The Summer Science Program

UNIVERSAL TIMES

Vol. 25

Fall 2006

INSIDE THIS *UT*

MEMOS

- Remember SSP as you plan your year-end charitable donations. Mail in the form on page 7, or visit www.ssp.org/donate to use a credit or debit card.
- The online database of alumni and faculty is undergoing an important upgrade. When it is ready, we'll send new login instructions.
- Mark your calendar for Reunion Day 2007: July 7 in Socorro, July 14 in Ojai.

OJAI

by Dr. Ran Sivron, Ojai Academic Director

At the 48th annual SSP in Ojai, students were as enthusiastic as ever, both academically and socially. Two new telescopes were installed, and the near earth asteroid (NEA) project got off to a promising start.

For analog observations we used a new Takahashi refractor equipped with a 4x5 sheet film holder. During the first two weeks our dedicated staff spent many nights adjusting the mount, but after that students took well-guided, measurable films at a reasonable rate (one per 3.5 attempts), and proceeded to the measuring engines.

Once each team had a measured film, they completed three or four digital observations with our new 14" Meade LX200R reflector with ST1301 CCD camera, and "measured" them with software.

All 12 teams combined their analog and digital observations to complete the orbital determination, and almost all used the f and g series to check their calculations and predicted positions for two later observations of their asteroids. Their results showed lower uncertainties and better accuracy than in recent years. Most students did the light travel time correction to improve their elements. Some went further,

(Continued on page 6)

2006 CAMPUS REPORTS

SOCORRO

by Dr. Alfred Leung, Socorro Academic Director

Despite the challenges of new staff and cloudy skies, our program was a success. The students were well disciplined, followed instructions, and all teams completed their orbit determinations. Those with less academic preparation were willing to ask for help as needed. Of course, few arrived prepared for SSP's intense focus on astronomical observations and computer programming, so diligence was more important than preparation. Students displayed a broad spectrum of personalities, and most were socially active and well-behaved (although a few intermittently fell asleep in class).

I gave 27 lectures on mathematics and physics; the first 15 were directly related to the core curriculum, while others covered popular topics such as special relativity, quantum mechanics, optics, and biophysics. The level of difficulty was equivalent to the third year of a university. In addition, I tried to instill in students the basic ingredients of a scientist: hard work, mathematical skills, and creativity.

Agnes Kim, Assistant Academic Director, gave ten lectures on astronomy and four on computer programming. She also spent many evening hours helping students in the computer labs. Liam McDaid, the other AAD, lectured 12 times on astronomy and related topics, and served as a "fifth TA", accompanying teams to Etscorn Observatory on the edge of the New Mexico Tech campus.

The "monsoon season" every summer makes Socorro

(Continued on page 6)

Field trip! to the Very Large Array outside of Socorro

PARENTS SAY

"If you send your child to SSP, expect your kid to phone home terrified during the first week, alternate enthusiastic and scared messages during the next ten days, not have time to respond to calls during the following three weeks, then hastily phone you as a very busy adult during the last days at SSP.

Have you ever watched a butterfly emerge from a chrysalis? What an assured young man I embraced at the airport!"

