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SUCCESSFUL MOVE TO WESTMONT COLLEGE

It went down to the wire.

Just days after a new concrete pad and pier were poured, and hours before faculty would arrive, an intrepid band of SSP alumni, local amateur astronomers, and Westmont faculty managed to get our clamshell dome and Meade 14-inch reflector moved from Ojai and re-assembled at their new home.

And it all worked fine ... well, after a quick trip to Oceanside Telescope, to remove the remains of an unfortunate mouse and clean the mirror. But the students never even heard about that.

As far as they could tell, SSP had always been up and running smoothly at Westmont College.

Westmont is compact and beautiful, with the perfect combination of dorms, classrooms, recreational opportunities, and of course the 24" Keck telescope to which we were given ample access.



Much of the credit for the smooth transition belongs to Westmont physics Prof. Warren Rogers '76. Our Associate Academic Director (and paraglider) Michael Faison said it well: Warren was "the wind beneath our wings."

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- Update your email address, send news or questions: sspalum@ssp.org
- Browse the online database of alumni and faculty: ssp.org/database
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ACADEMIC DIRECTOR REPORTS

SSP @ Westmont College

by Tracy Furutani '79

The 52nd Summer Science Program made a successful transition from the Ojai Valley to Westmont College in the gorgeous foothills above Santa Barbara. The first SSP class to achieve gender parity attended lectures in spherical trigonometry, statistics, calculus, kinematics, computer programming and astronomy, heard eight guest speakers on topics ranging from neuroscience to asteroid impact mitigation, and trekked to the Kavli Institute of Theoretical Physics, Las Cumbres Observatory Global Telescope, Griffith Observatory, the Getty Museum, Caltech, the Jet Propulsion Laboratories, and Wheeler Gorge.

(Continued on page 6)

SSP @ New Mexico Tech

by Ran Sivron

The 8th SSP at New Mexico Tech succeeded both academically and socially. The near earth asteroids (NEAs) project worked extremely well despite an unusually rainy year in Socorro. Overall this was one of the best SSP programs I have been involved with.

All students completed the near-Earth asteroid (NEA) orbital determination, using Gauss's method. Thirty-four students used error propagation to find the uncertainties in their values of their orbital elements. Thirty students used their elements to predict the ephemeris of a fourth observation, and propagated their errors, obtaining uncertainties in the projected RA and dec.

(Continued on page 6)

2010ERS SAY

The way of living and interacting with people here is so exactly the way I've always wanted to do it, that I'm scared what will happen when I leave.

—Nicholas Induni

I learned that whomever separates academic and social life makes a big mistake.

—Tudor Giurgica-Tiron

For me, science has always been a class. Now I understand what it is like to be a scientist.

—Ari Vogel

"IT'S THE PEOPLE"



Students and faculty at Westmont College



Students and faculty at New Mexico Tech

CHAOS IN THE SOLAR SYSTEM

2010 was the second year of a four-year partnership with Southwest Research Institute, bringing the Orbit Integration Research Project to SSP, with funding provided by NASA's Lunar Research Institute.

This summer Dr. Amy Barr '94 and two colleagues spent two days on both campuses during the last week of SSP. Students plugged their asteroid orbital elements into an N-body orbital integrator called SwIFT, enabling a more realistic prediction of its future path — including uncertainties

resulting from random perturbations — than the classic two-body solution provides.

Wrote a student: "It gave us an application for our ODs, as well as providing a framework for the discussion of chaos theory. It was a real life example of how scientists can use software in their research."

Next summer there will be improvements, such as making SwIFT available to students earlier in the program.

COLLEGE CLASSES OF 2014

Brown	Min Jung Yoo
Caltech (8)	Jacob Shenker, Aniruddha Bapat, Erika DeBenedictis, Isaac Kim, Stephanie Laga, James Chang, Garima Gupta, Bhargav Setlur
Columbia (3)	Jack Goetz, Michael Yan, Dylan Liu
Cooper Union	Joseph Kreitinger
Cornell (2)	Yuting Chen, Hee Sung Park
Dartmouth	Chanon Praepipatmongkol
Delhi Univ.	Maitreyi Sangal
Emory Univ.	Rajiv Velury
ETH Zurich	Ekin Ilseven
Harvard (6)	Jung Hoon (Stephen) Liu, Ioana Florea, Leah Weiss, Kristin Barclay, Sebastian Chiu, Jordan Feyko
Harvey Mudd	Andrew Turner
Istanbul Tech. U.	Ceren Burcak Dag
MIT (14)	Yoonjeong Cha, Hao-yu Derek Chang, Michelle Chen, Raven Clayborn, Tongji (YouYou) Li, Jonathan Lui, Dhananjai Venkataramanan Saranadhi, Carolyn Zhang, Jie Zhao, Lena Ziskin, Kendall Capshaw, Anna Ho, Charles Liu, Demetra Sklaviadis
New York Univ.	Nitin Srinivasan
NM Tech	Paula Tapia
Pennsylvania (2)	Pulak Mittal, Jake Rubin
Pomona College	Rebekah Cramerus
Princeton (2)	Ketevan Tsereteli, Michael Wagner
Reed College	Andrew Warren
Rice	Ryan Pyle
Stanford (10)	Benjamin Lei, Sameer Arya, Dominic Becker, Wesley Chang, Jane Hae Soo Shin, Brendan Freund, Jack Ingalls, Joey Jachowski, JJ Liu, Jong Hyuck Won
UC Berkeley (3)	Abhimat Gautam, Minyong (David) Jia, Daniel Wu
UC Santa Barbara	Chia-Hsi (Jessica) Lin
Univ. of Chicago	Shankara Pailoor
Yale (6)	Pearson Miller, Antonia Gallman, Helen Wang, Chris Hong, Charlie Kelly, Aaron Lewis



