



# The Refractor

*The Bulletin of the Eastbay Astronomical Society*

Founded in 1924 at Chabot Observatory, Oakland, California

Volume 73  
Number 9  
May 1997

## The Whole Shebang: A State of the Universe Report

Saturday, 10 May

6:00 p.m., Dinner 7:00, Awards and Lecture 8:30

San Lorenzo Community Church  
945 Paseo Grande, San Lorenzo

### Dr. Timothy Ferris

*University of California, Berkeley*

After a sumptuous banquet, grab an extra cup of coffee, settle back, and listen as Dr. Timothy Ferris will explain all about *The Whole Shebang!*

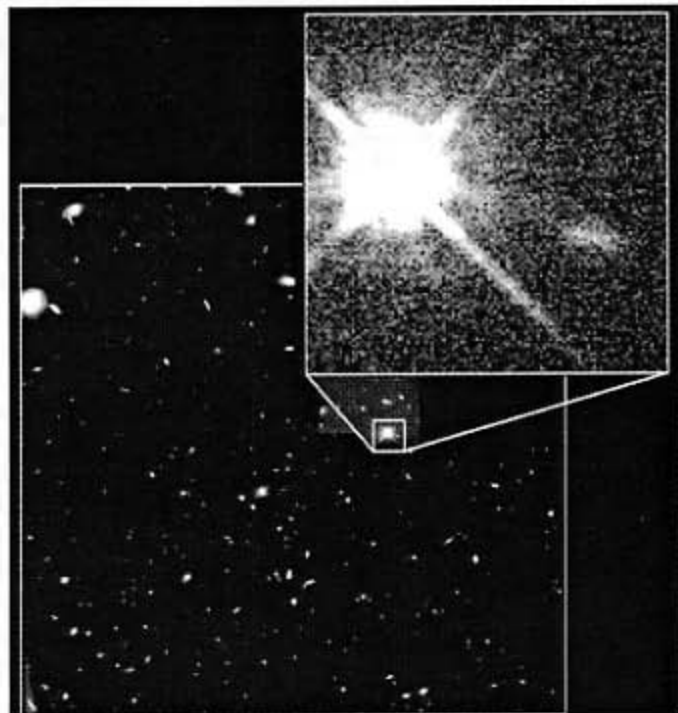
Timothy Ferris is currently emeritus professor at the University of California, Berkeley. Author of the bestsellers *Galaxies*, *Coming of Age in the Milky Way*, and *The Mind's Sky*, as well as other books, his ninth book, *The Whole Shebang*, is being published by Simon & Schuster.

Born in Miami, Florida, Ferris was educated at Northwestern and Rutgers and worked as a reporter and editor for the *New York Post* and *Rolling Stone*. He was a professor of English at Brooklyn College. He taught both writing and the history of science at USC before he came to Berkeley. He is a regular contributor to *The New Yorker*, and he writes a column for *Scientific American* magazine. His books have been nominated for the National Book Award and the Pulitzer Prize.

Ferris has been active in television since the age of seventeen, when he had a weekly show on a network affiliate in Miami. He wrote and narrated *The Creation of the Universe*, an award-winning 90-minute PBS special that has been called "the best science documentary ever made." He has been an essayist for *The MacNeil/Lehrer News Hour* and a commentator for National Public Radio's *All Things Considered*.

Ferris produced the Voyager audio-video record, an artifact of human civilization containing music, sounds of Earth and encoded photographs launched aboard the Voyager interstellar spacecraft. He serves as a consultant to NASA on long-term space exploration policy, and was among the journalists selected as candidates to fly aboard the Space Shuttle in 1986.

Ferris has received the American Institute of Physics prize, the American Association for the Advancement of Science prize, and a Guggenheim Fellowship. He was the 1986 winner of the Klumpke-Roberts Award of the Astronomical Society of the Pacific. This prestigious award recognizes outstanding contributions to the public understanding and appreciation of astronomy. Other Klumpke-Roberts Award winners have included Isaac Asimov, Carl Sagan and Patrick Moore.



A NASA Hubble Space Telescope image of the farthest cluster of galaxies in the universe, located at a distance of 12 billion light-years. This image is a remarkable glimpse of the primeval universe, as it looked about two billion years after the Big Bang. The cluster of 14 galaxies (other objects are largely foreground galaxies) lies in front of a quasar in the constellation Sculptor. Presumably the brilliant core of an active galaxy, the quasar provides a beacon for searching for primordial galaxy clusters. The image was taken on September 6, 1994, with the Wide Field and Planetary Camera-2. The 4.7-hour exposure reveals objects down to 28.5 magnitude. The enlargement shows one of the farthest normal galaxies yet detected, (blob at center right). The galaxy lies 300 million light-years in front of the quasar (large white blob and spike on left side of frame) and was detected because it absorbs some light from the quasar. The galaxy's spectrum reveals that vigorous star formation is taking place.

