



## From the President H. D. Wolpert



Large astronomical sites in California date from the late 1800's and early 1900's. Interferometry and adaptive optics have kept these sites in the forefront of advanced astronomy despite "light pollution" and other factors. We will have a rare opportunity to see behind the scenes at the one of these astronomical sites that is in our back yard, Mount Wilson.

To start, we will have a talk, this month, on CHARA the optical stellar interferometer being constructed at Mount Wilson. This installation, when completed will consist of six 1meter telescopes spread across the mountain with the largest baseline of 354 meters.

Then join us May 12th for a Saturday outing to see first hand this installation and tour the observatory. Plan to bring a picnic lunch and bring your family to view the 100 inch telescope, walk on the observing floor of the 60 inch telescope, see the power house

with the Fairbanks-Morse engine with its 110 volt DC generator, weather permitting the 150 foot solar tower and of course the museum. To arrange for this tour it will be necessary for members and guests to sign up by April 2nd or earlier. Make your reservations by contacting Gaylord Moss, [gmoss@mediaone.net](mailto:gmoss@mediaone.net) (310) 827-3983 or one of the officers or board members on our web site.

### Historical Note

When we mention astronomy in California, three astronomical sites might come to mind. These are Mount Wilson, Palomar Mountain and the Lick Observatory on Mount Hamilton.

The Mount Wilson Observatory, 32 km (20 mi) northeast of Los Angeles is 1742 m (5710 ft) above sea level. The Mount Wilson Observatory is owned by the Carnegie Institution of Washington and was initially established in 1904 exclusively for the study of the sun, though the instruments of the observatory have also been used to study other astronomical objects such as stars, nebulas, and galaxies. In 1908, a 60-in (1.52-m) reflecting telescope, then the largest in the world, was completed. In 1917 the 100-in (2.54-m) Hooker telescope was completed, the largest in the world until 1948, when Palomar's 200-in (5.08-m) Hale telescope was built.

Palomar Observatory, 80 km (50 mi) northeast of San Diego, California, is owned by the California Institute of Technology. The Hale 200 inch (5.08-m) telescope, weighing 480 metric tons, is not for visual observation but for making photographic and photoelectric records of the faintest and most distant objects in the sky. Other telescopes at the observatory include an 18-in (46-cm) Schmidt telescope, a 60 inch (1.52-m) reflecting telescope and a 20-in (50-cm) photoelectric telescope.

Lick Observatory located on Mount

Hamilton in central California near San Jose has its headquarters at the University of California, Santa Cruz. The observatory, which was completed in 1888, contained a 36-in (about 91-cm) refracting telescope. Lick Observatory acquired a reflecting telescope with a 120-in (3.05-m) mirror in 1959. It also contains the 20-in (about 51-cm) Carnegie Astrograph.

For additional information see:

- <http://www.mtwilson.edu>,
- <http://www.chara.gsu.edu/index.html>,
- <http://astro.caltech.edu/observatories/palomar/index.html>,
- <http://www.ucolick.org>,
- <http://ngst.gsfc.nasa.gov>,
- <http://sim.jpl.nasa.gov> ,
- [Http://ast.star.rl.ac.uk/darwin/interfeometers.html](http://ast.star.rl.ac.uk/darwin/interfeometers.html)

**IMPORTANT**

This is your last chance to renew your membership with the OSSC in time to be listed in the Directory which will be published in May. To all members who already renewed their memberships - a special thank you for your great support. In case you wonder about your renewal status, please check the mailing label of your newsletter. If it does not say 00/01 your payment has not been received. Please contact Reddy Chirra at [rchirra@mediaone.net](mailto:rchirra@mediaone.net) , or Tel: 310-398-5178

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**Images Newsletter**

Deadline for contributions is the date of the monthly meeting preceeding the next issue. Send information to:

OSSC is the Southern California Section of the Optical Society of America and is a non-profit organization.



**Profile**

By Tom Godfrey

**Darryl E. Gustafson**  
OSSC President 1989-1990

Darryl was born on a farm in northwest Iowa in 1935. When he was 10, the family moved to a nearby small town, with predominantly Swedish residents, named Albert City. At that point, his father became a full-time partner in the local John Deere dealership. His early work experience included a paper route and later, for five summers, operation and setup of automatic screw machines at a local factory that manufactured grease guns. After graduating from high school, it wasn't a tough decision to reject the offer of a career at the grease gun factory and Darryl left to attend their church related school, North Park College in Chicago. He transferred to Northwestern University two years later and received a B.S. degree in Mechanical Engineering in 1958.

At Northwestern, Darryl participated in the CO-OP program, then mandatory for undergraduate engineering students; this program required students in their final two years of study to gain work experience by working every other quarter in an industrial company. Darryl applied to work at Bell and Howell Company, which he drove by every day on the way to school. Bell and Howell involved their "CO-OPs" in a very wide range of company activities including optical design, engineering, and manufacturing activities. The exposure to optics and particularly optical design opened up a very interesting world to Darryl. Computers were being used (two LGP-30s) which made it all the more interesting; these computers could trace a skew ray at the amazing speed of 1 ray surface per second compared to five minutes for a very skilled operator of a desk calculator! Darryl spent three months in the optical design department and actually enjoyed such mundane tasks as plotting ray aberrations (before the days of computer driven plotters). This work was very helpful in providing a basic intuitive understanding and visualization of lens aberrations.

