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► **Update your profile** and find other SSPers: [ssp.org/database](http://ssp.org/database)

► Donate securely to the **2014 Annual Fund**: [ssp.org/donate](http://ssp.org/donate)

► Join the **Facebook group** (search for "SSP Alumni")

## A SECOND SSP CURRICULUM!?

As the number of applicants has zoomed upward in recent years, to 742 in 2013, some have asked: why stop at two campuses? Why not expand SSP further?

Asteroid orbit determination has provided an ideal core for SSP's curriculum, but expansion using that project is limited by the availability of faculty and dark skies. Ideally we could find another project, analogous to the O.D., around which to build a new Summer Science Program curriculum.

Now is the time to explore those possibilities, **with the help of a \$300,000 grant** just received from the Gordon & Betty Moore Foundation.

### Two Parallel Tracks

This grant will fund a three-year planning process on two parallel tracks:

Development and testing of a new curriculum, modeled after the successful OD Curriculum

Strategic planning for how SSP could scale up to operate two curricula on three or four campuses (Orbital Determination on two campuses + new curriculum on

one or two more)

### Key Elements

- Protect the quality, financial resources, and academic rigor of the program as it currently exists.
- Maintain stable leadership; Richard Bowdon '74 will continue as Executive Director.
- Translate SSP's "secret sauce" and proven design elements to a new curriculum.
- Investigate restructuring options that would best enable scale-up.
- Offer the life-changing SSP experience to more deserving students!

### Finding a Curriculum

In 1959, Paul Routly's idea to teach asteroid orbit determination to high school students was a stroke of genius, that won't be easy to replicate. Here's how we plan to try:

- Solicit curriculum concepts from alumni, scientists, and educators.
- Select one or two curricula to develop.
- Identify faculty to flesh out those cur-

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UMMER

Two "S" compose the symbol for "theorem"

The two-S pattern is also like a integral sign: "Summer" and "Science" are just like the upper and lower limit.

Year 2013, different fonts are used to stress the formula. Also, 0 and 1 (binary) indicate programming.

$P^2 = a^3$  is Kepler's Third Law, where  $P$  is the period (in year), and  $a$  the semi-major axis(in Astronomical Unit) of any planet rotating around the Sun.

Student-designed logo for the SSP-wear at NM Tech

## 2013ERS SAY

*"Stick a bunch of incredibly smart, fun, kind people in a pressure cooker of physics, math, astronomy, and programming, and a diamond of awesome pops out." –Daniel Palumbo*

*"Everyone struggles here, but that's the point. You learn you are capable of so much more than you could have ever imagined."*

–Rebecca Gracia

*"SSP is maintained by its alumni because we owe a fantastic amount of credit to SSP for setting up our lives." –David Morales*

*"I got to use scientific equipment and conduct research without someone staring over my shoulder and telling me what to do." –Karl Otness*

*more at [ssp.org/quotes](http://ssp.org/quotes)*

## NM TECH CAMPUS



by Dr. Michael Faison,  
Academic Director

Despite a few minor glitches, unusually cloudy weather, and a student getting lost all night at White Sands, I'm pleased to report that the 2013 Summer Science Program was a resounding success.

Every year I teach at SSP, I am astonished and impressed with the intelligence, creativity, maturity, enthusiasm, and energy of SSP students, and this year was not an exception. Working with and getting to know these students are by far the greatest perks of serving on the faculty at SSP.

Socially, this group of students interacted very well together. Stress and lack of sleep continue to be the main health issues. Students seemed to take pride in how little sleep they could get away with. Sometimes they were up late working, but more often they stayed up due to "fear of missing out." The staff allowed this, as long as students stayed awake in lecture.



Dr. Faison helping students in the  
NM Tech computer lab

Continuing the tradition started by Anna Heinz '98, TA Elaine Johnson '05 and I taught weekly swing dancing classes, which were very well received as usual. After the first "fundatory" dance, most of the students continued coming to dance lessons, and could often be found dancing in the dorm, during lecture breaks, or at the observatory between images.