On moonless nights, Professor Ferris searches for extragalactic supernovae from Rocky Hill observatory, which he designed and built, in Sonoma County, California.

No better description of Timothy Ferris's intellect can be found than in his own words: "Each human mind is a galaxy of intelligences, wherein shines the light of a billion stars."



## Virgo

second largest of all the constellations, lies to the south of the Herdsman, Bootes, in an area of the sky that Edwin Hubble called the "Realm of the Nebulae." Indeed, located within the triangle bounded by Spica, Denebola in Leo, and Arcturus in Boötes are hundreds of bright galaxies, members of the Coma-Virgo Cluster. Among these are the twin elliptical galaxies M84 and M86, which Conrad Jung has photographed in the accompanying illustration. M84 is the westernmost of the two, and is a round, bright diffuse object, increasing in brightness toward its center. It produced a supernova in 1957, unusual for elliptical type galaxies. M86 is just 17 arcminutes away. This object actually has another elliptical companion that is only about 15th magnitude. In all, Virgo is the home for nine of the Messier objects, including the Sombrero galaxy, which was found by his colleague Mechain after Messier had finished his catalog. It was added to the list as M104 in the year 1784.

In Greek mythology, Virgo is the maiden Astraea, goddess of innocence and purity, who is the daughter of Themis, the goddess of justice. In our drawing, the virgin is at her bath and at peace with nature; her innocence is depicted in the friendship shown her by the birds. In most early cultures, Virgo was almost universally associated with the harvest. The bright star Spica is named for the Latin word meaning wheat. Harvesting of grain was begun when Spica rose just ahead of the Sun. When Vindemiatrix, Mistress of the Vineyard and northernmost of Virgo's stars, first rose before the Sun, this was a signal for the gathering of the grapes.

Few stars in Virgo's coterie are bright. Spica is the major star, while Porrima, Vindemiatrix, Delta Virginis and Zavijava complete the list of stars brighter than magnitude 4. Zaniah is a variable star that shines between magnitudes 3 and 4; it is called by the Chinese Tien Mun, Heaven's Gate. It lies almost exactly on the celestial equator.

Continuing with Chinese lore, we find that the star we know as Spica was the first of the twenty-eight Houses of the Moon, which constituted the Chinese lunar Zodiac. This was the home of the God of Long Life, Shou Hsing. Although a god of the stars, he would come down to Earth at times.



One time, in south China, lived a youth named Chao Yen. His father learned from a fortune teller that his son was slated to die before he reached the age of nineteen. Dismayed when his father told him this news, Chao

Yen, then eighteen, burned incense at the temple and joined with the priests in their chants of worship, but there seemed no hope, because it was told that the span of a man's life could not be changed once it had been written.

Shortly before his birthday, Chao Yen went into the forest to hunt, and he killed two deer with his keen aim with bow and arrow. Lying down to rest under a large oak, he woke to find that nearby were two regally clad men at a table engrossed in a game of chess. Chao Yen listened quietly, and heard the proclamations of the men. "Thirty-eight," said one, "a reasonable life, though not overlong." He wrote something on a tablet and continued the game. "Twenty-three," he called after a few minutes, and wrote again. "Much too short!" After a while, the older of the two men cried "Eighty-nine. That man will be ever thankful to me for a long life."

Chao Yen realized that the two were playing for the lives of humans, and he stepped forward and demanded "Who are you? And what strange game is this?" The younger of the two replied in a friendly manner, "I am the spirit of Pei Tou, the Northern Dipper; and my opponent is Shou Hsing, the God of Longevity, from the southern sky. It is he who fixes the date of a man's birth, and I fix the date of his death."

Chao Yen then pleaded, "You must help me. Could you not play again for my life, for I have been told that I must die before my nineteenth birthday? If you will help, I will be grateful until my last days. I will bring you fine offerings, such as these two deer that I have taken, for I am a good hunter." The two men argued, for the time of life was unalterable, once set. But at last, they agreed to a compromise. Pei Tou said "I cannot possibly erase the characters written in the book of death, nor can we gamble again for the same life, but I can reverse the characters which say "nineteen" (十九) so that they read "ninety" (九十) a life long enough, certainly."

