



# The Refractor

*The Bulletin of the Eastbay Astronomical Society*

Founded in 1924 at Chabot Observatory, Oakland, California

Volume 75  
Number 7  
March 1999

## From Flagstaff to the Moon: The Gene Shoemaker Story

**Dr. Carolyn Shoemaker**

*Lowell Observatory*

**Saturday, 6 March, 1999**

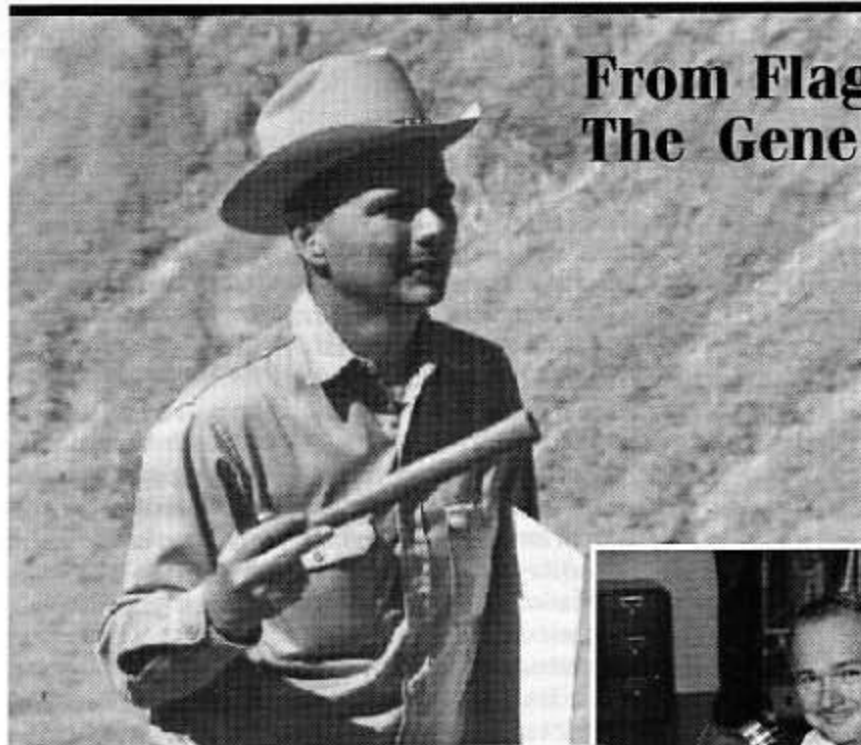
• 6:00 pm – Doors open

• 7:00 pm – Dinner

• 8:30 pm – Awards and talk

**San Lorenzo Community Church**

945 Paseo Grande, San Lorenzo, California



**Eugene M. Shoemaker**

April 28, 1928 – July 18, 1997



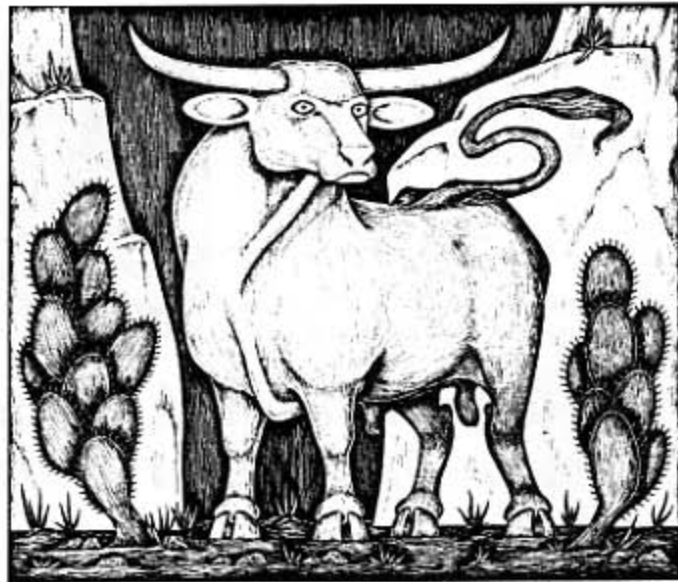
**The 75th Anniversary  
of the Eastbay  
Astronomical Society**

One of the most historic meetings in the 75 years since the founding of the Eastbay Astronomical Society will be the Banquet and Awards Celebration on March 6. Our speaker will be the eminent Dr. Carolyn Shoemaker, discoverer of more comets than anyone else in history. She will tell—for the first time—the remarkable and humorous story of her husband, Dr. Eugene M. Shoemaker, one of the most able scientists of the twentieth century. Intimately involved with almost every aspect of her husband's work for the last thirty years, no one is better able to tell this incredible story—and we'll be the first to hear her tell it!