As AD, I set the curriculum in accord with the old SSP mantra, "no black boxes," or at least as few as possible. The students learned the fundamental of digital image processing and analysis, astrometry, photometry, two-body orbits, numerical integration, parallax correction, ephemeris generation, and angles-only orbit determination using the Method of Gauss. They also coded their own analysis tools in Python for centroiding, least-squares plate solution, measuring apparent magnitudes, calculating classical orbital elements, determining parallax shift.

We were fortunate to have access to two 14-inch telescopes for part of the program; this allowed us to send up parallel teams when skies were clear, or to give students the chance to do side projects without interrupting asteroid imaging. However the weather was unusually cloudy. By the 4th week, monsoon season had begun, and most evenings began with thunderstorms followed by a full night of

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## WESTMONT CAMPUS



by Dr. Tracy Furutani '79,  
Academic Director

As former Chair Steve Cotler '60 is fond of saying, the key ingredient of SSP is the people. By that he means not just the students and faculty but the entire extended SSP family. It takes dozens of people – most of them volunteering their time – to create “the educational experience of a lifetime”.

Our students successfully imaged their near-Earth asteroids (NEA) using the two telescopes at Westmont and the PROMPT robotic telescopes in Chile, then coded a Gaussian orbital determination (OD). Most generated an ephemeris for another observation, and performed a light travel-time correction for their observations. Many students made a parallax correction, and a few coded the differential correction or tried the Laplacian method.

Weather was unusually poor this summer, with two-thirds of the nights either partially or completely fogged out. On clear nights, Associate AD Dr. Adam Rengstorf supervised students at Westmont's Keck 24-inch as they imaged asteroids, nebulae, and clusters.

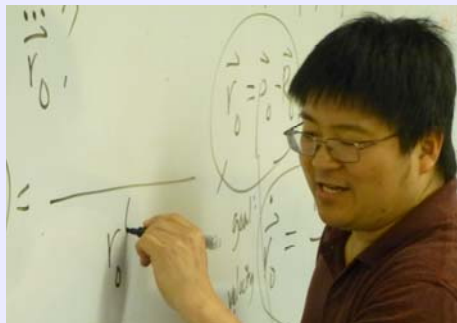
Helping every step of the way was our fine corps of TAs: computational biologist YJ Cha '08, mathematician Jack Goetz '09, planetary astrophysicist Josh Tollefson, and physicist Leah Weiss '08. Veterans Magnus Haw '07 and Becky Rapf '06 came to help get everything set up properly.

Most students learned for the first

time how to live independently, including how to do laundry, and to budget dwindling time and cash-on-hand. They were guided by Site Director Leslie Clark, who also arranged doctor visits, organized breakfasts, and took midnight calls from parents.

The guest speaker series kicked off with Westmont Prof. Tom Whittemore discussing mirror grinding, followed by UCSB physicist Omer Blaes on black holes, Caltech geologist Bethany Ehlmann explaining Martian geology, and author Sam Kean speaking on genetics. At Open House Day, Steven Trainoff '79 delivered the after-dinner talk on short notice when the scheduled speaker had to cancel. Victor Tsai '98 spoke on his research in glaciers and tsunamis, Larry Sverdrup performed his Mad Science show, and Margarita Marinova described her aeronautics work at

(Continued on page 6)



2013 was Dr. Furutani's 10th as SSP faculty, for which he was honored at the Alumni Dinner in Los Angeles on Sept. 28th

## 2013ERS SAY

*“SSP has made me realize that I thrive in this kind of peer group, and it has convinced me to look again for such a wonderful mix of people.” –Raja Atluri*

*“Before coming here, I was bitter that I was an outcast at my school for working hard.*

*As a result, I looked at studying rigorously as a painful but essential part of life, like eating vegetables.*

*One day, in the middle of trying to finish our OD's, we paused to have a nerf gun war. While running around the computer lab dodging nerf darts, I had a sudden insight: intense learning and studying can be as fun as anything else, if not more.”*

–Wally Wibowo

*“I have become friends with people I would have never thought I would even have a real conversation with. SSP has made me a more open-minded person.”*

–Aparna Narendrula

*more at [ssp.org/quotes](http://ssp.org/quotes)*

## NM TECH ACADEMIC DIRECTOR'S REPORT

(Continued from page 2)

clouds. We needed remote images for all teams to get four each.