—Horia-Nicolai Teodorescu, Romania

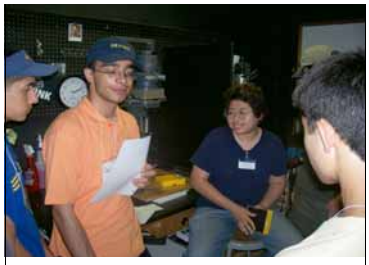
STAR LINEUP OF GUEST SPEAKERS

Ojai

- Andrew Friedman TA '02, Harvard Univ.: "Measuring the Expansion and Acceleration of the Universe with Supernovae and Gamma-Ray Bursts"
- Dr. Lynne Hillenbrand, Caltech: "Young Stellar Clusters and Accretion Disks"
- Dr. Louise Prockter, Johns Hopkins: "The Messenger Mission to Mercury (It's not the humidity, it's the heat!)"
- Dr. Larry Sverdrup, Ophthonix, Inc.: "Mad? Science"
- Dr. Tapio Schneider , Caltech: "The Dynamics of Climate Change: Facts, Physics, Forecasts"
- Dr. Kim Bruce '65, Pomona College: "Computational Semantics of Natural Languages"
- Dr. Bruce E. Jaffe , USGS Pacific Science Center: "West Sumatra International Tsunami Survey Team Report"
- Dr. Keith Devlin, Stanford Univ.: "NUMB3RS Numbers: The Real Story That Inspired the Hit CBS Television Series"
- Dr. Clifford Stoll, Acme Klein Bottle: "Dr. Stoll's Surprise"
- Stephen L. Cotler '60, SSP Vice-Chairman: Closing Address

Socorro

- Dr. Andrew J. Hanson, Indiana Univ.: "Solar Journey"
- Dr. Gregory Lyzenga, Harvey Mudd College: "High Powered Rocketry for Fun and Learning"
- Dr. Larry Sverdrup, Ophthonix, Inc.: "Mad? Science"
- Dr. Oliver A. Ryder, Zoological Society of San Diego: "Conservation and Research for Endangered Species"
- Dr. Paul Pottinger, Univ. of Washington: "The Science of Malaria"
- Dr. Penelope Boston, New Mexico Tech: "Caves from Earth to Mars and Beyond"
- Dr. Tyrone Hayes, UC Berkeley : "One-hundred-eyed Giants, Hermes, and Zeus' Infidelity...What do these things have to do with amphibians and pesticides?"
- Dr. Daniel Kammen, UC Berkeley : "Renewable Energy"
- Charles Holland, Jr. '60, SSP President: Closing Address



Darkroom orientation with TA Agnes Kamasi '01

Telescope orientation on the new Takahashi refractor

Working a little calculus

Talent Show in Socorro

TA Razvan Ungureanu '01 hard at work in the TA office

New Mexico has plenty of White Sands — just no ocean.

PARENTS SAY

"It was all we hoped for and more. Months after the program, this unique group of friends continues to communicate daily, sharing their lives and future plans. Their paths are sure to cross again."

—James and Kathy Bartz

Some Things Change Dept.: The Sky software provided by Software Bisque has largely replaced paper star charts

THE UNIVERSAL TIMES

Published by Summer Science Program, Inc.
Business Office:
108 Whiteberry Dr
Cary, NC 27519
Richard D. Bowdon '74, Executive Director
Email info2@summerscience.org
Voicemail 866.728.0999
Website www.summerscience.org

Class of 2005 Colleges

MIT (8)	Laura Han '04, Renuka Ramanathan '04, Arka Dhar, Shen Huang, Sara Mouradian, Sreya Sengupta, Lindsay Wilhelmus, Joshua Suresh
Harvard (7)	Yan Yan Mao '04, Masha Baryakhtar, Anna deBakker, Prajakta Jaju, Caitlin Lewarch, Kyle Chen, Robert Corty
Caltech (6)	Noele Norris '04, Paul Suffoletta '04, Matthew Feldman, Ga Il Lee, Guglielmo Lockhart, Benjamin Steele
Stanford (5)	Daniel Jachowski '04, Geeta Persad '04, Patrick Blaes, Jason Jia, Evan Miyazono
Princeton (5)	Tiffany Ko '04, Bambi Tsui '04, Ota-Benga Amaize, Seda Arca, Lucas Baradello
UC Berkeley (3)	Rajind Devendra, Brandon Giles, Calvin Lee
Johns Hopkins (3)	Alex Haase, Anuar Imanbayev, Allen Yu
Dartmouth (2)	Chris Kim, Geng Wang
Duke (2)	Sidney Kuo, Jason Lee
Notre Dame (2)	Emilio Cecconi '04, Patrick Holvey
Olin Colllege (2)	Spencer Backus, Matt Bowes
Rice (2)	Jameson Neff '04, Scott Newman
UCLA (2)	Boris Dzyubenko, Kalina Ward
Yale (2)	Laura Chanan, Tsz Ying (Della) Fok
Carnegie Mellon	David Schultz
Case Western	Jared Griebel
Columbia	Omer Erkovan
Cornell	Michael Feldman
Harvey Mudd	Dmitriy Yakovlev
New Mexico Tech	Sarah Stanley
Northwestern	Ozgur Tekin
Oxford	Zhifan Song
Penn State	Andy Eck
Pennsylvania	Michael DeLiso
Tulane	Torie Hartwick
Univ. of B.C.	Jennifer Loong
Univ. of Chicago	Adam Anderson
Univ. of Dallas	Sean Malone
Univ. of Florida	Elaine Johnson
Univ. of Rochester	Greg Wilbur
Univ. of Toronto	Farah Kabir
USC	Shiyu Bai
UT Austin	Mary Bishop
Vassar College	Rachel Wagner-Kaiser
Wellesley	Catarina Pien
Wesleyan	Matt Ragins '04