That must be why they call it "White Sands"



Terrific TAs at NM Tech



Making movie night snacks in the dorm kitchen



Alumni tour Westmont's 24" Keck telescope.



Designing the campus T-shirt

TRUSTEE ELECTION RESULTS

The second election of SSP Trustees was held this spring by online ballot, emailed to all alumni and former faculty for whom we have email addresses (send yours to sspalum@ssp.org).

Results were announced at Reunion Day at Westmont and in the August *Universal Times Email Edition*. Three incumbents were re-elected: Dr. Janice Bishop '81, Lissa Ong '99, and Dr. David Pierce.

SSP @ WESTMONT AD REPORT

(Continued from page 1)

Moreover, every student completed the Gaussian orbital determination for their asteroid and had their observations submitted to the Minor Planet Center. Every student team completed a final report with error analysis. Some teams even went so far as to generate a 3-D dimensional visualization of their asteroid's orbit.

The Meade 14" remains our primary telescope, but Westmont generously gave us access to their beautiful 24-inch Keck DFM reflector, under the watchful eye of Assoc. Academic Director Michael Faison. Students were also able to supplement their data with remote observations from the PROMPT telescope in Chile.

I was grateful to have wonderful colleagues, including Dr. Faison and Site Director Barb Martinez, both for their third SSPs. Aply assisting the students in all ways were our fantastic corps of teach-

ing assistants, who sat up with them night after night, observing, programming or simply talking about life after high school. Each TA brought an "extra" with them: Rico Chiu '04 showed students how to design their own steps in Dance Dance Revolution, Bethania Baciagalupe '03 taught basic yoga relaxation techniques (as well as maintaining the student blog), Mary Masterman '05 engaged students in some thought-provoking Questions of the Day and deeper issues of third-world development, and Benjamin Steele '05 led hikes, culminating in the ascent of Montecito Peak.

The only major drawback to Santa Barbara is the thick layer of fog that often rolls in from the ocean; in the key 26-night period during the middle of the program, there were 12 clear nights and 4 partially clear nights. If we had still been using one film-based astrograph, the weather would have prevented some groups from obtaining three good obser-

vations. But with digital imaging and multiple telescopes, every team even obtained a fourth observation to check the accuracy of their orbital elements through ephemeris generation. Students programmed nearly all of the software tools they would require for the summer, including astrometry of their asteroid and reference stars.

SSP hired three local high school students to serve a continental breakfast every morning. This proved to be quite popular, with far more students eating breakfast regularly than in past programs.

Finally, I want to thank all of the people who made the program possible: the Westmont Physics Dept. and Conference Services; Julie Kornfield, Steve Vass and Karl Forster at Caltech; Stuart Stephens, Van Snyder, Dennis Elliot and Tracy Neilson at JPL; and Ed Krupp and David Reitzel at Griffith Observatory.

SSP @ NM TECH AD REPORT

(Continued from page 1)

Some students went even further: performing a light travel-time correction and stellar aberration correction; showing that Laplace's method is less effective for NEAs; using differential corrections to obtain more accurate orbital elements; and finding the minimum distance from earth to their asteroid in the future.

Quality of images varied significantly. On nights with poor seeing, the signal to noise ratio for faint (mag 17) asteroids went as low as 1.1 to 1. We often had to observe through holes in clouds, and half of the observations were cancelled due to bad weather. I believe the most important addition to the curriculum should be in the observatory. There should be more observations aimed specifically at reducing signal to noise ratio and getting the best possible images for astrometrics. This, in

pedagogical terms, will be the analogue to better guiding and measuring.

The "no black boxes" philosophy of SSP reached new heights. Before the OD and ephemeris generation programs, students wrote an "electronic measuring engine" and a Least Squares Plate Reduction program. Some generated their own Earth-Sun vectors instead of using the JPL values, or created a visualization of their asteroid orbiting the Sun.

There has been some discussion of whether 3-student teams are still relevant with digital observations. We found the team structure crucial in both academic and social aspects, such as the Honor Code. Teammates counseled one another against disturbing others, slacking, copying, or just falling behind. They felt responsible for their team's academic success.

Our field trips to Sunspot/Apache

Point, the Very Large Array, and Magdalena Observatory meshed well with the curriculum. Trips to White Sands National Monument, Carlsbad Caverns, Old Towne Albuquerque, and Elephant Butte Reservoir were just pure fun.