Dr. William Anderson did a great job of teaching the math and physics. He is liked and respected by all. I also very much enjoyed

working with Barb Martinez as Site Director. She cares very deeply for the students, and managed all the logistics for us.

As for TAs: I've never had a "bad" TA at SSP, but I've never seen TAs work together as well as these four: Elaine Johnson '05,

Ryan Handoko '08, Dillon Liu '09, and Rebekah Cramerus '09. All are very competent, hard-working, easy to get along with, and fun. They each bonded with the students (appropriately) in their own way, and each played an enormous role in the success of the program.

## WESTMONT ACADEMIC DIRECTOR'S REPORT

(Continued from page 3)

SpaceX. Closing speaker Michael Weiss '76 gave an interesting take on the role of luck and coincidence in a career.

Former AD Martin Mason returned for a series of three workshops on computer programming. Westmont's own Warren Rogers '76 lectured on nuclear processes in stars. Michelle Kirchoff and Luke Dones from the Southwest Research Institute put on a two-day

workshop, teaching students to extrapolate their asteroid orbits over the next 40,000 years. I'm happy to report that only a few of them will someday crash into Earth.

Jet Propulsion Lab scientist and former AD Stuart Stephens led our tour there, assisted by Van Snyder '69 and Denis Elliot '63. At Caltech we toured labs researching seismology, chemical engineering, and astrophysics. Shorter trips included the Las Cumbres Observatory headquarters, Kavli Institute for

Theoretical Physics, Carpinteria Beach, and State Street in downtown Santa Barbara.

Trustee Liaison Dr. Dave Pierce drove up for a night to check on us and share some SSP memories with the students.

I add my profound gratitude to former AAD David Reitzel at Griffith Observatory, and John Briggs '76 at HUT Observatory. I only wish there was enough space to list everyone who helped us!



*Fun in the gypsum at White Sands National Monument*



*Furious note-taking in the classroom at Westmont*

## A SECOND SSP CURRICULUM!?

(Continued from page 1)

ricula in detail.

- "Alpha test" one or two curricula then select one to take forward.
- "Beta test" the chosen curriculum: have a few alumni from the previous summer complete the project over 5 weeks, simulating SSP.
- Seek new, outside funding and a

host campus for the expansion.

- Target opening for summer 2017.

A full-size third campus will open if and only if a new curriculum proves itself in this thorough process, **and** funding can be secured for its multi-year operation.

**By 2017 SSP could reach over 100 students per year** (triple the

original 36 students/year), with the possibility of more later.

### How you can help

- ✓ Continue to support SSP's regular operations, which will continue without interruption.
- ✓ If you have an idea for a new project, look for an email soon that explains how to submit it for consideration.

## HELP MAKE SSP 2014 POSSIBLE

Your generous gift will help inspire 72 gifted teenagers to reach their amazing potentials. Return this form with your check, or visit [ssp.org/donate](http://ssp.org/donate).

\$ \_\_\_\_\_ ☐ \$1000 ☐ \$500 ☐ \$250 ☐ \$100 ☐ \$50 ☐ \$25

Credit to: \_\_\_\_\_ ☐ alum ☐ parent ☐ faculty ☐ friend

Allocate to: ☐ unrestricted gift (or \_\_\_\_\_%)  
☐ SSP Endowment (or \_\_\_\_\_%)

Please contact me regarding:

- ☐ President's Council (annual pledge)  
☐ Legacy Society (bequest / estate planning)  
☐ SSP Benefactors (Endowment pledge)  
☐ Volunteering



SSP c/o Laura Kang Ward  
 436 Jackson Ave  
 Livermore, CA 94550

Have you moved? Changed your email address? Want to volunteer? Let us know at [sspalum@ssp.org](mailto:sspalum@ssp.org).