Everyone knows of their codiscovery with David Levy of the "String-of-Pearls" comet that bears their names, Comet Shoemaker-Levy 9. This event in 1994 captured the popular imagination and inspired many future scientists.

But did you know that Gene Shoemaker was the founder of the discipline of Astrogeology? That he was slated to be the first scientist in history to walk on an extraterrestrial body and was measured for a space suit before a medical condition tragically cut off this lifelong dream of his? That he found the proof that various geologic features on Earth were formed by comets and asteroids hitting the earth? That he was the lunar geology teacher for the Apollo astronauts who walked on the moon? That he helped choose their landing sites? That he was given the National Medal of Science by President Bush in the White House Rose Garden in 1992 (Notice his trademark bolo tie)? That he was the science advisor for the movie "Deep Impact"? These and many more amusing snippets will delight you.

*Continued on page 3*



## Taurus, the Bull

is nicely placed for viewing in the early evenings in March. Home to the open clusters of the Pleiades and the Hyades, the constellation claims two first-magnitude stars, Aldebaran, which marks the red eye of the Bull, and El Nath, at the tip on one of the horns. The Crab Nebula is here, too.

*[Editor's note: The following story is R-rated for violence. Parental guidance is suggested.]*

Minerva, daughter of Jupiter and goddess of wisdom, presided over the useful and decorative arts; agriculture and navigation of men; and spinning, weaving and needlework of women. King Cecrops had named the city of Athens for her (her Greek name was Athene), and it was there that Minerva kept counsel. One of her mortal subjects in the city of Athens, Arachne, had mastered the skill of embroidery to such a high level that even the nymphs would come to admire her work. Arachne thought her work to be the equal to Minerva's, and challenged the goddess to a contest.

Minerva created a tapestry of great power, representing Jupiter and Neptune in a central circle, with the four corners illustrating scenes of the displeasure of the gods at such presumptuous mortals who dared contend with them. These were meant to discourage her rival before it was too late.

Arachne chose to depict subjects showing the failings and errors of the gods. It was in one of these scenes that the story of Jupiter's seduction of Europa, Princess of Phoenicia, was stitched. Jupiter had assumed the form of a snow-white bull with golden horns and enchanted the young girl to mount his back, whereupon he dashed into the sea and swam with her to Crete. There he revealed himself as Jupiter, king of the gods, and claimed her as his bride. Arachne's embroidery was so fine that the nymphs thought the scene to be real. Europa seemed to look back to shore with longing eyes to summon her friends for help.

Minerva sensed that Arachne was superbly skilled, beyond even her own abilities, and she could not tolerate it. She slashed the piece to ribbons, and she berated the girl, making her feel the guilt of her actions. Arachne could not endure the shame and she went and hanged herself.



*In 1758, the famous French comet hunter Charles Messier observed a fuzzy patch of light near the star Beta Tauri. The spot did not move, and Messier began a catalog of such objects in order that he and other observers should not confuse them for comets. So M1 is the first of the deep-sky objects in his list of 45 that was published in 1771. By 1781 his list had grown to 103, and with later additions the Messier Catalog now stands at 110. This photo of M1, the Crab Nebula, is by Conrad Jung.*

Minerva found the girl suspended from the rope and took pity on her, restoring her to life. But as a punishment for her presumption, she sprinkled Arachne with potent juices which caused her hair to come off and her body to shrink. Her fingers moved to her sides and served for legs. Her body remained suspended from the silken rope. Her descendants are known as arachnids, and they are often found spinning and weaving their exquisite designs.

