The Summer Science Program

# UNIVERSAL TIMES

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## INSIDE THIS UT



## RE-CONNECT WITH SSP

- Visit the web site at www.summerscience.org
- Join the alumni email discussion forum by sending a message to SSPForum-subscribe@yahoogroups.com
- Tell local science and math teachers about SSP (and refer them to our web site)
- Plan to visit Ojai for Reunion Day, Saturday, July 20, 2002
- Send a tax-deductible donation (see page 7)
- Volunteer your time (see page 7)

## STATE OF THE PROGRAM 2001

BY STEVE COTLER '60, SSPI C HAIRMAN

Our second year of alumni-run operation was extremely successful. Here's a partial list of what's been accomplished:

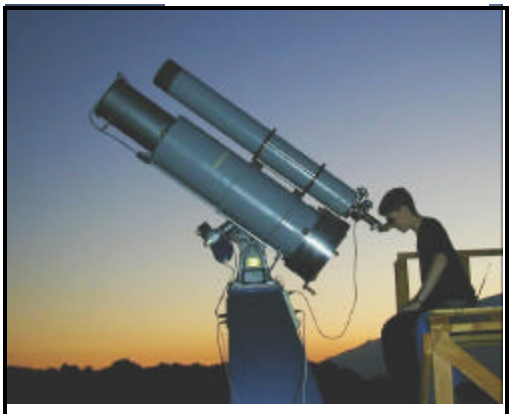
- Thirty bright, enthusiastic teenagers made it through six intense weeks , and told us that SSP was better than they could've hoped. [*Read some of their comments inside.*]
- We solidified our relationship with Happy Valley School ("HVS"); it now appears that we have found a long-term home.
- John Briggs '76 refurbished and remounted the old UCLA astrograph from Thacher and installed it on the HVS campus.
- Our Curriculum Committee reviewed the venerable curriculum, finding it sound and still relevant. At their suggestion, we purchased a new computer-controlled telescope with CCD camera to complement the astrograph.
- We received 350 inquiries and 76 completed applications — the most since 1993. Our outreach efforts to underrepresented minorities showed progress, and will continue.

Several challenges remain:

- We need more alumni involvement--both donations and participation. The class representative system has not worked as well as we hoped.
- We are working to build institutional support, but progress has been slow.
- After two years of all-volunteer operation, SSP needs a permanent office and professional administration.

In sum, your organization's focus has progressed from survival / transition to stability / evolution.

Please stay connected. We encourage and gratefully accept help and suggestions. Email me at scotler@summerscience.org.



*The refurbished and remounted SSP astrograph and guide 'scopes, back in service.*

## ACADEMIC DIRECTOR'S REPORT

BY DR. TRACY FURUTANI '79

The students of the 43rd Summer Science Program came to Happy Valley School in Ojai from as near as Simi Valley and as far away as Jordan. On June 24 they found themselves immersed in the social and intellectual crash course that is SSP. After a day of orientation to the faculty and one another, they quickly settled into a routine of lectures by me and Dr. Mark Hammergren, as well as the venerable SSP extras: guest lectures, field trips, beach and town excursions, homework, the Question of the Day, and Ultimate Frisbee.

The weather in the Ojai Valley this summer was far from ideal for asteroid observation. Twenty-one observing sessions had to be cancelled due to rain, clouds, or especially, fog. (This is a record for cancellations for at least the past ten years). Ably assisted by

*(Continued on page 2)*

*Some things never change: "Where's my asteroid??"*

# Treasurer's Report

BY HENRY LICHSTEIN '60

As the new Treasurer, it is my obligation to look after SSP's income and expenses, working actively with the Board. My background includes 30 years at Citibank as a Financial Controller, Treasurer, and Technology Strategist.

I grew up and now live in Los Angeles, after SSP earning engineering and management degrees at MIT. My older son was the first second-generation SSP'er.

Like most of you, I feel that SSP was one of the defining early experiences of my life. I feel so strongly about it I have been "giving back" with time and money ever since. My reward is witnessing how the intelligence, enthusiasm and spirit of recent classes match that of ours of so long ago.

John Rabold, '70, has been Treasurer (among his many other SSP duties) during the revitalization of SSP. John did a marvelous job. He set up the books, worked with the State to incorporate SSP as a non-profit, and developed the operating procedures I inherit. If I can at least balance the books as well as he did, I will be happy!

In round numbers, it cost $130,000 to run the SSP this year. Of that, fees paid by students covered less than half; contributions (plus a little investment income) made up the difference. Almost half of the budget went for room and board at Happy Valley School, a third for faculty salaries, and the rest for supplies and travel.

Next year's budget will be higher as we can no longer expect volunteers to do all of the administrative tasks. I encourage all SSP friends and alumni to support the program with your time and donations.

