

# **Universal Times**

The Summer Science Program

October 2007

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### **CLICK HERE**

- <u>www.ssp.org/</u> <u>database</u> — update your information in the online database
- www.sspreunion.com
   register your interest in attending the 50th in July.
- www.ssp.org/donate
   send a secure donation through PayPal
- www.ssp.org/socorro (user Socorro, password NMT) — everything about the 2007 Socorro campus

# **SSP TURNING 50**

Next summer will be the 50<sup>th</sup> Summer Science Program. Reunion Weekend on **July 18-19** will be an opportunity for alumni and former faculty of all ages to return to Ojai and celebrate our small but unique institution. It will be a concentration of some of the brightest and most interesting people in the world, who share an intense, magical experience that changed their lives.

Fifty years ago this month, the Soviet Union launched Sputnik, the first artificial satellite. The launch shocked Americans into a frenzy of action to improve math and science education and to encourage young people of all ages to consider careers in physical sciences and engineering. Within days, the Headmaster of Thacher School began contacting leaders in academia and industry about his idea to host a summer program for rising seniors. The Summer Science Program was born.

Only a few of those initiatives still thrive – those that transcended both the Space Race and the Cold War. SSP even survived the withdrawal of federal funding for summer programs in the 1980's, and the loss of Thacher's sponsorship in 1999. Since then SSP has been the only summer enrichment program managed and largely funded by its own alumni.

Volunteers are now working on planning this event. We need to know if you may be able to attend. Please complete the form at <u>www.SSPreunion.com</u>.

Just 18 days after Sputnik's launch shocked the world, Thacher Headmaster Nelson Chase wrote to the President of Stanford, proposing SSP. Here is an excerpt.

I wonder if you have as yet happened to see Howard Brooks, whom I chanced to meet in Boston, and to whom I presented an idea which has been in my mind for some time concerning a summer school project here at Thacher, beginning in 1959, and designed for some 25 gifted boys coming from anywhere and from any background in the State of California. The courses offered would be for llth and l2th graders, and only in the field of science. My idea would be for these courses to be of an advanced nature, perhaps following the Advanced Placement Program, and to be conducted by both secondary and college teachers working together.

It seems to me that such a project would help to answer some of the pressing needs of today's educational problems, particularly with regard to the opportunities in science, and the offering of such a program to able and ambitious youngsters.

### CHAIRMAN'S LETTER

After another successful SSP on two campuses, my thanks go to our dedicated faculty and Executive Director Richard Bowdon '74 for making it happen, and to the Trustees and other volunteers who find time for SSP yearround. Best wishes to the Class of 2007, an amazing group of young people who made all our work this year worthwhile.

Now our attention turns to the 50th Anniversary Celebration weekend next July. We want each and every alumnus and former faculty to be a part. We range in ages from 17 to 67, but have a special bond in common. Come to see your classmates and to revel in the glow of a program unique in the world for the quality of its alumni, for its longevity, and for the promise in its future. You were a part of the first 50 years, become a part of the next 50 years. See you in Ojai, July 18-19.

Best wishes, Henry Lichstein '60, Chairman



#### 2007ERS SAY

I cannot take SSP out of my mind. Nothing else seems good enough now. I changed more in 6 weeks than in 4 years of high school. Can I attend SSP again next year?

-Eda Gjergo

# THE STARS OF SSP 2007



Ojai students and faculty

My best SSP experience: lying under the stars at 4 AM with five friends from all over the world, experiencing what we learned during morning lectures, and making sense of all that we see in the night sky. —Alexander Beltes



Socorro students and faculty

NEAR-EARTH ASTEROID O.D. IN '08

SSP is so challenging and fulfilling, in all aspects, that it's a pity school takes up so much time — we could be doing something like this.

-Jayson Lynch

#### By Dr. Tracy Furutani '79 Chair, Curriculum Committee

Asteroid orbit determination (the OD) has stood the test of time as an ideal central research problem for SSP. Our gifted teenagers can do it from start to finish in six weeks ... just barely. But using analog, film-based images has restricted us to bright, main-belt asteroids first discovered in the 19<sup>th</sup> century, whose orbital elements are stable and well-known. As one student wrote, "I thought that we would be doing original research, rather than re-confirming already known information."