The young man threw himself on the ground, overcome with gratitude and with joy. When he looked up, he was alone. Even his deer were gone, and he knew then that the gods had taken them in token. As darkness came Chao Yen looked up and saw the stars of Shou Hsing shining brightly, and in the north the seven stars of Pei Tou were splendid.

The constellation of Virgo is also the location of the brightest known quasar, 3C273 Virginis, which was instrumental in the discovery of these objects in the early 1960s. At 13th magnitude it should be possible to find with a telescope of above eight inch aperture. Lying three billion light years away, it is likely the most distant object amateurs will see in their telescopes.

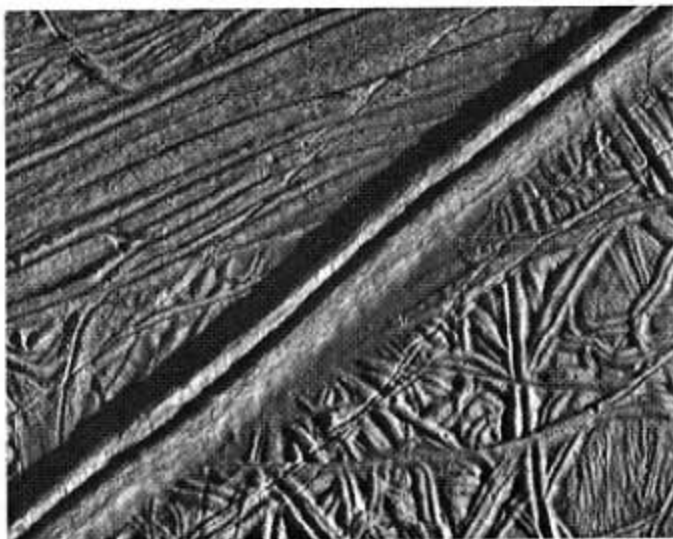
## Roberts Rules

By Carter Roberts

We are looking forward to the 73rd Anniversary Dinner this month. You are all encouraged to come for this occasion to enjoy a companionable and complete banquet. You'll want to hear Dr. Timothy Ferris, one of the most prominent speakers we've had in a great while, give a State-of-the-Universe Report.

The peak performance of Comet Hale-Bopp led to an unusual public awareness of celestial activity and an unusually fine time for Astronomy Day on April 12. I'd like to thank all EAS members who helped make our part in this public outreach work so well.

On 1 April (no fooling!) Observatory Consultant Walter Sigmund from the University of Washington spent the day in Oakland. After a tour of the present facility he was shown where the telescopes are to be located at the new site. The rest of the day was spent in discussion with representatives of COSC staff, the Architecture Committee and the architects. Topics discussed included air flow approaching, around and within the telescope enclosures, positioning of telescopes within the domes, materials for use for the telescope enclosures and considerations for landscaping. It has long been planned to make the rooms for the two refractors look as much as possible like something from the 19th or early 20th centuries. One suggestion has been that the interior walls be like those at the present site but without the ugly paint job. Sigmund indicated that thermally this was the best possible choice. The plan, at present, is to do that and provide ventilation with wooden framed windows and perhaps slats that can be opened to permit air to move more freely past the telescopes. The 16-ft high retaining wall between the two telescopes will either be eliminated or moved far enough northeast that air can flow freely around the outside of the telescope enclosures. Another recommendation was that the telescopes be located as high as possible within the domes. Since the dome for Rachel will be 45 feet in diameter as compared to the present 40 feet, Mike Reynolds and I have figured how much we can lower the top of the dome to accomplish this and also reduce the obstruction for the 36-inch telescope. We believe we have reduced the obstruction to a maximum of about 23 degrees. It will not be possible to position Leah high within the dome since the committee members voted 3 (Mike, Jose, Terry) to 1 (me) to buy a new 24-foot dome, and positioning the dome low enough relative to floor level would not leave enough clearance for a legal doorway. The exact positioning of that dome will be determined once the dome makers submit the specifications. In summary, a tremendous amount of progress has been made. The changes need to be approved by the COSC Board at their next meeting. The concern now is that someone will decide these modifications will cost too much or delay the project too much as COSC rushes toward construction. All the money from the Air Force grant must be spent by 30 September 1999. Most of these changes wouldn't have been changes if the architects and the committee members had just listened to what they were told many months ago. This illustrates the problem of designing by committee where many committee members don't understand what needs to be considered. More than 5 years ago we said that the architects needed an observatory expert. Finally there is one.