This year's "theme" in Socorro was superheroes. Here are three outside the classroom in Weir Hall.

2006ERS SAY

"I found out that there are people out there as eccentric and odd as I am."

–Peck Yang

"It's no coincidence that SSP alumni keep such strong ties — a program so academically rich, and allowing you to meet people as intelligent and passionate about science as you are, is bound to stick in your mind for the rest of your life."

–Erik Madsen

Some Things Never Change Dept.: doing homework together in the common room in Ojai

PARENTS SAY

"After SSP Anshul is a different person. There was a complete transformation in him. He now knows how fun and academics can coexist and he has learned the art of balancing both."

–Sandeep Bhagi

"We are truly amazed at how David had matured both emotionally and intellectually over the few weeks at SSP. The experience affirms his plan to major in physics. SSP is well worth the cost – the experience is priceless. We are grateful to SSP for paving the way for our next generation of young scientists."

—Manyee Gee

OJAI REPORT

(continued from page 1)

doing a stellar aberration correction and/or four-observation solution. I think we are now on the right track academically, with a curriculum that is on its way to become a new model if not for the next 48 years, then maybe the next 24….

Most teams submitted their results to the Minor Planet Center. Student Matthew Yankowitz and AAD Dr. Christian Thomas co-taught the submission procedures to students. Matthew, one of the first students to finish the OD, took it upon himself to learn the method, and communicated directly with MPC Director Dr. Brian Marsden.

I mostly attribute this success to, as usual, the relentless work of the academic staff. At Prof. Martin Mason's suggestion, we taught the open-source Visual Python programming language and and integrated it into the curriculum. I rewrote the OD packet given to students. Other factors were the better pointing accuracy of the new telescopes and the better resolution of the new CCD camera.

We were also working on the future of SSP. Over the summer I observed several near earth asteroids (NEAs) of magnitudes 15 or brighter with students using the Meade. (NEAs down to mag 19 can be observed with this telescope, after installing some software patches.) I have shown that we can obtain preliminary orbital elements using 3 hours or 1 day intervals. I suggest that next year, we add NEAs after the main-belt asteroid OD project is concluded.

We installed and successfully used color filters for experimental photometry on miscellaneous deep sky objects. Students also used the telescopes for "fun" observations of various nebulae and star clusters.

SSP is about much more than the OD, and the social aspects are much more than just what happens when 36 smart students get together. As in previous years we planned many activities that fascinated our young and eager students. We had ten guest speakers [*see list on page 2*], and took field trips to JPL and the planetarium in Santa Barbara. After visiting Caltech, most of the students said they intend to apply there! The last week featured our now-traditional geological field trip to Wheeler Gorge, led by former AD Dr. Tracy Furutani '79. And of course, weekly beach trips were a great joy to all.

Among the many social activities were: a cultural evening, first suggested two years ago by Nava R. Sivron (my late wife); tango lessons; disco in the yurt; a bonfire with sleepover by the soccer field; and a two-day "Assassins" tournament. It was a full schedule of work and fun.

SOCORRO REPORT

(continued from page 1)

less than ideal for astronomical observations … and this year was worse than usual. Many nights of observation were clouded out, to everyone's frustration. Thanks to a few supplemental CCD images taken by the faculty in Ojai at our request, all 12 teams were able to obtain sufficient data for their orbit determination. Agnes Kim wrote instructions to show students how to correct the Ojai data for parallax.