So, Taurus is Jupiter in the guise of the Bull, according to Roman and Greek lore. The constellation was called the Bull by virtually all of the ancient civilizations.

Four thousand years ago, the Sun was in this constellation at the time of the spring equinox—New Year's Day for many peoples—and the most important date in the year, marking the time for plowing and planting. Taurus was the first sign of the Zodiac. To the Hebrews the constellation was known as Aleph, the first letter of their alphabet.

Early in the 18th century a small patch of light was discovered by John Bevis. It was rediscovered in 1758 by Charles Messier, and it is the first in Messier's catalog of nebulous objects. In 1844 the Earl of Rosse observed and sketched the object and named it the Crab Nebula. Known as Taurus A to radioastronomers, in 1948 it became the first radio source to be identified with a known visible object. This was accomplished by an unusual method by John Bolton. He constructed a special radio telescope set facing the sea and located on a high cliff-top. By receiving radio signals directly from the Crab Nebula and by reflection from the sea, he was able to achieve the same precision as a single radio telescope whose diameter is twice the height of the cliff.

A second Messier object in Taurus is the Pleiades cluster, M45. Many know this beautiful grouping of stars as the Seven Sisters. Myths of many cultures have been told. Some were presented in the February, 1996 issue of *The Refractor*.

## The Helen M. Pillans Award

The Helen M. Pillans Award is given annually to an individual or nonprofit institution that has been of distinguished meritorious service to the amateur astronomical community. This award is given in Helen Pillans' memory to honor the nominee for having given so much to extend the boundaries of astronomical enjoyment to all living within our geographical region.

Past recipients of this Eastbay Astronomical Society award include the original honoree, Dr. Helen Pillans, a longtime teacher of astronomy, in 1983. In 1984 the award was given to Kingsley Wightman, teacher at Chabot from 1948 until 1994 and first Director of the Rotary Chabot Planetarium. Walter C. Marion, founder of the EAS telescope maintenance group, and Betty Neall, longtime EAS Board member serving the EAS in many capacities for over fifty years, were honored in 1985 and 1986. The eminent John Dobson, popularizer of "Sidewalk Astronomy" and the Dobsonian telescope which he designed, was recognized in 1988. In March, 1989 the award went to Wes Hearther, who developed many unusual telescope designs that preceded those in use today. Anne Creese was honored in 1990 for her work with the Burns Library of the EAS. Don Stone, EAS treasurer and six-time president of AANC, was presented with the award in 1991. In 1992 and 1993, the accomplished astrophotographer and teacher of young people at Chabot Observatory, Conrad Jung, and Paul Zurakowski, leader of the Telescope Makers' Workshop, were presented with the Pillans Award. The winner in 1994 was Dr. Terry Galloway, who for almost 25 years spearheaded the Chabot Relocation Project.

Robert Schalck organized and carried out the cleaning and testing of Rachel's lenses when repairs were necessary. He provided a 12.5-inch telescope to the Philippine Astronomical Society which was the largest telescope then in the Philippines. For this and for his two decades of service to the Chabot Telescope Makers' Workshop and the Riverside Telescope Makers Conference, for nine years as EAS Director of Instruments, and for his service as EAS President and Archivist, Bob was granted the award in 1995.

In 1996, 1997, and 1998, the Pillans Award was presented, respectively, to Dr. John W. Westfall, former Director of the Association of Lunar and Planetary Observers; to Carter W. Roberts for his unstinting efforts as AANC's Astronomy Day coordinator, for his work in promoting safe eclipse viewing, for his major role in refurbishing the Chabot telescopes, and for his service as president of EAS; and to Kevin Medlock, for his wondrous years of service to the amateur astronomical community. Kevin, along with his wife, Denni, cofounded the Fremont Peak Observatory Association, helped the EAS maintain the Chabot telescopes, and started the on-going Large Amateur Telescope project to build a 70-inch amateur telescope.

The Helen Pillans Award pays tribute to the many people who have given their time and expertise to those of us who pursue the avocation and science of astronomy. The Award ceremony also provides an opportunity to point out that astronomy is an unbounded adventure for the youth of our community, worthy of the full support of the members of the Eastbay Astronomical Society.