With CCD telescopes now available on both campuses, the best way to return scientific relevance and urgency to the OD is to observe Near-Earth Asteroids. Some NEAs have orbits that intersect Earth's, inherently of interest and concern to the entire world. Observations taken by SSP students and submitted to the Minor

# COLLEGE 🖛 SSP '06

| Bucharest Conservatory             | Andrei Biro  |  |  |
|------------------------------------|--|--|--|
| Caltech (10)                       | Anguel Alexiev '05, Daniil Feldman, Michelle Filiba,<br>Sarah Howell '05, Kirit Karkare, Joy Lin, Erik Madsen,<br>Suzanna Piatt, Hillary Walker, Christopher Wong  |  |  |
| Columbia                           | Luwen Huang  |  |  |
| Cooper Union                       | Hannah Clevenson   |  |  |
| Cornell (2)                        | Andrew Baldinger, Russell Wolf   |  |  |
| Dartmouth (2)                      | Ahra Cho, Berk Öztürk  |  |  |
| Duke                               | Robert Wainblat  |  |  |
| George Mason Univ.                 | Minu Ramanan   |  |  |
| Georgetown Univ.                   | Lambert Wang   |  |  |
| Harvard (5)                        | Levi Dudte, Jonathan Finn-Gamino, Daniel Handlin,<br>Tiziana Smith, Mike Teodorescu  |  |  |
| Harvey Mudd                        | Kevin Chan   |  |  |
| Macaulay Honors Col-<br>lege, CUNY | Mariana Sant'Anna  |  |  |
| MIT (14)                           | Amelia Arbisser, Anshul Bhagi, Jenna Caldwell, Mi-<br>chelle Chang, Yipeng Huang, Justin Lan, Jennifer Li<br>'05, Sonya Makhni, Mary Masterman '05, Kimberly<br>McManus, Adrian Melia, Daniel Montana '05, Danielle<br>Piskorz, Chris Su |  |  |
| Northwestern (3)                   | Alexander Chen, Stephanie Oh, Carol Shen   |  |  |
| Notre Dame                         | Brad Cordova   |  |  |
| Olin College of Engr.              | Jacob Izraelevitz  |  |  |
| Princeton (6)                      | Oguzhan Atay, Ryan Dahn, Ben Knudsen, Anh Nguyen<br>'05, David Tsao, Peck Yang   |  |  |
| Rice                               | James Liu  |  |  |
| Stanford (6)                       | Alan Hshieh, Kimberly Kreitinger, Jenny Kwan '05,<br>Max Libbrecht, Max Murialdo, Matthew Yankowitz  |  |  |
| Swarthmore (2)                     | Ross Greenwood, Dougal Sutherland  |  |  |
| UC Berkeley (5)                    | Sarah Cheon, David Gee, Fakhra Khalid, Andrew Lyon,<br>Jason Tsai  |  |  |
| Univ. of Michigan                  | Heeho Park   |  |  |
| Univ. of Nevada at Reno            | Zach Johnson   |  |  |
| Univ. of Wisconsin                 | Justin Balantekin  |  |  |
| USC                                | Henry Yuen   |  |  |
| Washington Univ.                   | Emily Podany   |  |  |
| Williams College                   | Aaron Bauer  |  |  |
| Yale (3)                           | Alison Lu, A.J. Riggs, John Scrudato   |  |  |

(Continued from page 2)

Planet Center could improve the predicted orbits of these NEAs.

This past summer, we confirmed that NEAs can be imaged with our equipment. In coming months we will decide exactly how the astrometry will be done, how lectures will need to be modified to accommodate a significantly larger digital image processing emphasis, and how analog equipment can be used to augment the NEA project. We'll keep SSP as "hands-on" as possible.



Socorro Head TA Razvan Ungureanu '01 helps a team using The Sky software.



Using "clickers" in Dr. Dubson's lecture in Socorro



Foosball time!



At SSP even doing homework can be fun.



Being a TA can be fun, too!



A UFO visits Ojai (or is it only a Frisbee?)

## **OJAI ACADEMIC DIRECTOR'S REPORT**

(Continued from page 8)

measuring. Measuring was, as usual, hard – but educational. Despite (and maybe because) of the difficulty of guiding and measuring I still found the astrophotography part of the program pedagogically essential.

Associate AD Dr. David Reitzel of UCLA and I also offered optional projects not directly related to the OD. Students in Ojai and Socorro made simultaneous observations of a Near-Earth Asteroid to calculate its distance by parallax. Others took digital color images, observed the Jovian moons to find Jupiter's mass, or observed Cepheid variables stars. Some students are continuing their research from home.

