The Summer Science Program

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SSP 2010 IN SANTA BARBARA

The SSP Board of Trustees has voted to move the California campus next summer from Besant Hill School in Ojai to Westmont College in Santa Barbara. The decision was prompted by the expiration of SSP's contract with Besant Hill, and Westmont's offer of its first-class facilities, including a new 24" telescope.

An alumnus on the Westmont physics faculty, Warren Rogers '76, played a key role in the decision. "I remember fondly my own SSP summer, so I'm gratified that I can do something to help future students have their own life-changing experience," he said.

The move comes after ten years at Besant Hill. Although the program has been very successful there, a college campus offers better computer resources and other infrastructure, increasingly important to the curriculum.

"It's been a strain to maintain two complex telescopes by ourselves," commented Richard Bowdon'74, SSP's Executive Director, "and our computing needs are greater than ever. Although we'll miss the people and dark skies at BHS, our experience at New Mexico Tech has proven the advantages of

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ACADEMIC DIRECTOR REPORTS

Ojai Campus

by Ran Sivron

Half a century after the first SSP, the program is alive and well. The successful transition over the last few years to observing near earth asteroids (NEAs) can be the foundation for a program that thrives for the next 50 years. NEAs are great motivators; most teams calculated the time and distance of closest approach to earth of **their** asteroid.

Students come to the program increasingly well prepared in physics and calculus. That gives us more opportunities to cover some advanced topics that can help them get better orbital elements. For example, programming and error analysis got greater roles in this year's program. These are rarely taught in high school and can give our students a significant head start in college.

In the first two weeks, students manually guided the Takahashi to take and

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Socorro Campus

by Don Davis

I am pleased to report that all 36 students completed the program in Socorro, despite problems getting good orbits for most of our NEAs this year. Tutoring sessions in differential calculus and vector algebra helped those with less preparation. And, our students were very well-behaved and polite … and healthy, without one trip to the ER. (True, one student brought a flash drive infected with a virus, but that was inadvertent, and Tech's anti-virus software prevented it from spreading.)

There were two sources of OD problems. First, we relied on code from last year which contained an error. After a lot of effort some students were able to find and correct that error - they can do very impressive work! However, they were still getting very erratic results for some asteroids – even hyperbolic orbits. Unfortunately time ran out before anyone could crack this problem. Student Jack Ingalls emailed me about a

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2009ers Say

When I came back home, my brain was over-functioning.

–Ekin Ilseven

The most amazing aspect of SSP is probably learning new things and facing new challenges every single moment.

–Oprescu Miruna

I have become much more open to the idea of collaboration and cooperation because of SSP.

–Dylan Liu

I don't know whether I want to be an astro-physicist or a neuro-scientist, but I do know that whatever I do, I will work in a team, made up of people as quirky and diverse as those I spent six weeks with this summer.

–Anna Ho

SSP is life as it should be.

–Leah Weiss

–more quotes at ssp.org–

"It's the People"

Ojai students and faculty

Socorro students and faculty

SSP 2010 in Santa Barbara

(Continued from page 1)

holding a college-like program at a college."

Westmont is a small (1,200 students), private, liberal arts, undergraduate, non-denominational Christian college, with a strong science curriculum. SSP will lease facilities there, as has been standard practice since leaving Thacher in 2000.

Westmont recently installed a 24" DFM telescope, to which SSP will have access. However the weather and "seeing" will be inferior to Ojai. To supplement local images, student teams will be able to obtain observations on request from the PROMPT robotic telescopes in Chile.

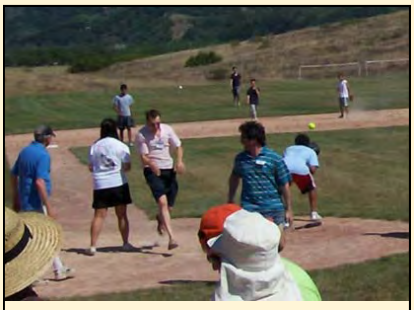
Bowdon addressed potential alumni concerns about leaving Ojai. He noted that Westmont is a quiet, beautiful place where SSP can maintain social isolation. "Ten years after leaving Thacher, seven years after opening at New Mexico Tech, we understand the essential design elements that make SSP successful," he said. "We know SSP can work outside of Ojai."