Many legendary speakers have been heard at EAS over the past 75 years. Carter Roberts and Don Stone have listed a selection of these scientists, including Fred Whipple in 1930, Gerard Kuiper in 1934, Otto Struve in 1951, Clyde Tombaugh in 1989, Charles Townes in 1992, and Gene Shoemaker in 1994. Carolyn Shoemaker will join this impressive roster of prominent speakers with her appearance at our dinner meeting—a very rare opportunity to hear about someone central to the history of astronomy from someone central to the history of astronomy!

The Eastbay Astronomical Society is pleased to welcome Dr. Carolyn Shoemaker as our featured guest in celebrating 75 years as an organization devoted to the wonders and mysteries of the universe. EAS is also pleased to present the Helen Pillans Award to Denni Medlock. Her untiring efforts have guaranteed that amateur astronomers will continue to have access to a broad complement of facilities for their enjoyment of the sky.

## Comet Comments by Don Machholz

Comet Linear (1998 M5) moves past the North Celestial Pole while Comet Williams fades in our evening sky. Periodic Comets Jager and Harrington-Abell remain near each other in our Winter Milky Way.

C/1998 A1 (Tilbrook): Justin Tilbrook of Australia visually discovered this comet on January 12. He was using an 8-inch reflector at 70× to find the tenth magnitude object. Justin was intentionally looking for comets when he found this, his second comet. His first comet find, 18 months ago, was accidental—he was checking out variable stars at the time. Comet Tilbrook is moving away from both the Earth and Sun, and dimming. During late December, while still undiscovered, it passed 30 million miles from us. I swept over it on December 9, when I picked up galaxy NGC 6217 but missed the equally faint comet, a couple of degrees away. Then on January 3, shortly after moonrise, I swept over it when it was near Jupiter in the evening sky. Perhaps it brightened rapidly shortly before discovery.

## The Board of Directors Directs

The following actions were taken at the meeting of the EAS Board of Directors on February 11, 1999.

1. Carter Roberts' position as the EAS representative on the Board of Directors of COSC was extended.
2. The dates for the lecture meetings were set through June as the first Saturday of the month. After July, in order to accommodate observers who wish to take advantage of darker skies around New Moon and who would also like to attend the meetings, the dates will likely shift to the third Saturday of the month. Comments from members are solicited.
3. With Astronomy Day coming May 22, anyone with suggestions for activities should communicate with Carter Roberts.
4. The Board reviewed various landscape designs for the service entrance area at the new COSC site in Joaquin Miller Park. These projects of Merritt College students all paid close attention to the use of California native plants. They were quite diverse in suggesting outdoor recreation areas and parking areas for employees.

Philip Crabbe, *Vice President/Secretary*

## Astronomy! Space! The Future!

Saturday March 27, 1999 in the May Treat Morrison Auditorium and Morrison Planetarium at the California Academy of Sciences, Golden Gate Park, San Francisco

A full day of exciting science for the general public. Includes admission to the Academy and a Planetarium ticket.

**Dr. Alex Filippenko** of UC Berkeley - Einstein's Biggest Blunder? The Case for an Accelerating Universe.

Recognizing that gravity should make the Universe contract, but believing the Universe to be static, Albert Einstein introduced the "cosmological constant" (a long-range repulsive effect) shortly after developing his General Theory of Relativity. When Edwin Hubble discovered that the Universe is expanding, Einstein renounced the cosmological constant, calling it the biggest blunder of his career. Ever since, most cosmologists have assumed that the Universe began in an expanding state (the Big Bang), and that gravity has gradually decelerated this expansion. Recently, however, two independent groups observing very distant supernovae (exploding stars) have found strong evidence that the expansion of the Universe is actually *accelerating* with time! This suggests that the cosmological constant is positive, that the Universe will expand forever, and that space is geometrically flat on large scales. Moreover, the derived age of the Universe is 14 billion years, consistent with the ages of the oldest known stars. Dr. Filippenko will present an overview of the project, its results, and implications. This work was recently voted the "Science Breakthrough of 1998" by Science magazine.

