

CALIFORNIA INSTITUTE OF TECHNOLOGY

Summer Undergraduate Research Fellowships
1996 Annual Report

SURF



SURF is one of the premier academic programs that keeps the Institute a leader in education and research. SURF offers our students unparalleled experiences and gives them a strong advantage as they begin their careers or attend graduate school. The integration of knowledge learned from textbooks and in the classroom with real research problems encourages critical, analytical thinking. SURF students learn how to do research; they ask new questions; they may discover solutions to unsolved problems; they often become co-authors of scientific papers; and importantly, they become colleagues within their research groups.

Many members of the Caltech community are required to provide a SURF experience for our students. The mentors and their research groups, the SURF Board, the SURF Administrative Committee, donors, volunteers, and administrative staff—all of these individuals and groups are important to the success of SURF. The commitment of almost 800 people to ensuring an outstanding educational experience for our students creates strong bridges among various constituencies including alumni, prospective students, donors, parents, staff, JPL, faculty, and students—both undergraduate and graduate. I thank all involved for your leadership, your support, your hard work, and your loyalty to SURF and to the Institute.

I want to personally thank Doug and Betty Nickerson for their outstanding leadership in creating the J. Weldon Green SURF Endowment to support a SURF student annually and to challenge Caltech to raise two additional endowments. I also want to express deep appreciation to Carl and Shirley Larson, to Warren and Katharine Schlinger, and to The Associates for establishing SURF endowments this year in response to the challenge. The enthusiastic and committed support of these friends has greatly strengthened the financial foundation of the SURF program. On behalf of future students who will be supported and their mentors: Thank you!

Thomas E. Everhart
President
California Institute of Technology

DEDICATION

The 1996 SURF program is dedicated to Edward B. Lewis, Thomas Hunt Morgan Professor of Biology, Emeritus, in celebration of his receiving the 1995 Nobel Prize for Physiology or Medicine, in recognition of his long commitment to research and teaching, and in honor of his mentoring five SURF students. Professor Lewis' passion for research, his insight and intuition, his dedication to basic research in genetics that continues to yield deeper understanding is an inspiration for today's students.

SURF was not the beginning of undergraduate research at the Institute. When I was an undergraduate, I worked in the Guggenheim Aeronautics Laboratory on structural research for Jay Fredericks. Many students worked for Ernest Swift in chemistry and became co-authors of papers. It took Fred Shair's vision in 1979 to pull together the best aspects of these earlier programs to create the excellent learning experience that SURF provides. Betty and I were introduced to SURF in 1982 by Elba Smith, Director of The Associates, and Ed Baum, Senior Development Officer. Samuel Krown, a member of The Associates, had become interested in SURF, became its founding donor, established the first SURF endowment, created the SURF Board, and served as its first chairman. We were pleased to become charter members—together with Joanna Muir, Hannah Bradley, Marcella Bonsall, and Vic

Veysey—of this committee to help support the vigorous and dynamic three-year-old program started by Fred Shair, then a professor of chemical engineering at Caltech. Betty succeeded Samuel Krown as SURF Board chair in 1985.

The SURF program has grown and prospered. Eighteen students participated in 1979, when SURF began; 248 in 1996. The small group of supporters has also grown.

The endowment has increased and has put SURF on a more robust financial base. Hugh Colvin boosted the SURF endowment by establishing nine funds. Last year's challenge added four more endowed SURF positions, bringing the total number of endowments to 29. These endowments have added to the financial support and stability of the program.

In 1992 the Institute agreed to underwrite up to 20 SURF positions against the subsequent year's fundraising efforts. This important commitment added stability and certainty to the SURF award process. SURF has become a mature program. We must continue to work hard to maintain the level of support and to ensure that SURF can continue to provide the outstanding experiences we desire for Caltech undergraduate students.

In addition to our fundraising efforts, the SURF Board held the annual Kickoff Dinner featuring Caltech's latest Nobel laureate, Ed Lewis, Thomas Hunt Morgan Professor of Biology, Emeritus, and this year's SURF dedicatee. The annual barbecue on the first day of SURF was attended by all students and by many sponsors and potential supporters. Joanna Muir put together a donor/student dinner which generated much enthusiasm among all who attended. In the coming year the Board will discuss proposals from the administration to increase the scope of SURF.

I want to thank the SURF staff, Carolyn Merkel, Susan Clark, and Carol Casey, for their help. And I want to thank all our friends for their past support; I hope and trust that we will warrant continued participation. We look forward to the next years with enthusiasm and optimism.

*Douglas B. Nickerson*

The SURF Administrative Committee (AdComm) sets the academic policies of the SURF program, oversees the intellectual standards, and advises the Caltech administration on long term plans for development of SURF and programs relating to SURF. The committee consists of faculty from each of the Institute's academic divisions, senior members of the JPL technical staff, student representatives, and members of the Caltech administrative staff, including the SURF Director. All of the faculty members of the committee are or have been SURF research advisors. In addition to overseeing and planning, the Committee participates in SURF directly. Its members review all of the students' research proposals – more than 300 this year. Members of the committee participate

in judging the competitors at the Doris S. Perpall Speaking Awards and often participate in SURF Seminar Day.