College ⟵ SSP '08

Allegheny College	Hannah Kowen
Brown	Ryan Handoko
Caltech (8)	Christine Chang, Gabriella Dodd, Lauren Gilbert, Tsung-Ju Lu, Joanna Robaszewski, Ryan Thorngren, Christine Wu, Hunter Zhao
Cambridge Univ.	Konrad Komorowski
Carnegie Mellon (2)	Arsenij Kouriatov, Andrew Rodriguez
Columbia	Helen Zhang
Harvard (6)	Mary Davies '07, Mi Deng, Dmitri Gekhtman '07, Roberto Landin, Samuel Meyer, Alexander Sahn,
Harvey Mudd (3)	Matthew Goodwin, Jacob Leonardis, Melinda Macia
Imperial College	Jacklyn Nagle
Indian Inst. Tech.	Singh Udbhav Kumar '07
MIT (12)	Juhee Bae, Kiranmayi Bhattaram, Duanni Huang, YiAn Lai, Kayla Meduna, Arun Saigal, Avanti Shrikumar, Jeremy Steeger, Stephanie Thompson, Hannah Walker, You Yoon, Chen Zhao
NMSU	Marie Fulmer
Northwestern (2)	Derrick Liu, Insu Paek
Ohio Univ.	Sarah Wyss
Princeton (6)	Santhosh Balasubramanian, Michael Lee, Kanika Pasricha, Paloma Tamminga, Andrew Tracer, Wesley Verne
Rice (2)	Chad Bustard, Dana Dement
Stanford (2)	Wesley Leung, Shayon Saleh
Swarthmore	Mark Olson
UC Berkeley (3)	Bryan Cheng, Victor Lai '07, Alan Xie
UC Santa Barbara	Gil Tabak
UCLA	David Oh
Univ. of Chicago	Sean You
Univ. of Michigan	Aditya Arun
Univ. of Rochester	Charlotte Hotchkiss
Univ. Simon Bolivar	Michael Gandelman
Washington Univ.	Yunke Liu
Williams College	Adnan Khan
Yale (3)	Maria Altyeva, Wendy Lin '07, David Steinberg

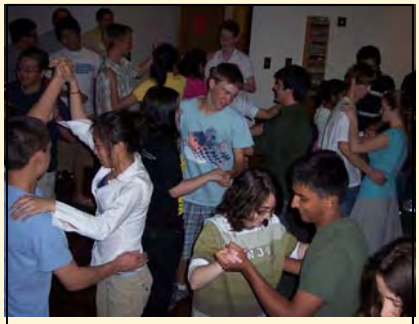
Trustee Election Results

The first-ever election of SSP Trustees was held this spring by online ballot, emailed to all 1,213 alumni and former faculty for whom we have email addresses [send yours to sspalum@ssp.org]. Results were announced in the *Universal Times Email Edition* for August. Razvan Ungureanu '01, TA '05-'07 was elected, along with incumbents Steve Cotler '60 and Dan Seligson '71.



The throw to the plate is not in time! Alumni win again!

SSP students love physics.



Swing dancing has become a Socorro tradition.

Action at a distance: Dr. Larry Sverdrup blows out the candle.

The 2009 Ojai TA Corps.

Ojai Academic Director's Report

(Continued from page 1)

measure film images of a variable star, programmed a plate solution program to obtain its coordinates, compared those to published values, and wrote a report. This gave them a good foundation for the OD project to come next.

For the first time in recent years, students used Gauss's method for the OD, predicted the asteroid's position at a future observation, and tested the prediction with an extra observation. Four students also performed the light travel-time correction.

I was especially pleased that SSP's "no black boxes" philosophy reached new heights. In addition to the OD and ephemeris generation programs, the students wrote their own software for: error propagation, a complete electronic "measuring engine", least squares plate reduction, Doppler shifts from extra-solar planetary systems, and visualizing the orbit of their asteroid.

As a side project, a parallax experiment was conducted in collaboration with the Socorro campus, taking simultaneous observations from both locations. Students attempted to obtain the distance to the asteroid based on the FITS images alone – with no instructions. A few obtained results within 10% of the published value.