**Dr. Alan Binder** of the Lunar Research Institute and NASA Ames - Our future on the Moon: Does the discovery of ice on the Moon renew our vision of lunar observatories? The latest on the Lunar Prospector Mission in its attempt to determine whether the moon is still geologically active, whether it has a dense core, and whether it contains potentially valuable minerals!

**Dr. Jeff Moore** of NASA Ames - What is the future of Mars exploration and beyond? What might future missions to comets and asteroids reveal?

**Dr. Debra Fischer** of SFSU and Lick Observatory - The Quest for Earthlike planets. New planet discoveries. When will we discover worlds like Earth?

**Dr. Dan Werthimer** of Project Serendip - The Future of SETI.

**Panel discussion:** What are the goals and trends in amateur astronomy? What does the future hold for amateurs? How will we encourage young astronomers? Hear what a panel of prominent amateur astronomers has to say.

Registration fees are: Advance Registration: \$20.00. 10-18 years of age: \$10.00. Registration at the door (all ages) \$25.00. For more information and preregistration Call: Morrison Planetarium Office: (415) 750-7127, 10-6 M-F California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118. Make check payable to Morrison Planetarium and include an SASE.

Bring your own lunch, try the cafeteria, or venture out to a nearby restaurant!

## Project Astro

Be a visiting astronomer in Bay Area schools and community centers in 1999-2000!

The Astronomical Society of the Pacific is seeking amateur and professional astronomers and advanced astronomy students to participate in Project ASTRO, an innovative program that matches amateur and professional astronomers with 4th-9th grade teachers in Bay Area schools and community centers.

Project ASTRO helps astronomers form an ongoing partnership with a teacher. Astronomers with an interest in education and some experience working with children or teens or presenting astronomy to the public are encouraged to apply. Astronomers attend a two-day summer training workshop with their partner teacher, receive a wide variety of activities and resource materials, work together to plan school year activities and programs and commit to make at least four daytime visits during the school year.

During the school year, visiting astronomers (depending on their interests) can help to lead hands-on activities, serve as a resource for teachers, organize evening observing sessions, create a school astronomy club, present auditorium programs, arrange field trips, or assist with science fair projects. The project's emphasis is on a hands-on, inquiry-based approach that research has shown is most effective in helping students learn the process of science.

The 1999-2000 training workshop is scheduled for Saturday, August 7th and Sunday, August 8th at NASA Ames Research Center in Mountain View. Participating astronomers are required to attend all or most of the workshop. Visits will begin in the Fall of 1999.

The first application deadline (for preferred placement) is April 11, although applications will be accepted after this date. To request an application call (415) 337-1100 extension 101 or e-mail [astro@aspsky.org](mailto:astro@aspsky.org). For more information contact Aimee Chang, Bay Area Project ASTRO Coordinator, at the Astronomical Society of the Pacific: (415) 337-1100 ext. 101 or check out their web site at [www.aspsky.org](http://www.aspsky.org).

Project ASTRO is funded by the National Science Foundation.

### Eastbay Astronomical Society

President:	Carter Roberts	(510) 524-2146
Vice President, Secretary:	Phil Grabbe II	(510) 655-4772
Treasurer, Membership:	Don Stone	(510) 733-6738
Board of Directors:	Anne S. Creese	(510) 638-1702
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	Ken Swagerty	(510) 223-6143
	Paul Zurakowski	(925) 447-6837
Immediate Past President:	Betty Neali, <i>ex officio</i>	(510) 533-2394

Articles and photos for *The Refractor* are encouraged. Deadline for the April issue is March 15, 1999. Items may be submitted by mail to the editor, Ellis Myers, 215 Calle La Mesa, Moraga, CA 94556. Internet e-mail address: [cas@silicon.com](mailto:cas@silicon.com). For further information please call (925) 284-4103.

