.2
12-24	22h29.6m	+04~08'	69~	E	9.9
12-29	22h29.5m	+03~40'	64~	E	9.6
01-03	22h29.4m	+03~12'	59~	E	9.
Periodic Comet Schwassmann-Wachmann 2					
11-29	08h34.3m	+16~28'	120~	M	11.6
12-04	08h37.5m	+16~22'	124~	M	11.5
12-09	08h40.1m	+16~20'	129~	M	11.4
12-14	08h41.8m	+16~21'	134~	M	11.4
12-19	08h42.8m	+16~26'	138~	M	11.3
12-24	08h43.0m	+16~35'	144~	M	11.2
12-29	08h42.4m	+16~48'	149~	M	11.1
01-03	08h41.1m	+17~05'	154~	M	11.1

Comet Mueller

A possible target for observational astronomers this month is Comet Mueller (1993a), as it courses across the northern sky. Discovered at Palomar Observatory last January, the comet will reach perihelion next January 8. But the comet will get no closer to the Sun than about 180,000,000 miles, and right now it's about as close to Earth as it will get. Observers report it to be about ninth magnitude, though there has not been any mention of a tail. The comet is high in the northwest after darkness, so look for it when the Moon's phase is favorable. Coordinates are given in the accompanying article.

CHABOT PUBLIC PROGRAMS

There will be no public planetarium programs on 24 December or 31 December but there will be a final showing of *The Star of Bethlehem* on 25 December and *Galaxies* will be presented on 1 January 1994. Both programs are at 7:30 p.m.

106th ASP Meeting

The 1994 meeting of the Astronomical Society of the Pacific will be hosted by Lowell Observatory and Northern Arizona University at Flagstaff, Arizona, beginning June 25. The meeting will coincide with the 100th Anniversary Celebration of Lowell Observatory.

The first two days will feature public talks, exhibits and a star party, under the title Universe '94. This will be followed by two days devoted to a Teachers' Workshop. The Scientific Symposia are scheduled for June 28-30 with discussions related to "Completing the Inventory of the Solar System" and "Multiple Telescope Robotic Observatories". History Sessions will occur also on June 28-30. Tours around Flagstaff will be available for participants and guests on June 27; and on the following day there will be an Open House at Lowell Observatory.

For further information on this meeting, or for membership, contact the ASP at 390 Ashton Avenue, San Francisco, CA 94112. The telephone number is (415) 337-110, and the fax number is (415) 337-5205.

November EAS Board meeting

Reported by EAS President Carter Roberts

The first hour of the meeting was devoted to a spirited discussion of some ideas presented by EAS member, former Tri-Valley Stargazers President, and present AANC President Alan Gorski under the heading "Toward a Better EAS." Some of the points made were:

- Very few young members are attending our lecture meetings. (In fact, a rather low percentage of members of all ages attend.)
- Need advertising of lectures and events.
- Lectures should start and end earlier and have a break for socializing.
- Continue improving *The Refractor*—include information about short presentations at the beginning of the meetings and give more information about ongoing activities.
- Send out a well thought out questionnaire every year and publish the results.
- Institute a Family membership.
- Consider having members vote on dues structure.
- Increase the use of the telescopes at Chabot by EAS members.