In lecture we covered the usual array of topics, except that vectors, forces, momentum and energy were shrunk to three classes this year. We added one lecture on "How to Write a Research Report"; as a result, the quality of the report-writing this year was much improved over past years.

To address the issue of different levels of incoming preparation among the students, the TAs led a series of programming and math/physics workshops. About a third of students attended these optional sessions, with a strong positive effect on their morale.

As usual there were several fantastic guest lectures. We took field trips to JPL, Caltech, Griffith Observatory, Kavli Institute for Theoretical Physics, Getty Museum, and Wheeler Gorge, and the usual local beaches.

I see a very strong correlation between staff efforts to communicate SSP's honor code, and the overall success of the program. Getting students to understand and internalize the honor code is not easy; most need an adjustment period and frequent reminders. But with that effort students achieved great results both academically and socially.

Rosie, Laura, Rico, Christina, Martin and Barb were the best staff I have ever worked with. They exceeded my expectations, and I feel privileged to have spent the summer with them. We laughed and cried together, consoled each other, and covered for each other more times than I can recount.

Socorro Academic Director's Report

(Continued from page 1)

week later from home that he had solved it – we needed to convert the earth-sun vector from ecliptic (the default from JPL Horizons) to equatorial coordinates.

The guest speakers were all excellent, with Larry Svedrup (Mad Science demonstrations) and Bruce Held (ex-CIA agent) especially riveting the students. Trustee Steve Cotler '60 does an outstanding job of arranging interesting speakers who expose students to many fields outside of physics and astronomy. There were field trips to the Very Large Array, Magdalena Ridge Observatory, Carlsbad Caverns, Trinity Site/White Sands/Apache point, Albuquerque, and Elephant Butte Reservoir.

The Etscorn Observatory is well suited for SSP observational programs, with three telescopes available to us this year. Dr. Dan Klinglesmith is willing to take calls in the wee hours to answer questions Other NMT campus personnel were also very supportive.

We had two "special" lectures in Socorro this year, *i.e.* lectures that were an integral part of the curriculum, as distinct from the guest lecture program. Dr. David Tholen, who does NEA ODs for a living, spoke via live video link from the Institute for Astronomy in Hawaii. Mr. Jason Speights, a graduate student in astronomy at NM Tech, gave an excellent talk on galaxies, including his cutting edge research on galactic spiral structure formation.

Bill Andersen, who returned for his second year as Associate AD, is a real treasure. His passion for teaching extends beyond the regular classroom lectures to organizing special evening sessions on topics ranging from remedial vector algebra and differential calculus to relativistic quantum mechanics. Bill was a pillar of strength, and his cheerful and positive attitude make him a pleasure to work with.

Site Director Leslie Clark was on the front line in dealing with TA and student issues this year; suffice it to say that she was the voice of experience in dealing with these issues. While there are lessons to be learned and applied to future SSP programs, the energy and insights of Leslie were needed to get through 2009 in Socorro.

I also want to thank our excellent TAs: Peter Combs '03, Rebecca Mickol, Michelle Krok, and Rachel Paterno-Mahler '02. Ojai faculty Ran Sivron and Martin Mason were willing to provide help and share resources, much appreciated by a new AD.

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

Credit to: _____ ☐ alumnus ☐ parent ☐ faculty ☐ friend

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☐ Endowment Scholarship Fund (or _____%)