Bell and Howell had growing needs for optical designers at this time, and Darryl accepted Irving (Sandy) Sandback's offer to join them as a Jr. optical designer after graduation. In addition to Sandy, the Bell and Howell design group had several others that would later become significant members of the Southern California optics scene, including Tom Harris, Sy Brewer and Eileen Thiesen. Learning from these competent associates, Darryl quickly began designing lenses for the 8 and 16 mm camera and projector lines, as well as for defense and aerospace applications. A memorable project was the zoom lens he designed for the Surveyor project, the first soft landing on the moon; this project led to his first business trip to Hughes in Culver City, meeting Hank Frels and Marcel Gawartin for the first time. After Tom Harris transferred to the Bell and Howell Research Center in Pasadena, Darryl became increasingly involved in computer programming activities, including assisting Tom in adapting his programs to work on Bell and Howell's IBM 7070 machine.

In January of 1965, Darryl joined Tom Harris as a partner in Optical Research Associates, a Pasadena company Tom had formed in 1963. At ORA, Darryl designed a wide variety of optical systems including relay lenses, zoom lenses, anamorphic systems, FLIRs, and others; two of particular note were a 108 degree wide angle zoom lens for the Apollo-Soyuz Test Project and an 18 inch f/4 apochromatic used for high resolution earth photography from Skylab. In addition to lens design, Darryl was very active in software development for ORA's proprietary optical design software. He was an advocate for making the software, now called CODE V, available as a commercial product, first as a turnkey hardware-software system in 1975, then access on the Cybernet network, and finally as a software product installed on the customer's computer. With the introduction of the CODE V product, he gradually transitioned out of optical design and software development and directed ORA's software marketing and customer service activities until 1994. He then became responsible for ORA's business development activities until his retirement in January of 1998.

Since retiring, Darryl continues to serve on ORA's Board of Directors and to do a modest amount of consulting, primarily for ORA. He also enjoys participation in his church choir, renewing relationships with old college friends, spending time with his six children and two grandchildren, following the stock market, playing golf and traveling in the U.S. and abroad.

Darryl has been a member of OSSC since coming to California in 1965. He served the OSSC in various capacities in the mid-eighties and finally as President in the 1989-90 year. Darryl can be reached at 626-836-3874 or at darryleg@msn.com.

Wednesday, March 14 at 7:00 pm  
**Stellar Interferometry at Mt. Wilson: CHARA**  
 Dr. Theo ten Brummelaar

**Abstract**



The (Center for High Angular Resolution Astronomy) CHARA Array is an optical stellar interferometer being constructed by Georgia State University on Mount Wilson. It consists of six 1m aperture telescopes spread across the mountain with the largest baseline of 354m. The wavelengths of operation are from 0.5 to 2.5 microns, giving a maximum resolution of around 1 nano radian. To date all six telescopes have been installed and four are fully in operation. Fringes have been obtained between two of these four and as soon as we dig ourselves out of the snow we expect to be operating with four telescopes and with all six by the end of the year.


A large interferometer like this raises many interesting optical design problems, not all of which have been solved. I will describe the optical layout of the instrument and discuss some of the more interesting design challenges. The current status will also be described as well as our plans for the near future. The enclosed picture is of myself standing near one of our optical delay lines, capable of controlling optical delays of up to 100m with an rms precision of 10 nm.

**About the Speaker:**

Born, raised and educated in Australia. After a few brief stints away from University of Sidney working as a free-lance programmer and drummer I finally finished my Ph.D. in 1992. My Ph.D. work concerned the tip/tilt servo used in the Sydney University Stellar Interferometer being constructed at that time. Having caught the 'interferometry bug', the following year I came to the US to join the CHARA team as a postdoc working on the initial design and proposal writing for the CHARA Array. I now go under the title of Research Scientist II and I now reside in California. After eight years in the country I finally got the all important 'green card' last month and was surprised to find out that it is in fact pink.

Dr. Theo ten Brummelaar can be reached at The CHARA Array-Georgia State University-Mount Wilson Observatory: <http://www.chara.gsu.edu/~theo> Ph: 626-796-5405 Fax: 626-796-6717

**Next Meeting**  
**Date:** Wednesday, March 14, 2001, 6:00 PM, Happy Hour; 7 PM, Dinner; 8:30 PM Speaker.  
**Cost:** Dinner: \$20. Speaker only: No charge.  
**Speaker:** Dr. Theo ten Brummelaar  
**Topic:** Stellar Interferometry at Mt. Wilson: CHARA  
**Location:** Four Point Sheraton  
 700 West Huntington Drive, Monrovia, CA Tel: 626-357-5211  
**Reservations:** preferably by e-mail to our Arrangements Chair, Gaylord Moss, [gross@mediaone.net](mailto:gross@mediaone.net) by Monday, March 9 or by phone at (310)827-3983  
**Menu Choice:** Chicken Breast, London Broil, or Vegetarian Meal  
 For current updates, directions and map, please visit our website at [www.osscc.org](http://www.osscc.org).



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