The Board supported most of his proposals and suggestions and also realized that too much work was presently being done by too few people and that additional help would be required to implement his suggestions. Mike Reynolds volunteered to organize the first picnic and star party at the new Chabot site. Alan Gorski agreed to prepare a questionnaire which will be given to everyone attending the Annual Dinner. Next year we hope once again to send out a questionnaire at renewal time. Dave Rodrigues volunteered to send out some publicity. The Board passed a motion to provide for a family membership. At the December Board meeting we will work out the change of wording that will be required in our constitution to implement it. Members will be asked to vote at the 8 January 1994 lecture meeting on this change and also to replace Chabot Science Center with Chabot Observatory & Science Center in the constitution. A motion was approved to list the members who are authorized to provide telescope training and authorization in *The Refractor*. It was agreed that, beginning in January, the lecture meetings would begin at 7:30 p.m. and would be re-organized to provide a break before the main speaker. We would welcome additional suggestions from members. For the last decade, the old Lecture Room in the Chabot Observatory has housed various computers including the PDP 11/24 computer which EAS has been using to support the relocation effort, put out the Bulletin, and for administrative work. Recently Mike Reynolds requested the use of that room to provide additional offices, room for 7 or 8 Macintosh computers to be used by the public on Friday and Saturday evenings and by staff at other times, and space for a table for small staff meetings. The EAS Board voted to clean the room out and turn it over to the COSC prior to 1 January 1994. The Board also authorized disposition of most of the computer equipment presently in the old Lecture Room with the exception of the PDP 11/24 and possibly some other equipment which will be moved into the Sliding Roof Classroom. I wish to thank Alan Roche for his work with the computers the last few years.

Endeavour Ready To Go

Technicians at the Kennedy Space Center continue in their efforts to prepare Endeavour for the Hubble Space Telescope servicing mission. Endeavour's STS-61 mission is targeted to launch on December 1, 1993. The seven-member crew is expected to return 11 days later with a landing at the Kennedy Space Center. On November 19, it was announced that a faulty pressure sensor in a wing-flap control likely would not delay launch.

TELESCOPE MAKERS' WORKSHOP

The TMW normally meets every Friday evening from 7 to 10 p.m. in the Physics Lab at Chabot. There will be no meeting on 24 December and perhaps not on 31 December. For information call Paul Zurakowski at (510) 447-6837.

December Election of Officers

At the November meeting, the Nominating Committee nominated Nancy Cox as an addition to the present Board, having already recommended re-election of all the present officers and Board members. They did not find someone to assume the role of Secretary which Betty Neall is presently filling on an interim basis. Nominations have been closed and the election will take place at 8:30

President:
Vice Presi
Secretary: ?
Treasurer: Don S.
Board members: G
Creese, Franklyn Creese
Paul Glanville, Conrad .
Roche, Dave Rodrigues, i

This column is defective.

and Paul Zurakowski. Betty Neall is automatically a member of the Board as the Immediate Past President.

DATELINE DECEMBER

14 1546	Tycho Brahe, born
27 1571	Johannes Kepler, born
25 1642	Isaac Newton, born Lincolnshire, England
16 1857	Edward E. Barnard, born
11 1863	Annie J. Cannon, born, pioneer spectroscopist
21 1968	Apollo 8 launched, first manned spacecraft to orbit the Moon, Frank Borman, William Anders, James Lovell, Jr.
15 1970	Soviet Venera 7 touches down on Venus, first soft landing on another planet
2 1993	Endeavour STS-61, Hubble service mission with Commander Dick Covey, Pilot KenBowersox, Claude Nicollier, Jeffrey Hoffman, Story Musgrave, Tom Akers, Kathy Thornton. Launch is set for 4:57 a.m. EST = 01:57 PST.
6 1993	Last Quarter Moon, 07:49 PST = 15:49 UT
13 1993	Geminid Meteor Shower peak
13 1993	New Moon, 01:27 PST = 09:27 UT
20 1993	First Quarter Moon, 14:26 PST = 22:26 UT
21 1993	Winter Solstice, 12:26 PST = 20:26 UT
25 1993	Christmas Day
28 1993	Full Moon, 15:05 PST = 23:05 UT

UPCOMING EVENTS

4 December. EAS Lecture: **The Edge of the Solar System** by **Dr. Jane Luu,** Stanford University

10 December. EAS Board Meeting

8 January. EAS Lecture: Speaker to be announced. Please note that this will be the second Saturday in January, owing to the New Year holiday. Please note also, that our new starting time will be 7:30 p.m.

14 January. EAS Board Meeting

29 January. NCHALADA Discussion

26 February. EAS Annual Banquet

16 April. Astronomy Day

Eastbay Astronomical Society, Inc.
4917 Mountain Boulevard
Oakland, CA 94619

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