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Livermore, CA 94550

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Inspiring Guest Speakers

Ojai	Socorro
Dr. Duncan Agnew '67, UCSD - "The Rotating Earth: Where Astronomy meets the Oceans, the Atmosphere, the Ice Ages, and the Earth's Core"	**Dr. Eileen V. Ryan**, New Mexico Tech - "Follow up and Characterization of Potentially Hazardous Asteroids using the MRO 2.4m Telescope"
Michael A. Weiss, MD '74, Case Western Reserve Univ. - "Molecular Biophysics of Sex Determination"	**Dr. William Bottke**, Southwest Research Inst. - "Exploring the Formation and Bombardment History of the Moon"
Dr. Amy C. Barr '94, Southwest Research Inst. - "Melting and Core Formation in Jupiter's Twin Moons Ganymede and Callisto"	**Dr. Penelope Boston**, New Mexico Tech - "Caves: Exploring Life Underground from Earth to Mars and Beyond"
Dr. Andrew J. Hanson, Indiana Univ. - "3D Journeys through the Universe in Space and in Wavelength"	**Dr. David Tholen**, Inst. for Astronomy, Univ. of Hawaii - "KNOBS: Orbit Determination of NEAs by Numerical Methods"
Dr. Ann R. Karagozian, UCLA - "Combustion: Does it have a Future in a Green World?"	**Dr. Diana E. Wheeler**, Univ. of Arizona - "Insect Societies, or: Ants, Bees and Termites, Oh My"
Dr. Aubrey de Grey, SENS Foundation - "Prospects for Defeating Aging Altogether"	**Mika McKinnon '00**, SciFi Network's Stargate Franchise - "Disaster Science Fiction"
Dr. H. Michael Sommermann, Westmont College - "A Soliton Model of Nucleons and Nuclear Interactions"	**Dr. Larry Sverdrup**, Trex Enterprises - "Mad? Science!"
Dr. Joy A. Crisp, JPL / Caltech - "Spirit, Opportunity, and the Next Big Rover Going to Mars"	**Paul Pottinger, MD**, Univ. of Washington Medical Center - "Parasitic Infections: Impact, Neglect, and Opportunities"
Dr. Larry Sverdrup, Trex Enterprises - "Mad? Science!"	**Dr. Henry Roe '91**, Lowell Observatory - "Titan's Methane Monsoon"
Dr. Tyrone Hayes, UC Berkeley - "From Silent Spring to Silent Night"	**Dr. Michael Dubson '73**, CU Boulder - "Optics, Meteorololgy, and an Airline Crash"
	E. Bruce Held, Sandia National Lab - "Espionage in New Mexico"

Parents Say

Getting to know other talented and highly motivated students inspired Helen to reach even higher.
—Jim Wang

Our son has grown up in rural Idaho with a passion for math and science. Peer interaction has been deeply lacking. SSP is the best thing that's ever happened to him.
—Carole Freund

Before SSP Kendall questioned if she could truly succeed in a college environment. Now, finally, she feels empowered. Going into the college application process, this is wonderful.
—Nikki Capshaw

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Cary, NC 27519

"What fun it was to meet such a great group of young people, from all over the world. The international aspect of SSP is a wonderful evolution, not only for science but also as a new generation of ambassadors for peace in our troubled world."

–Michael Weiss '74, parent and guest speaker, '09

LETTER FROM THE CHAIR

By Dr. Elizabeth Simmons '80, Chair, SSP Board of Trustees

SSP Year 51 and counting! Another cohort of students successfully completed their analysis of (near-earth!) asteroids at the Ojai and Socorro campuses. Parents describe how the summer of science immersion has enhanced the academic confidence of their returning teenagers. And the faculty are distilling the summer's experience into cogent recommendations for fine-tuning the observational program in summer #52.

The big news is our pending move from Ojai to Westmont College in Santa Barbara, with the assistance of Physics Dept. Chair Warren Rogers `76. While we have enjoyed 10 years at Besant Hill School, our experience at New Mexico Tech since 2003 has made abundantly clear the many advantages of partnering with a college. Better equipment, more staff support, and campus faculty as potential speakers and collaborators are just a few of the benefits we anticipate from this new partnership.

Your Trustees and working committees will also continue pursuing issues related to supporting the more diverse cohort of students that we are welcoming to SSP. In order for SSP to be a leader in bringing gender, racial/ethnic, and socioeconomic diversity to science, it is not enough to invite a broader range of students to apply or attend. We must ensure that we are truly anticipating and meeting their needs, so that all who attend will have a successful experience.

Finally, we have completed the transition to a "membership" organization, in which all alumni and faculty are invited to vote for the Trustees who will chart the program's future course. A younger alumnus, Razvan Ungureanu '01, has been elected to the Board of Trustees in a rather close contest, heralding a new era of SSP leadership. While we always remain grateful to older alumni who generously donate time and funds, the program can only continue to flourish if the younger generations do likewise. Please step forward to help lead SSP into the future!

Dr. Simmons is Professor of Physics at Michigan State Univ. and Dean of its Lyman Briggs College