## Parents Say

*"SSP changed our daughter from a good student to a 'mature thinking' great student. SSP could also stand for 'Student Success Program.'"*

– Jan and Sylvia Kapphahn, parents of Katy Kapphahn '01, Arlington, Texas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# Academic Director's Report

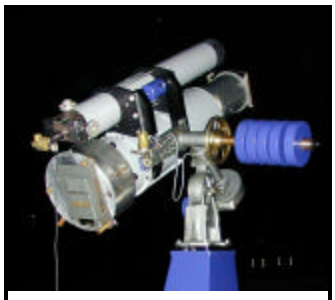
*(Continued from front page)*

scheduling TA Adama Frye '96, however, each student team was able to complete its observations.

The 10 teams of three students needed 168 observations to obtain the necessary 30 measurable exposures of their chosen asteroids. While this is a disappointing ratio, we were using film for the first time in SSP history (Kodak has stopped making glass plates). Also, everyone was getting used to the refurbished astrograph and guide scope, moved from the Thacher dome for repairs in Sunspot, New Mexico, by SSP Telescope Engineer John Briggs '76. John attached the tubes to a robust equatorial mount from his own collection, then installed them on a rise behind the dorm.

*The new, free-standing measuring engine in use.*

The measuring process was aided this year by the generous donation of an excellent measuring engine from St. Andrews College in Scotland. Unlike the Mt. Wilson and UCLA measuring engines used for decades by SSP, the 220 kg St. Andrews engine is not portable [*see photo at left*]. Instead of a standard Vernier scale, it has a spiral Vernier scale, which takes a little getting used to. Students, however, found it faster and easier to use, so it soon became their favorite. TA Christian Thomas '95 was instrumental in the setup and instruction of students on this machine.



*The remounted astrograph.*

Measurements were converted into asteroid positions using a program called LSPR (least squares plate reduction), translated into C by Head TA Chris Wyman '94. The students wrote the orbital determination code (in the C language) with the help of Wyman and TA Zak Cotler '98. For some reason, the song "Crazy Game of

*(Continued on next page)*

# No 2002 Program in New Mexico

SSPI's Board of Directors, meeting on Oct. 3, decided **not** to open a second SSP campus in New Mexico next summer. Funding commitments received to date from foundations and governmental entities are not sufficient to fully fund the new campus. The Board had previously resolved to build a "financial firewall" between the two programs for at least the first three years.

However, in light of the enthusiasm shown by so many New Mexico-based educational and scientific institutions, the Board will continue investigation of and fundraising for a New Mexico campus, with an eye toward summer 2003. This decision will be made by mid-year.


Sky & Telescope's *feature article on SSP appeared in the March 2001 issue.*

# Senior Faculty Move Up

Academic Director **Dr. Tracy Furutani** has accepted a position at California Polytechnic State University in San Luis Obispo, teaching physical science. He will also continue research on his dissertation topic: the use of electron spin resonance (ESR) spectroscopy for dating geological materials.

Associate AD **Dr. Mark Hammergren** has moved to Chicago to become an Astronomer at the Adler Planetarium and Astronomy Museum (the first planetarium in the western hemisphere). In addition to supporting the planetarium's education and public outreach activities, he will continue research into the composition and internal structure of (what else?) asteroids!

## Academic Director's Report

*(Continued from previous page)*

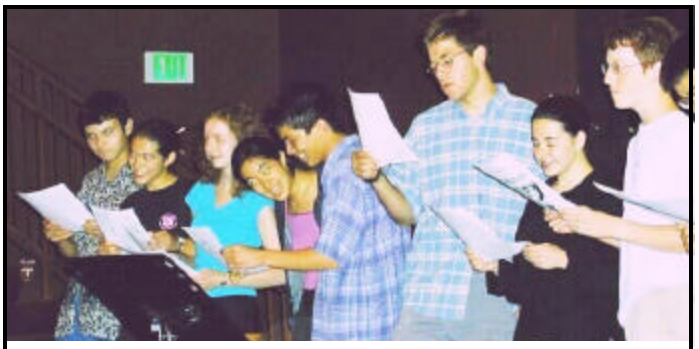
Poker" became a hit in the computer room as the students wrote and debugged code at all hours of the day and night. In the end, all but two turned in successful orbital determinations. As always their OD results will be forwarded to the Harvard-Smithsonian Minor Planet Center.

Guest lecturers gave talks on everything from finance to medicine to blazars. Students also enjoyed three field trips: to JPL in Pasadena (hosted by Dr. Stuart Stephens, Academic Director '94-'98), to Vandenberg AFB's launch complex, and to Wheeler Gorge for a little geology (my own research interest). Program Administator Sayuri Desai '87 coordinated these trips, and handled many other tasks large and small.