We enjoyed an outstanding lineup of guest speakers. Perhaps the most touching moment came when Dr. Mike Weiss '73 told of attending the wedding of one SSP teammate, and years later, the funeral of the other.

I am grateful to Dr. Dan KlingleSmith and Jason Speight for their great support at Etscorn Observatory, and all the folks at NMT Residential Life. And of course, I especially thank my colleagues: Site Director Leslie Clark, Associate Academic Director Bill Andersen, and four outstanding TAs: Sherry-Shiu Bai '05, Sean Mattingly '03, Rachel Kaiser-Wagner '05, and Benjamin Knudsen '06.

DONATION FORM

Please help inspire 72 gifted teenagers to reach their amazing potentials. Return this form with your check, or donate online using a credit card at www.ssp.org/donate. Send any questions to sspalum@ssp.org.

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Send corrections to your mailing or email addresses to sspalum@ssp.org, or mark on the back of this form.

INSPIRING GUEST SPEAKERS

WESTMONT	NM TECH
Dr. Paul Pottinger , Univ. of Washington Medical Center - "Parasitic Infections: Impact, Neglect, and Opportunities"	Dr. Eileen V. Ryan , New Mexico Tech - "Follow up and Characterization of Potentially Hazardous Asteroids using the MRO 2.4m Telescope"
Dr. Sigrid Close , Stanford - "Asteroids and Space Situational Awareness"	Dr. Larry Sverdrup , Trex Enterprises - "Mad? Science!"
Dr. Larry Sverdrup , Trex Enterprises - "Mad? Science!"	Dr. Henry Roe '91 , Lowell Observatory - "Titan's Methane Monsoon"
Dr. Jean Chiar , SETI Institute - "Spectroscopy and Space Dust"	Mika McKinnon '00 , Science Consultant for "Stargate" on the SyFy Network - "Disaster Science Fiction"
Dr. Omer Blaes , UC Santa Barbara - "Astrophysics of Black Holes"	Dr. Michael Dubson '73 , Univ. of Colorado at Boulder - "Optics, Meteorology, and an Airline Crash"
Dr. Gal Bitan , Geffen School of Medicine, UCLA - "Neurodegenerative Diseases"	Dr. Tyrone Hayes , UC Berkeley - "From Silent Spring to Silent Night"
Dr. Michelle Khine , UC Irvine - "Think Big...Then Shrink"	Dr. Penelope Boston , New Mexico Tech - "Exploring Life Underground from Earth to Mars and Beyond"
Dr. Warren Rogers '76 , Westmont College - "Nuclear Astrophysics and the Origin of the Elements"	Dr. Michael A. Weiss '74 , Case Western Reserve Univ. - "Molecular Biophysics of Sex Determination"

The Guest Speaker Series is underwritten by Sandia National Lab / Lockheed Martin

2010ERS SAY

*Friends become family.
 Everyone is open and welcoming.
 —Yujin Maeng*

*For those with existential angst, feeling that the world is harsh and meaningless, SSP can be a beacon.
 —Lander Martin*

*It cannot be explained, only experienced.
 —Reed Sanchez*

*I am proud and grateful to have joined the SSP network.
 —Reilly Raab*



The Summer Science Program

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Cary, NC 27519

"There are times in a youth's life, that a single teacher or activity becomes his or her life changing event. Jeffrey recognized that science is not only his passion, but that being around those "who are like me, think like me, understand me" is the educational Utopia he has been searching for, and the professional milieu he will no doubt seek.

**–Rosette Sperling,
parent of Jeffrey Sperling**

LETTER FROM THE CHAIR

By Dr. Elizabeth Simmons '80, TA '84-'85, Chair, SSP Board of Trustees

SSP's 52nd summer has flown by! As the reports from the Academic Directors attest (*page 1*), our students employed digital imaging and programming techniques quite effectively in the analysis of near-earth asteroid orbits. Access to the PROMPT telescope in Chile allowed teams to circumvent tricky local weather.

Our collaboration with the Southwest Research Institute (*page 2*) added a new dimension to SSP by engaging students in an exciting project on non-linear orbital dynamics. Above all, every student enjoyed the many benefits of residence on a college campus thanks to our partnerships with New Mexico Tech, and now, Westmont College.

This year, your Trustees and working committees made tangible progress on supporting the more diverse cohort of students that we are recruiting and admitting. In order to make SSP a leader in bringing gender, racial/ethnic, and socioeconomic diversity to science, we have been partnering with consultants and programs affiliated with MIT and Caltech to ensure that we offer all stu-

dents a successful experience. Continued support from alumni for our generous financial aid program, e.g. through our Endowment Scholarship Fund (*page 7*) is critical to this part of the SSP mission.

As part of our new operating mode as a "membership organization," we held our second community-wide election of trustees in summer 2010 (*results on page 3*). We have also been drawing an increasing number of outstanding alumni volunteers into roles on SSP's working committees, including admissions, alumni relations, development, and outreach (*page 5*). And we are grateful to the many donors who make the program's continuation possible – especially those in the Legacy Society and President's Council (*page 4*). Please contact me (esimmons@msu.edu) or Henry Lichstein (henry@lichstein.com) if you would be interested in reconnecting with SSP in any of these ways.

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