Internet: <http://silicon.com/~eas> • <http://chabot.cosc.org/~eas>

## Roberts Rules

By Carter Roberts

The guest book of speakers at EAS meetings over the last seven-and-a-half decades contains the signatures of an incredible number of famous people. I have entered a selection of these scientists and authors here, and I hope to have a more or less complete list for your inspection at the dinner on March 6. I think you'll be as impressed as Don Stone and I have been in cataloging this roster.

Charles Bender died on December 29, 1998. A longtime fan of the Telescope Makers' Workshop, Charlie usually came with Wes Hearther. We had seen little of him since his move to Valley Springs some years ago but he continued to make donations to the TMW when renewing his EAS membership. We have received a donation from his estate which will be put to a good use.

Mr. David Eakin of Richmond has donated three telescopes and some posters to the EAS. The telescopes are an old-style C-5 with wedge, an Astroscan, and a 4-inch lens with homemade cell in a cardboard tube. The head/drive assembly is from Edmund. The refractor needs some work but the others only appear to need cleaning of the correctors. The posters have not been looked at in detail but include some very nice images.

The 31st annual Riverside Telescope Makers Conference will be held on Memorial Day weekend, May 28-31, 1999 at Camp Oakes near Big Bear Lake northeast of San Bernardino. This is the biggest gathering of amateur astronomers anywhere in California and has lots more than just telescope making. The swap meet on Saturday morning is a great place to unload that astro-junk from your garage or look for that missing piece to your telescope. The numerous vendors have good prices and, in many cases, a way for you to see how their product works out in the real world. The Beginners Corner helps those of all ages get started in astronomy. The Chabot TMW usually has a major presence at this event. The theme for the lectures, "The Moon," will reflect the appearance of the Full Moon on Saturday and the appearance, also, of some major speakers. Registration information is available on the web site at <http://www.rtmc-inc.org> or by calling (909) 948-2205. The RTMC also sponsors an observing weekend at Borrego Springs in the California desert. This year it will be held on September 10 and 11. Registration for "Nightfall" begins in late May and all the air-conditioned rooms are normally sold out by mid-May.

There will be no Telescope Makers' Workshop on Friday, March 19 because the room will be in use for the Science Fair.

1924	Dr. Robert Grant Altken	Associate Director, Lick Observatory	The work of an astronomical observatory
1926	Dr. A.O. Leuschner	Students Observatory, UC Berkeley	The minor planets of the Solar System
1928	Dr. C.Donald Shane	UC Berkeley	Long-period variables
1928	Dr. Donald H. Menzel	Lick Observatory	The spiral nebulae
1929	Dr. Robert J. Trumpler	Lick Observatory	Star clusters in the Milky Way
1929	Prof. Nicholas T. Bobrovnikoff	Lick Observatory	Comets
1930	Dr. Fred L. Whipple	Lick Observatory	Determination of stellar temperatures
1930	Dr. Dorothea Klumpke Roberts	1st Life Member of EAS	Sir William Herschel's 52 diffuse nebulosities
1934	Dr. Gerard P. Kuiper	Leiden Observatory, Holland	Statistical studies of double stars
1937	Dr. Dinsmor Alter	Director, Griffith Observatory	The planetarium in astronomical education
1939	Dr. Nicholas U. Mayall	Lick Observatory	The globular clusters
1941	Prof. Gilbert Bruce Blair	Department of Physics, U of Nevada	How big is big? Or, the molecule versus the Milky Way
1946	Dr. Harold Weaver	UC Berkeley	Novae
1951	Dr. Otto Struve	Leuschner Observatory, UC Berkeley	Collisions in the Solar System
1962	Carl Sagan	UC Berkeley	The physical environment of the planet
1973	Col. Alfred M. Worden	NASA Astronaut	Apollo 15
1974	Dr. Herbig	Lick Observatory	Comets, molecules, and interstellar material
1975	Dr. Donald E. Osterbrock	Lick Observatory	Planetary nebulae
1981	Dr. Jill C. Tarter	UC Berkeley	SETI, the search for extraterrestrial intelligence
1985	Dr. Frank D. Drake	Dean of Natural Science, UC Santa Cruz	Search for extraterrestrial intelligence
1985	Karl Henize	NASA Astronaut	Spacelab 2: An astronomy adventure
1987	David Levy	Planetary Science Institute, U of Arizona	In the shadow of Kitt Peak: The special joy of amateur astronomy
1988	Dr. Alexei Filippenko	UC Berkeley	Supernova 1987A: 16 months later
1988	George T. Keene	Eastman Kodak Company	Astrophotography today
1988	Poul Anderson with Karen Anderson	Science Fiction Authors	The art of building worlds
1988	Dr. Timothy Ferris	UC Berkeley	Coming of age in the Milky Way
1989	Clyde W. Tombaugh	New Mexico State University and Lowell Observatory	Discovering Pluto
1990	David Malin	Anglo-Australian Observatory, Siding Spring, Australia	The universe in color: Things to see and do in the dark
1990	Dr. Geoffrey W. Marcy	San Francisco State University	The search for extra-Solar planets
1990	Roger Ressmeyer	Starflight Photo agency	Space places
1992	Dr. Charles H. Townes	UC Berkeley	The mysterious object at the center of our Galaxy
1993	Dr. Don Parker	ALPO	CCD's and planetary observing
1993	Dr. Jane Luu	Stanford University	What's at the edge of the Solar System?
1993	Dr. Sandra Faber	UC Santa Cruz	The large scale structure of the universe
1994	Dr. Eugene Shoemaker	USGS, Flagstaff	The greatest show on Jupiter: Comet Shoemaker-Levy 9
1995	John Dobson	San Francisco Sidewalk Astronomers	That all may see this universe