Everyone enjoyed reunion day. The students created some truly creative table centerpieces for a sculpture contest (with winners chosen by the votes of returning alumni). After dark, Dr. Hammergren demonstrated SSP's new digital telescope [*see article on page 7*]. In the course of twenty minutes he captured and displayed images of two program asteroids, a newly discovered comet, the Whirlpool galaxy, the Eagle nebula, Uranus, Neptune, and Pluto.

This year's fabulous talent show culminated in a bizarre chorus line to the aforementioned "Crazy Game of Poker" [*see photo below*].

On Sunday August 5, our newest alumni celebrated having successfully completed the greatest challenge of their academic lives. I thank the students, parents, Happy Valley School staff, and most of all, SSP alumni and friends, for making SSP '01 an outstanding experience.



*Student talent show: "Crazy Game of Poker", anyone?*

## Parents Say

*"Probably the best part of this program was allowing our son to work with some of the best young minds in the country. Our son attends public school and has done quite well, but he had never been exposed to the level of students that were present at SSP."*

– Jim Tarter, Twin Falls, Idaho, father of James Tarter '01

*On Reunion Day, alumni and students heard a fascinating talk by Dr. Jill Tarter.*

## 2001'ers Say

*"This program has been the most wonderful, enjoyable, interesting experience of my life."*

*"The program allowed me to constantly challenge myself to do the best that I can."*

*"I have learned so much, not only about physics, math, & astronomy, but also about myself and what I want to do with my life."*

*"I can't really think of a way my summer could have been better."*

# Guest Speakers 2001

**So What's This About a Cosmic Speed Limit? Superluminal Motion in Blazars**—Alma Zook, Prof. of Astronomy at Pomona College and former SSP faculty

**Mad Scientist Show**—Larry Sverdrup, Research Scientist, Trex Enterprises

**Advances in Flight**—Paul MacCready, CEO, Aerovironment Corporation

**Gravitational-Wave Astronomy**—Peter Shawhan, Research Fellow, Caltech

**Neurobiology**—Jacqueline Snyder, Graduate Student, New York University

**SETI Overview**—Jill Tarter, Principal Investigator, Search for Extraterrestrial Intelligence Institute

**Can Finance become a Science? or, Adam Smith and the Paradigm Shift**—Lee Van Slyke '64, Consultant, MHL/Paratus

**Cataclysmic Variables: Stars that go bump in the night**—Paula Szkody, Prof. of Astronomy, U. of Washington

**Project Stardust** and **Rare Earth**—Don Brownlee, Prof. of Astronomy, U. of Washington

**Radioastronomy**—Andrew West '94, Graduate Student, U. of Washington, and former SSP TA

**Paleoecology of Mammoths**—Kathryn Hoppe, Research Fellow, UC Berkeley

**Once and Future Mars: Martian Meteorites, 2001 Mars Odyssey and More**—Tony Irving, Prof. of Geological Sciences, U. of Washington

*Larry Sverdrup hammers with a frozen banana.*

**Parasites and Science**—Paul Pottinger, MD, Chief Medical Resident, U. Colorado Medical Center

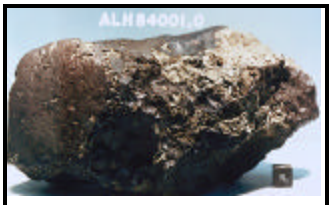
**Closing address**– David Pierce, Prof. of Astronomy El Camino College and former SSP faculty

## Yes, We Already Have Martian Rock Samples

By D. J. B '81, UTSE

What can Martian meteorites tell us about Mars?

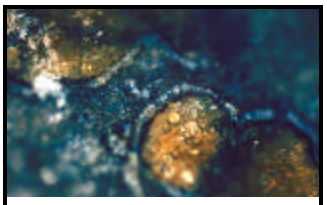
A dozen meteorites are thought to be of Martian origin. Scientists study them to learn about Martian chemistry and mineralogy, and in order to develop ground truths for the measurements made by instruments on landers and orbiters.




*Martian meteorite ALH 84001 (cube is 1 cm).*

One Martian meteorite, found in the Allan Hills of Antarctica, became famous in 1996 when it was found to contain carbonate and magnetite grains. These may have formed under low temperatures that are frequently associated, in terrestrial samples, with primitive life. The chemistry and crystal shapes of these minerals vary substantially, though, and many researchers are now trying to characterize the differences between biogenic and inorganic forms of these minerals.

Others study the visible and infrared spectra of Martian meteorites for comparison with spectral data of the Martian surface. Dark regions are thought to be mostly volcanic rock, while the brighter red regions are thought to contain more ferric oxide-pigmented dust.



*Carbonate grains (brown) surrounded by rings of magnetite (black) in ALH 84001.*

Chemical and spectral measurements from the Pathfinder lander show that surface rocks are altered compared with Martian meteorites. The current Mars Global Surveyor orbiter is providing high-resolution compositional information for the whole surface.