SSP is much more than academics. As in previous years we planned many extracurricular activities that fascinated our young and eager students. Among our quest speakers (see p. 7), Drs. Tyrone Hayes and Larry Sverdrup were the favorites (again). Dr. Ed Krupp '63 hosted us on a field trip to the new Griffith Observatory. The students loved Ed, and loved the trip. At Caltech we visited the Laser Interferometer Gravitational -Wave Observatory (LIGO). At JPL we were once again hosted by former AD Dr. Stuart Stephens and Van Snyder '63. Thanks also to Jim Young for hosting us at JPL's Table Mountain Observatory, and to Dr. Tracy Furutani '79 for his ever-popular guided geology tour of Wheeler Gorge. Beach trips were a great joy to all of us as always. TA Laura Grupp organized a field trip to HAAS Automation, a manufacturer of computerized machining centers. Laura and the other exceptional TAs in Ojai – Agnes Kamasi '01, Gabe Billings '03, Rachel Paterno-Mahler '02, and Peter Combs '03 - organized

games, the talent show, movie nights, and QODs.

Last but not least, Site Directors Danielle and Morgan Llewelyn kept our spirits up in innovative ways. For example, they started a new tradition of giving "Friday awards" to students deserving special recognition (for example: the most helpful, best artwork on the board, etc.). We also appreciated good support from the staff of the (recently renamed) Besant Hill School.



Students on Ojai celebrate after defeating the alumni in softball.

# SOCORRO ACADEMIC DIRECTOR'S REPORT

(Continued from page 8)

I lectured on calculus and mechanics, electricity and magnetism, special relativity, and quantum mechanics. Dr. Christian Thomas '96, Associate AD, lectured on VPython programming, astronomy, and the OD. The ten homeworks included programming problems, which many students found quite challenging.

Except for occasional tardiness to lecture and a few late homeworks, the students were remarkably well-behaved, mature, and respectful.

All 12 teams successfully acquired a measurable film, although every team needed between 5 and 15 attempts to succeed. The difficulty of acquiring a good film adds to the healthy intensity of the SSP program. Late nights, frustrating struggle, and final success are a recipe for life-long commitment to SSP. All students completed their OD programs, although two students couldn't quite get their orbital elements to converge. Four of the students reduced their data using the more sophisticated Gaussian method, in addition to the standard Laplacian technique, producing a more accurate orbit.

We enjoyed ten guest speakers and scientific field trips to the National Radio Astronomy Observatory, Sandia National Labs, Apache Point/Sunspot Observatory, and Magdalena Ridge Observatory, plus recreational trips. There were pool parties, movies on Saturday nights, swing dances, and a talent show. On Reunion Day, visiting Trustees and alumni defeated the students at volleyball. When the new Harry Potter movie came out, the father of one of our students paid for the entire group to see it!

The New Mexico Tech facilities were all well above my expecta-

tions. I am grateful to the NMT staff, especially Prof. David Westpfahl, Chair of the Physics Dept, who provided fine lecturedemonstration equipment. Although the food at the NMT cafeteria was excellent, I did miss the warm ambiance of the Dining Hall at the Thacher School.

We produced an elaborate website, containing photos, HWs, lecture notes, QODs, and much more. It is all still viewable at <u>www.ssp.org/socorro</u> (username socorro, password NMT)

Our highly skilled and dedicatedstaff made my job easy. Site Director Leslie Clark deserves much of the credit for creating a warm, welcoming atmosphere and a close-knit working group. She is a gem, completely dedicated to the students' well-being. Thanks also to our superb teaching assistants: Razvan Ungureanu '01, Anna Heinz '98, Sondy Springmann, Addie Dove, and Joey Espejo.

#### **Universal Times**

### DONATION FORM

Next summer, you can help inspire 72 gifted teenagers to reach their potential. Return this form with your check, or donate online using a credit card at www.ssp.org/donate. Thank you.

| \$  | □ \$1000 | □ \$500 | □ \$250 | □ \$100  | □ \$50    | □ \$25   |
|---|----------|---------|---------|----------|-----------|----------|
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| Allocate this donation to:  general support -or- Abell Scholarship Fund If mailing address on the other side of this form is incorrect, write address here: |          |         |         |          |           |          |