The UCLA measuring engine, shipped from Ojai, arrived damaged. A staff machinist restored it to functionality, but it presented a tremendous challenge to students facing a measuring engine for the first time. It will require more repairs before next summer.

Everyone on the staff at New Mexico Tech was extremely hospitable. Sara Grijalva and Malcolm Montgomery in the Residential Life Dept. worked beyond the call of duty, and Dr. Dan Klinglesmith made himself available at all hours to help with the telescopes and measuring engines. In the new Fidel Center, the variety and quality of food were very good (much improved from last year, I understand).

We visited the VLA, White Sands, Trinity Site, Albuquerque, and a conference in Santa Fe on Supermassive Black Holes [*see page 7*]. Our recreational activities included trips to Waldo Mine, Old Timer's Reunion in Magdalena, and Elephant Butte Reservoir; plus a dance and the talent show. Many of us took advantage of Tech's excellent facilities: gym, swimming pool, billiards tables, and tennis courts.

Leslie Clark served as Site Director, in charge of the students' welfare, field trips, receptions for guest speakers, and booking rooms for special events. She took care of students and staff alike. The four TAs were in close touch with the students 24 hours a day and almost 7 days a week. They led teams of students making observations, monitored their academic and social activities, and graded homework assignments. They worked very hard, cared a lot about the students, and carried on all the SSP traditions.

Next summer, I recommend that students be given more opportunities to express their creativity and contribute to the scientific process. They should have a chance to synthesize new knowledge based on what they have learned. I also recommend that digital observations be used exclusively in the OD. Although some argue that film has pedagogical value and that measuring with software is a "black box", the fact is that scientific instruments are now very complex; "black boxes" are here to stay.

In conclusion, all students benefited tremendously from the program, and the staff members collaborated cohesively and complemented one another.

Donation Return Form

I am enclosing my donation to the **only** independent science enrichment program managed and funded by its own alumni: ☐ **$1000** ☐ **$500** ☐ **$250** ☐ **$100** ☐ **$50** ☐ **$25** ☐ **$_____**

Credit to (*name*) _____ ☐ Alum ☐ Parent ☐ Faculty ☐ Friend

My email address: _____

Earmark my donation for: ☐ Unrestricted ☐ Abell Scholarship

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

Return this form to:

Summer Science Program
c/o Jeffrey Saye
820 Manhattan Ave, Suite 206
Manhattan Beach, CA 90266

Please correct your address on the back of this form.

It's safe and easy to donate on-line, using a credit or debit card, at **www.summerscience.org/donate**.

Summer Science Program, Inc. is designated a 501c(3) nonprofit corporation by the Internal Revenue Service. Donations are tax-deductible according to law.

FROM THE CHAIRMAN

(continued from back page)

served on the senior faculty in Ojai for six years. (Read their bios at ssp.org.) Our heartfelt thanks go to outgoing Trustees Tim McCarthy '59, Mitch Kapor '66, Freada Kapor Klein, and Roger Klausler. Roger, who kept SSP going at Thacher through the '80's and '90's and who has been of immense help in the transition to an independent SSP, is now Trustee Emeritus.

I also salute the dozens of other alumni and friends who help make SSP happen, and hundreds who make an annual donation [*see pages 4-5*]. Our non-profit organization draws continuously from this reservoir of support. During the lead-up to SSP's 50th Anniversary in 2008, alumni will be hosting gatherings around the country. The 50th will be a focus as we invigorate our alumni network.

On behalf of the Board, the staff, and especially the students, I want to thank everyone for supporting this marvelous, worthy Program.

SOCORRO CLASS TO BLACK HOLE CONFERENCE

Prof. Fulvio Melia, of the University of Arizona and Steward Observatory, is also father of Adrian Melia '06. By coincidence, he organized a professional conference in Santa Fe on "Physics and Astrophysics of Supermassive Black Holes", to be held on July 10th, right in the middle of SSP. So he invited our 44 students and staff to attend from Socorro.