### PARENTS SAY

*"Everyone associated with SSP is so helpful and supportive and we are proud to be part of it."*

— Meyyappan  
 and Alamu  
 Arunachalam

*"Local to global," that's how we would describe our daughter's*

*new perspective.*

*SSP opened her eyes to a world bigger than she*

*had ever imagined. We can*

*see it when she*

*talks about the*

*scientists and*

*students she met*

*from around the*

*globe. What an*

*amazing*

*program!"*

— Neal and

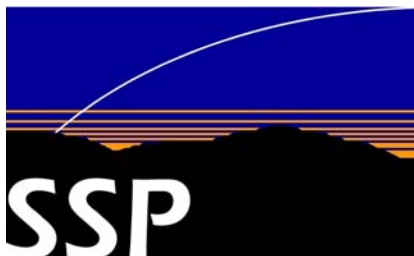
Miriam

Matsunobu

## COLLEGE DESTINATIONS

<b>Brown</b>	Sara Hartse
<b>Caltech</b>	Kushal Agarwal, Jon Joo, Lauren Li, Lindsey Whitesides, Parker Won
<b>Cambridge</b>	William Martin
<b>Carnegie-Mellon</b>	Xiaote Zhu
<b>Columbia</b>	Tanay Bhandarkar, Rasmi Elasmr, James Jang, Tomer Mate-Solomon
<b>Cornell</b>	Cecilia Chen, Christopher Goes, Sush Krishnamoorthy
<b>Harvard</b>	William Cox, Eric Lu, Saahil Mehta, Oksana Moscoso, Meg Panetta, Carolina Pena, Jess Rhodes, Melinda Song, Joule Voelz
<b>Harvey Mudd</b>	Clare Hamblen, Sherry Li, Dina Sinclair
<b>Imperial College</b>	James Wilkinson
<b>MIT</b>	Andreea Bobu, Cyndia Cao, Gi Choi, Crystal Cockerill, Andrew Esquivel, DesCartes Holland, Andres Perez, Marlyse Reeves, Julia Wu, Daniela Zuniga Sacks
<b>Oxford</b>	John Khouri
<b>Princeton</b>	Hunter Dong, Amelia Hankla, Guillaume Prévot, Elias Rubin, Bernardo Silva
<b>Stanford</b>	Andrés Camperi, Monica Chan, Alexandros Christodoulou, Marianne Dang, Matt Induni, Rafael Musa, Arthur Tsang, Jessica Zhao
<b>UC Berkeley</b>	Jeffrey Chan, Sissi Wang
<b>UC Santa Barbara</b>	Sam Aronson
<b>UCLA</b>	Wenhao Li
<b>Univ. of Miami</b>	Bria Johnson
<b>Univ. of Utah</b>	Alissa Whiting
<b>Yale</b>	Anthony Gagliardi, Calvin Rhodes, John Roethle, Andrea Smith, Georgia Smits, Ben Tong, Lining Wang, Jinseok Yang





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*Address Service Requested*

*"I was so very impressed by the vitality of the program and the spirit of the students. Compared to the modern tools of digital astronomy and computers, it seems that in 1974 we operated with stone knives and bear skins ... yet the palpable excitement of challenged young minds is the same."*

**—Michael Weiss '74,  
Guest Speaker '13**

## LETTER FROM THE CHAIR

*By Dr. Susan Jerian '79, Chair, Board of Trustees*

A lot can happen in five years. Five years ago NASA's Phoenix landed on an arctic plain on Mars. Now, the Curiosity rover has discovered water in the soil. Five years ago a proton beam was circulated for the first time in the Large Hadron Collider. This month, a Nobel Prize honored the discovery of the Higgs Boson. Five years ago the U.S. federal government banned funding for embryonic stem cell research. Now scientists know how to change mature cells into stem cells.

For SSP, a lot has happened in five years as well. We have crossed the 2,200 alumni mark. Five years ago we kicked off an endowment campaign to enable us to have a stable source of financial aid. Today we are only \$500,000 short of our goal of \$2,000,000.

Five years ago we tried to expand SSP, but encountered roadblocks at every turn. Today we have a \$300,000 grant from the Gordon and Betty Moore Foundation to enable us to expand intelligently. Every success we experienced over the last five years can be traced to help from alumni and friends, whether through donations, volunteering, or advice and moral support.

Five years from now where will we be? With your help, we will reach our Endowment goal of \$2M and will be offering SSP to more than 100 students every summer. We will have proven

that the life-changing SSP experience can happen in the context of more than one field of science.

These are exciting times. Stay tuned - stay involved!



*Dr. Ed Bertschinger '75 addresses alumni, friends, and family at the Alumni Dinner and 55th Anniversary Celebration in Los Angeles*