For more information on Martian meteorites and mission to Mars, visit mars.jpl.nasa.gov.

**Donation Return Form**

*Cut out this form and mail it with your check, payable to* **Summer Science Program, Inc.**, **9198 Skyline Blvd., Oakland, CA 94611-1748**. *Please correct your name and address, if necessary, on the back. To donate on-line using a credit card, go to* www.summerscience.org/contrib.htm.

I am enclosing my donation to the **only** independent science education program managed and funded by its own alumni: **__$500 __$250 __$100 __$50 __$25 $_____ __ contact me about my donation**

Credit to (*name*) _____ Year _____ __Alum __Parent __Faculty __Friend

Earmark my donation for: __Unrestricted __Abell Scholarship __Outreach __Permanent Endowment

__My employer will match my gift Employer: _____ (*please enclose matching gift forms*)

__I want to join the SSP forum email discussion group. My email address: _____

__I also want to make a donation of time. The best way to contact me is: _____

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# New Digital 'Scope in Place

**By Dr. Mark Hammergren, Associate Academic Director**

SSP took a major step into the digital age of astronomy this past summer with the acquisition of a new computer controlled telescope and electronic camera, to serve as a supplement to the classic photographic observations.

The telescope, a Meade LX-200 Schmidt-Cassegrain with a 10-inch diameter primary mirror, is popular among advanced amateur astronomers for its light-gathering power, ease of use, and reasonable cost ($4000 with accessories). The camera is a model ST-9E made by the Santa Barbara Imaging Group (SBIG), and also cost roughly $4000.

The camera uses a Charge Coupled Device (CCD), a science-grade version of the chips used in handheld video cameras, to precisely record astronomical images.

The advent of CCD cameras has led to a revolution in professional astronomy over the past two decades. They are far more efficient than photographic film at converting light into a recorded signal, providing more than ten times the sensitivity over the same exposure time. In tests of our new telescope system this past summer, we were able to detect objects as faint as 19th magnitude in a fifteen minute exposure, or about five hundred times fainter than the old astrograph can reach.

CCD cameras also have a uniform, linear response to incoming light, making it possible to precisely measure the brightnesses of celestial objects, whereas the complex, logarithmic response of photographic film permits only crude estimates of an object's brightness. Additionally, CCD cameras output images in digital form, making image processing and enhancement a straightforward process.

SSP has no intention to abandon the 43-year tradition of hands-on photography in favor of the new electronic equipment. Rather, we hope to use the advanced capabilities provided by the Meade telescope and SBIG CCD camera to explore exciting new astronomical projects, such as tracking small, faint near-Earth asteroids, newly discovered supernovae, or imaging extended nebulae and distant galaxies. In acquiring the Meade telescope and CCD camera, we ensure that future SSP students have access to the state of the art in astronomical equipment -- just as the students did four decades ago with the classic astrograph.

*Alumni again used experience and guile to beat the kids 24-10 at softball.*

*"We are delighted in the success of SSP at Happy Valley School. We are proud of SSP and the many amazing achievements of its graduates. Keep up the good work!"*

– Michael Mulligan, Headmaster, Thacher School

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## 2001'ers Say

*"I felt constantly inspired."*

*"SSP is the first place where I talked about nanotechnology and the evolution of consciousness over dinner."*

*"These were the six most tiring, challenging, and stressful weeks of my life. I enjoyed every minute of it."*

*"I could not have had an experience like this anywhere else."*

*"Huzzah!"*

*The computer room at HVS*

## Who makes SSP possible? You do! Donations from alumni and friends pay for over half of SSP's annual budget.

*Presenting the SSP Faculty and Class of 2001*

## Class of 2000 Colleges

The seniors from SSPY2K have now enrolled in some of the top colleges in the nation. If you work or study on one of these campuses, invite a new alum to lunch.

Noel Bakhtian: **Duke U.**
Orges Beqiri: **Stanford U.**
Chris Day: **UC Berkeley**
Abby Elliott: **Caltech**
Lisa Fukui: **Caltech**
Michelle Giron: **Caltech**
Meredith Hughes: **Yale U.**
Will Huang: **UC Berkeley**
Suneil Jhamb: **Caltech**
Ryan Kabir: **MIT**
Justin Kao: **Stanford U.**
Tim Lu: **Stanford U.**
Bertrand Lui: **Caltech**
Eric Ma: **Princeton U.**
Chinmay Maru: **UCLA**
Mika McKinnon: **UC Santa Barbara**
Matthew Mirpourian: **Oregon State U.**
Tiffany Ng: **Yale U.**
Huy Nguyen: **UC Riverside**
Que Anh Nguyen: **Olin School of Engineering**
Jake Pinheiro: **Harvey Mudd College**