## Tantalizing New Images

and data indicate Europa has a thin ice crust covering either liquid water or slush. Scientists are intrigued by the prospect that a slushy concoction of chemicals could nurture life.

This view of the icy surface of Jupiter's moon, Europa, is a mosaic of two pictures taken by the Solid State Imaging system on board the Galileo spacecraft during a close flyby of Europa on February 20, 1997. The pictures were taken from a distance of 2,000 kilometers (1,240 miles). The area shown is about 14 kilometers by 17 kilometers (8.7 miles by 10.6 miles), and has a resolution of 20 meters per pixel. Illumination is from the right (east). The picture is centered at about 14.8 north latitude, 273.8 west longitude, in Europa's trailing hemisphere.

One of the youngest features seen in this area is the double ridge cutting across the picture from the lower left to the upper right. This double ridge is about 2.6 kilometers wide and stands some 300 meters high. Small craters are most easily seen in the smooth deposits along the south margin of the prominent double ridge, and in the rugged ridged terrain farther south. The complexly ridged terrain seen here shows that parts of the icy crust of Europa have been modified by intense faulting and disruption, driven by energy from the planet's interior.

### Eastbay Astronomical Society

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Immediate Past President:	Betty Neall, <i>ex officio</i>	(510) 533-2394

Articles and photos for *The Refractor* are encouraged. Deadline for the June issue is May 28, 1997. Items may be submitted by mail to the editor, Ellis Myers, 215 Calle La Mesa, Moraga, CA 94556. Internet e-mail address: emyers@a.cri.com. For further information please call (510) 284-4103.

WorldWideWeb: <http://www.cosc.org> or <http://home.earthlink.net/~jpreston/eas/>



## Different Scopes for Different Folks

is the theme for the 1997 Riverside Telescope Makers Conference, an annual event since 1969 that has become a way of life for thousands of amateur astronomy aficionados across America. This year's meeting will be from Friday, May 23, through May 26. As always, the emphasis of this gathering will be innovations and expertise in the design and construction of optics for the pleasure of seeing into worlds beyond ours. Of special interest will be the awards of merit for telescopes built by participants. This year's keynote speaker is the publisher of *Sky & Telescope*, Rick Fienberg, who will discuss "Amateur Astronomy in a Wired World: How the Internet is Changing Our Hobby."

The location for this event is Camp Oakes, a YMCA camp east of Big Bear City, 50 miles northeast of Riverside in the San Bernardino mountains. The site, at an elevation of 7600 feet offers space for camping and includes dormitories, shelters, a meeting/dining hall, and the Charles Walker Observatory.

A feature of this 29th annual conference will be a repeat of the Beginner's Corner, which will provide an excellent opportunity for the novice to learn about telescope making through talks and workshops. A feature



from last year's event is not expected to be repeated. That is the snowstorm that caught people off guard and dumped as much as two inches of snow overnight. There will be an impressive array of speakers and much to interest the expert. There will also be a host of commercial exhibits, as well as a swap meet.

Registration fees will increase on May 1. For further details, contact Wayne Johnson, 21870 Mary Street, Perris, CA 92570, (909) 653-8813. Registration forms and brochures may be had from EAS President Carter Roberts.

## Expanding Your Horizons

By Louise Predovic

On March 1st of this year, Margaret Elmer, Karen Hee, and Louise Predovic spent an enjoyable but hectic day working with NASA at the Pacific Bell facility in San Ramon. 630 young ladies in the 6th through 12th grade were enrolled in the program *Expanding Your Horizons*. We presented the Star Lab program, a lecture on our nearest neighbor, the Moon. This also included a hands-on experiment to explore the formation of craters on the Moon. Inside the Star Lab we explored the Moon phases and had a slide show using Voyager's pictures of the Earth and Moon in space. We were fortunate in having Mr. Tartar, the director of NASA, stop by. Margaret, Karen, and I received such rave reviews from the more than 100 students attending our program we were asked to return next year.