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### **INSPIRING GUEST SPEAKERS**

| Socorro Campus   | Ojai Campus  |
|--|--|
| Dr. Tom Vestrand, Los Alamos National<br>Laboratory — Transient Astrophysics   | Dr. Deborah Fygenson, UC Santa Barbara<br>— Macromolecular Technology          |
| Dr. Agnes Kim, faculty '06, Univ. of Texas at Austin — The Singing Universe  | Dr. Gregory A. Lyzenga, Harvey Mudd<br>College — Rocketry                      |
| Dr. Marshall Long '71, Yale Univ. —<br>Probing Fire with Light   | Dr. Larry Sverdrup, Ophthonix, Inc. —<br>Mad? Science                          |
| Dr. Horton Newsome, Univ. of New Mex-<br>ico, Institute of Meteoritics — Impact<br>Crater Adventures   | Dr. Tyrone Hayes, UC Berkeley — From<br>Silent Spring to Silent Night          |
| Dr. Penelope Boston, New Mexico Tech —<br>Caves: Exploring Life Underground from<br>Earth to Mars and Beyond   | Dr. Kimberly Turner, UC Santa Barbara —<br>Nanotechnology                      |
| E. Bruce Held, Sandia National Lab —<br>Espionage in New Mexico  | Dr. Mark Moldwin, UCLA — The Perils of Space: An Introduction to Space Weather |
| Dr. Eric Davis, faculty '95, Inst. for Ad-<br>vanced Studies at Austin — An Assess-<br>ment of Faster-Than-Light Spacetimes:<br>Make or Break Issues | Dr. Kevin McKeegan, UCLA — Meteorites  |
| Dr. Larry Sverdrup, Ophthonix, Inc. —<br>Mad? Science  | Dr. Henry Roe '91, Lowell Observatory —<br>Methane on Titan                    |
| Dr. Eileen Ryan, New Mexico Tech — As-<br>teroid Hazards and the Magdalena Ridge<br>Observatory 2.4m Telescope                                       | Dr. David Pierce, faculty '74-'86, El<br>Cerrito College — Closing Address     |
| Dr. Nicholas Suntzeff, TA '76-'77, Texas<br>A&M Univ. — Cosmology  |  |
| Dr. Van Romero, New Mexico Tech —<br>Closing Address   |  |

#### PARENTS SAY

The genius of the program is an indepth, no holds barred scientific experience, which is orders of magnitude better than a lab internship. Isaac now understands the process of real science, which many scientists don't really learn until they are in graduate school. Thanks!

> —Paul Bleicher, father of Isaac Bleicher

Daniel's six-week search for 21-Lutetia's orbit is an apt metaphor for his search for himself. At SSP, he found both. He came back with a renewed sense of purpose, an even stronger work ethic, a group of superb friends, and the *inspiration to follow* his dreams. -Ely Dahan, mother of Daniel Dahan



The Summer Science Program Business Office: 108 Whiteberry Dr Cary, NC 27519

#### 2007ERS SAY

*I feel infinitely more prepared for college now.* 

*—Deepa Chari* 

You will never forget SSP because it helps you to discover who you are and what you want. —Jamie Tayar

Science first, beach second, each other above all. —Thomas Harris

# **ACADEMIC DIRECTOR REPORTS**

#### Ojai Campus

by Dr. Ran Sivron

Academically and socially, the 49<sup>th</sup> SSP in Ojai was very successful. All students completed the orbital determination, and generated an ephemeris to compare their predicted and observed positions. The open source VPython programming language is proving to be a very useful and effective learning tool.

After completing the basic OD, many students went further. Four students completed an error analysis, six included the light travel time correction, seven tried a fourth observation, one did stellar aberration correction, one used the Gaussian (vs. Laplacian) method, and one did a differential correction using extra observations, leading to a 90% improvement in accuracy.

We again had some problems getting both telescopes to work, but our dedicated staff fixed the 6" by the end of first week and the 14" by the end of the second, after which they worked great. All but one team got a well-guided film, and the other team borrowed one for

(Continued on page 6)

#### Socorro Campus

by Dr. Michael Dubson '73

My experience as Academic Director of SSP was exhilarating. The students, staff, and the facilities were all excellent. I made one substantial change to the lectures: I gave each student a "clicker" (hand-held voting devices). From time to time during lecture I would ask a question for all students to answer, giving me real-time feedback.

Compared to 1973 when I was a student, this group was better-prepared and perceptibly smarter. This was a truly remarkable bunch of 16- and 17year-olds. Also, compared to 1973, much more is expected of the students academically. There is still a wide spread of abilities and backgrounds, which is healthy for the students, but challenging for the teacher. One student commented wryly that some of my lectures "left half the students bored and the other half lost." The betterprepared students helped those who were struggling. There is no better way to learn than by teaching.