## DATELINE MARCH

- 25 1655 Discovery of Titan, Saturn's largest satellite  
Christian Huygens, Netherlands
- 13 1781 Uranus discovered, Sir William Herschel
- 29 1807 Vesta discovered, H. W. Olbers, Germany
- 13 1855 Percival Lowell, birthday
- 14 1879 Albert Einstein, birthday
- 8 1916 Public opening, 20-inch Chabot telescope
- 13 1930 Pluto announced, Clyde Tombaugh
- 1 1966 First impact on Venus, Venera 3 (USSR)
- 11 1977 Discovery of rings of Uranus  
NASA's Kuiper airborne observatory
- 25 1993 Discovery of Comet Shoemaker-Levy 9
- 
- 1 1999 Full Moon, 22:59 PST - 06:59 UT 2 March
- 10 1999 Last Quarter Moon, 00:43 PST - 08:43 UT
- 17 1999 New Moon, 10:49 PST - 18:49 UT
- 20 1999 Vernal Equinox, 17:44 PST  
- 01:44 UT 21 March
- 31 1999 Blue Moon, 14:49 PST - 22:49 UT

You are invited to make your own telescope at the

### TELESCOPE MAKERS WORKSHOP

Join our group each Friday evening at Chabot Observatory  
Call Paul Zurakowski for more details (925) 447-6837

## FUTURE CONJUNCTIONS

### March

- 6 6:00 PM EAS Annual Dinner and Awards
- 11 7:30 PM EAS Board meeting, Chabot
- 27 AANC Symposium, Morrison, S.F.

### April

- 3 7:31 PM EAS Meeting, Dr. Dan Werthimer.  
SETI@home
- 8 7:30 PM EAS Board meeting, Chabot
- 24 SJAA Swap Meet and Auction

## Chabot Observatory Programs • March

### Women Hold Up Half the Sky

Friday and Saturday evenings, March 5, 6, 19, 20  
For show reservations, phone (510) 530-3480 x36

*Women Hold Up Half the Sky* (A women in Astronomy Program) will show the outstanding contributions made to the science of astronomy by women astronomers. "Science Experiments You Can Do at Home" will precede the planetarium program and will consist of experiments that can be done with common household supplies. Telescope viewing is included, weather permitting.

Admission is \$5.00 for adults, \$4.50 for seniors, \$3.50 for children. Chabot Observatory & Science Center members are admitted free. EAS members are admitted free if space is available.

Chabot Observatory telescopes are open for viewing 7:30-10 PM on March 12, 13, 26 and 27, weather permitting. Free.

# Eastbay



# Astronomical Society

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