## Fremont Peak Photo? By Robert Hoyle

Ranger Rick Morales at Fremont Peak is requesting that we put out the word to the astronomy community to ask if anyone has a fairly recent photo (print or slide - maybe even CCD) taken at Fremont Peak (preferably, from the area around the 30"



*Photograph from Fremont Peak, 13 October 1996, looking south. The field of view is about 25 degrees high and shows the light-pollution problem brought about by the lights of the Soledad Prison complex 22 miles away. 50-mm lens, f/2.8, 3 minutes on hypered Ektachrome (ISO 800).*

telescope) of the southern horizon, looking almost due south toward the Soledad prison, before the new one came on line (about last April 1996). Rick's supervisor wants to talk to the prisons - on a State Department of Parks, to State Department of Corrections basis - about the effect of their light pollution on the Peak, and she thinks that a "before" photo

would be persuasive in this effort. What would be best is a "wide angle" shot with something like a 28mm to 50mm lens, or so, and a two to five minute exposure showing the relative lack of skyglow in that region before the new prison was built. Of course, we'll take what we can get, though, if this preferred type is not available. But surely someone has taken such a "piggy-back" photo of, say, the lower Scorpius region that would cover this prison area. If we can get a good "before" shot, we can then duplicate this for an "after" shot - and use these to show the prison officials what an effect their lights have had on the night sky at the Peak. It might really make a difference in winning the cooperation of prison officials to do something about their lights. You can send photos directly to Rick at: Rick Morales, Fremont Peak Observatory Association, P.O.Box 787, San Juan Bautista, CA 95045. Or call him at: (408) 623-4255.

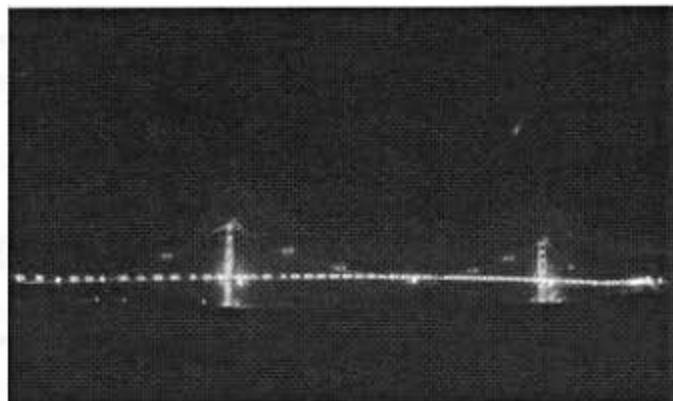


## Comet Comments *by Don Machholz*

Comet Hale-Bopp will be leaving the evening sky in early May as it moves south of the Sun. Southern Hemisphere observers will have some difficulty seeing it until it reappears in their morning sky in July. It also moves south of the ecliptic, where it will remain for the next 2400 years. This will be the last view most Northern Hemisphere observers will have of the comet, although those in mid-northern latitudes will be able to see it again this October and again in February 1998. More about that then.

Periodic Comet Tempel-Tuttle (= 55P = P/1997 E1) was recovered on March 4 by Karen Meech *et al.* using the Keck II 10-meter reflector in Hawaii. This comet is responsible for the Leonid meteor shower which occurs every November. It should be visible in amateurs' scopes late this year, passing 0.36 AU from us early next year. By then it will be visible in binoculars in the northern polar region..

Date (00UT)	R.A. (2000)	Dec.	Elong.	Sky	Mag.
<b>C/1995 O1 (Hale-Bopp) [Taurus]</b>					
04-27	04h27.2m	+28°34'	33°	E	-0.1
05-02	04h44.2m	+25°23'	31°	E	-0.4
05-07	04h59.2m	+22°25'	29°	E	-0.1
05-12	05h12.4m	+19°38'	28°	E	0.1
05-17	05h24.3m	+17°02'	26°	E	0.4
05-22	05h35.1m	+14°35'	24°	E	0.7
05-27	05h45.1m	+12°17'	23°	E	0.9
06-01	05h54.4m	+10°05'	22°	E	1.2
06-06	06h03.2m	+07°59'	22°	E	1.5
<b>46P/Wirtanen [Auriga]</b>					
04-27	05h38.6m	+29°17'	49°	E	11.3
05-02	06h02.5m	+29°54'	49°	E	11.5
05-07	06h25.7m	+30°14'	49°	E	11.7
05-12	06h48.4m	+30°18'	50°	E	12.0
05-17	07h10.4m	+30°08'	50°	E	12.2
05-22	07h31.6m	+29°46'	49°	E	12.4
05-27	07h52.0m	+29°13'	49°	E	12.7
06-01	08h11.4m	+28°31'	49°	E	12.9
<b>81P/Wild 2 [Cancer]</b>					
04-27	09h04.2m	+19°32'	96°	E	10.3
05-02	09h15.7m	+18°50'	94°	E	10.3
05-07	09h27.4m	+18°02'	92°	E	10.4
05-12	09h39.5m	+17°10'	90°	E	10.4
05-17	09h51.8m	+16°13'	88°	E	10.5
05-22	10h04.3m	+15°11'	87°	E	10.6
05-27	10h16.9m	+14°05'	85°	E	10.6
06-01	10h29.6m	+12°55'	84°	E	10.7



Carter Roberts captured this view of Comet Hale-Bopp above the Golden Gate Bridge during the week of April 1.