They all had the rare opportunity to hear mathematician Roy Kerr speak on "Solving Einstein's Field Equations". Dr. Kerr's solution, first published in 1963, describes the space outside a rotating black hole, and ushered in a "golden age of black hole physics".

REUNION FUN

SOTS in Socorro

Ojai Reunion Speaker Dr. Larry Sverdrup electrocutes a student.

	1	2	3	4	5	6	7	
Alumni	**0**	**3**	**0**	**1**	**8**	**0**	**2**	**14**
Students	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**3**

Ojai students actually trained with a coach (Caryn Mason) before the traditional softball game vs. alumni. It didn't work; alumni won 14-3. Trustee Steve Cotler '60 came out of retirement to hit a triple and a home run; Executive Director Richard Bowdon '74 was the winning pitcher. Afterward, students gave their traditional cry: "Wait 'til next year! We'll be alumni then!"

2006ERS SAY

"The priceless part of it was being with my SSP family and growing the most socially and as an individual, which was unexpected but definitely fruitful."
–Fakhra Khalid

"SSP is swing dancing for three hours before heading straight for the computer lab to finish a programming assignment. It's only at SSP that having fun can motivate you to do more work."
–Michelle Chang

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

2006ERS SAY

"SSP is a laboratory in which the subject of the experiment and the scientist are the same person, and that's you."

–Ben Knudsen

"SSP is literally life x 1000. That's the only way I can describe it."

–Henry Yuen

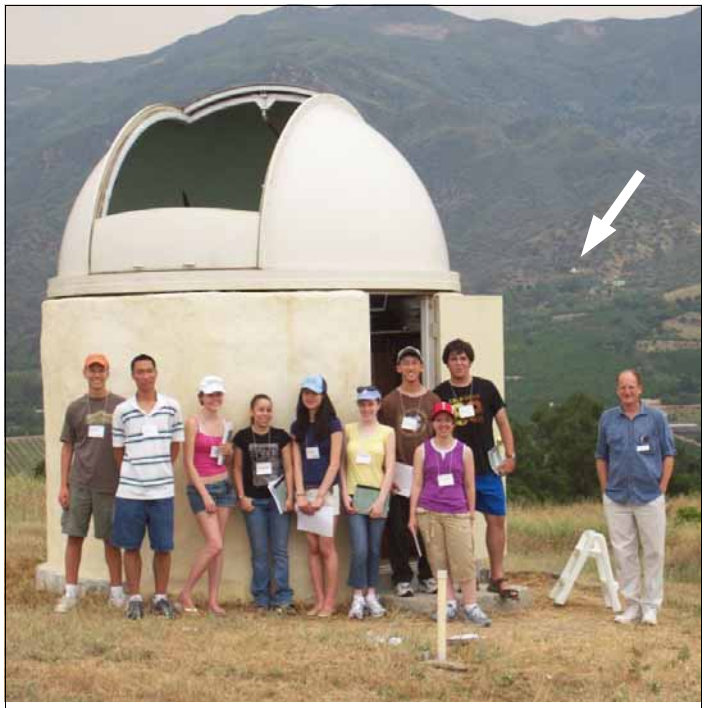
FROM THE CHAIRMAN

by Henry Lichstein '60

Like all organizations, SSP goes through changes of life. The Board of Trustees, which sets policy and is responsible for finances and staff, has new faces and new roles. Steve Cotler '60, one of the original "gang of five" alumni who took over management of the Program from Thacher in 2000, has stepped down as Chairman to focus on fundraising. Mike McKay '78, an investment fund manager, has stepped into the Treasurer's job I held. Most operating responsibilities are now in the hands of the Executive Director.

Last month we welcomed three new Trustees: Prof. Elizabeth Simmons '80, TA '84-'85; Dr. Eric Korevaar '76, TA '81-'83; and Dr. Tracy Furatani '79, who

(Continued on page 7)



The first day of SSP 2006. The arrow shows the dome at Thacher School across the Ojai Valley, installed by UCLA in the early 1970's, used by SSP for many years … now converted to staff housing!