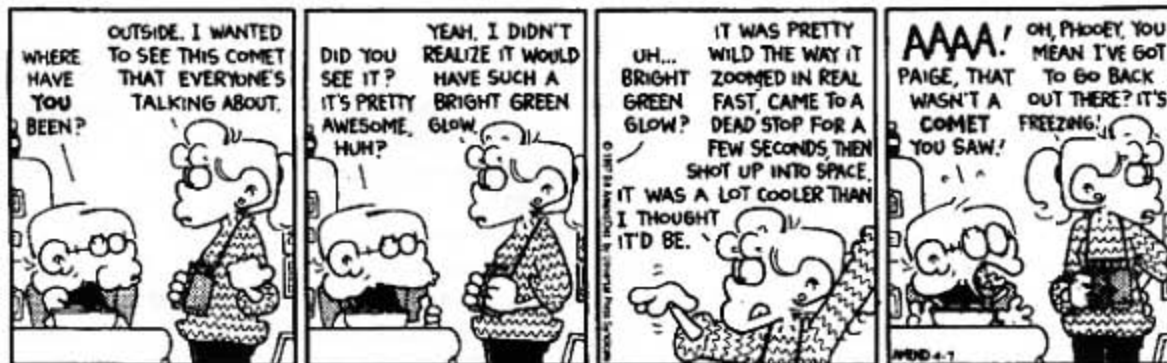
This Conrad Jung photo of Comet Hale-Bopp was taken on April 9, 1997, with a 300-mm lens at f/2.8 for a guided 10-minute exposure. Notice the bifurcated appearance of the ion tail.

The original photo is striking for the colors that define the blue ion tail in contrast to the buff-colored dust tail and the brilliant white coma. In a companion photo taken a week earlier, the dust tail shows a filamentary structure.



From a dark wilderness site at Carrizo Plain Natural Area in eastern San Luis Obispo County, Ellis Myers photographed Hale-Bopp on April 5. This was a 30-second exposure on Kodak Royal Gold 1000, using a 210-mm lens at f/4.

FOXTROT



## DATELINE MAY

- 5 1961 Freedom 7 (Mercury), first American in space,  
Alan Shepard, suborbital
- 30 1966 Surveyor 1 launched,  
first American soft landing on the Moon
- 30 1971 Mariner 9 launched, first Mars orbiter
- 14 1973 Skylab, first American space station, launched
- 4 1997 Lunar occultation of Saturn, 06:51 PDT
- 6 1997 New Moon, 13:48 PDT - 20:48 UT
- 14 1997 First Quarter Moon,  
03:56 PDT - 10:56 UT
- 22 1997 Full Moon, 02:15 PDT - 09:15 UT
- 29 1997 Last Quarter Moon, 00:52 PDT - 07:52 UT

### Eastbay Astronomical Society

#### Annual Banquet

Saturday, May 10, 1997  
San Lorenzo Community Church

**Dr. Tim Ferris**

**The Whole Shebang: A State of the Universe**

### Junior Astronomers

First and third Fridays, 7 - 9 p.m.

For information call Mrs. Louise Predovic, (510) 523-1096.

**Students, grades 4 through 6**

## FUTURE CONJUGATIONS

- 8 May. EAS Board meeting.
- 10 May. EAS Annual Banquet.  
San Lorenzo Community Church.  
Doors open at 6:00 p.m.  
Dinner at 7:00 p.m.  
Awards and lecture about 8:30 p.m.  
Dr. Timothy Ferris  
The Whole Shebang
- 23-26 May.  
Riverside Telescope Makers Conference
- 14 June. EAS meeting.
- 27 June. ASP 109th Annual Meeting. Chicago.  
Expand Your Universe.
- 2 August. Star-B-Que. Fremont Peak.
- 7 August. EAS/EBRPD Star Party.  
Bort Meadows

### Rotary-Chabot Planetarium Shows

Fridays and Saturdays, 7:30 p.m.

For information and show schedule, call (510) 530-5225.

**Comets of the Century** extended through May 10



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