Terry Cole

During the past year the Committee worked closely with SURF Director Carolyn Merkel, Doug Nickerson and members of the SURF Board, and the Caltech Development Office to bring additional fellowship funds into the program. Specifically, we strongly support the Small Business Industrial Associates Program that will bring funds to support SURFers working with Caltech faculty on research of interest to these industrial firms. Members of the AdComm have supported the students in initiating the *Caltech Undergraduate Research Journal*. This journal will provide a vehicle for more extensive reporting of SURF and other undergraduate research endeavors.

The AdComm is pleased that the Southern California Conference on Undergraduate Research founded by the Caltech SURF program has become a tradition among southern California universities and colleges. This conference was held at the Claremont Colleges in November, 1995.

The SURF Administrative Committee looks forward to another outstanding year in 1997!

The SURF Student Advisory Council (SURFSAC) had its third year with ten members chosen by interviews conducted by previous SURFSAC members. This year's elected officers were Priya Rai, Chair; Lin Jia, Vice Chair; and Sudipta Bardhan, Secretary. Carlos Maldonado was nominated to chair this year's *Caltech Undergraduate Research Journal* (CURJ) committee. The purpose of SURFSAC is to advise the SURF office on student needs and interests for undergraduate research and to provide feedback from the students on program activities and research experiences. An important activity, started last year by Chou Hung, was the *Caltech Undergraduate Research Journal*. The first issue, containing the eleven best SURF reports from the 1995 program, will be published this fall.

SURFSAC had three goals for this year:

- Our first goal was to establish guidelines to standardize the submission format for *CURJ*. The guidelines include a detailed outline of what sections should be included in the *CURJ* submission, the length of the report, and the tone of the report, which should be technical enough for a member from the same field of research but which should also coherently present "the big picture" to someone in a different field.

- SURFSAC members serve as ombudspople for the SURF class, and each of us was assigned a group of about 20 peers. To facilitate communication, the SURFSAC members made personal contact with each of

their group members in addition to e-mailing them frequently. Ms. Kathy Harris, Training and Organization Development Specialist, JPL, led a training session in problem solving and conflict resolution to help us better assist our groups and to address productively any issues that might arise.

- Finally, SURFSAC coordinated recreational and social activities for SURF students and mentors. Sudipta Bardhan coordinated a very successful series of five Wednesday night dinners for students to interact informally with different faculty members. Other events included trips to Disneyland, the beach, and Old Town Pasadena; Friday night movies in the Y lounge, two sports events at Braun Gym, an ice cream social, and a dessert afternoon for women SURFers, mentors, and staff.

SURFSAC will hold information sessions for prospective SURFers during the academic year and will help with program planning for next summer. All in all, 1996-97 promises to be an innovative and productive year.



The SURF Student Advisory Council

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he essence of the SURF program is the tutorial interaction between student and research sponsor, protégé and mentor. The program, modeled on the grant-seeking process, requires that students, in collaboration with their mentors, write a proposal for their projects. The proposals are reviewed by a faculty committee, and awards are made on the basis of reviewer recommendations and available funding. Students receiving a SURF award carry out the work during ten weeks in the summer, and at the conclusion, submit a technical report and give an oral presentation. Oral presentations are given at SURF Seminar Day, a symposium modeled on a professional scientific meeting. The Director's Report summarizes the activities and highlights of the 1996 SURF program.

It takes a community to make a SURF!

For each student, there are at least three or four other people working hard to ensure a quality experience. The extraordinary experience SURF provides its students requires a large cadre of faculty, graduate students, postdoctoral scholars, and JPL staff who serve as mentors. The SURF Board is a volunteer committee that helps raise funds for student stipends. The SURF Administrative Committee oversees the academic and intellectual components of the program and reviews students' proposals. The SURF Student Advisory Council provides an important student voice in planning and implementing the program and gives feedback on activities. Close to 200 donors to the 1996 program helped make it possible for 248 students to participate in SURF this year. Many staff members in accounting, development, human resources, the immigration office, payroll, academic departments, JPL, and, of course, the SURF office help with administrative or fundraising aspects of the program. The active support of the administration is crucial to the health of SURF.



Carolyn Merkel

PROFILE OF 1996 SURF PARTICIPANTS

<i>Division</i>	<i>Total Number of Students</i>	<i>Number of Caltech Students</i>	<i>Number of Non-Caltech Students</i>	<i>Number of Research Sponsors</i>
Biology	37	26	11	24
Chemistry and Chemical Engineering	50	41	9	25
Engineering and Applied Science	44	39	5	28
Geological and Planetary Sciences	10	9	1	6
Humanities and Social Sciences	5	3	2	4
Physics, Mathematics, and Astronomy	45	40	5	29
Jet Propulsion Laboratory	41	12	29	22
Small Business Industrial Associates	6	6	0	6
Off-Campus	5	5	0	5
Education SURFs	5	1	4	1
	248	182	66	150

PROFILE OF THE 1996 SURFERS

Sophomores	21%
Juniors	33%
Seniors	46%
Women SURFers	30%
Minority SURFers	10%
Median Grade Point Average	3.6/4.0*
Average Grade Point Average	3.5/4.0*

* Caltech students only, excluding freshmen

16% of living alumni who received their BS degrees from Caltech have participated in SURF.

SURF Statistics

Students participating in SURF are academically very strong. Academic excellence, however, is not necessarily a predictor of research talent or interest, and the eligibility requirement for applicants is a minimum GPA of 2.0. The following statistics demonstrate the excellence of SURF students.

At Caltech's 1996 Commencement:

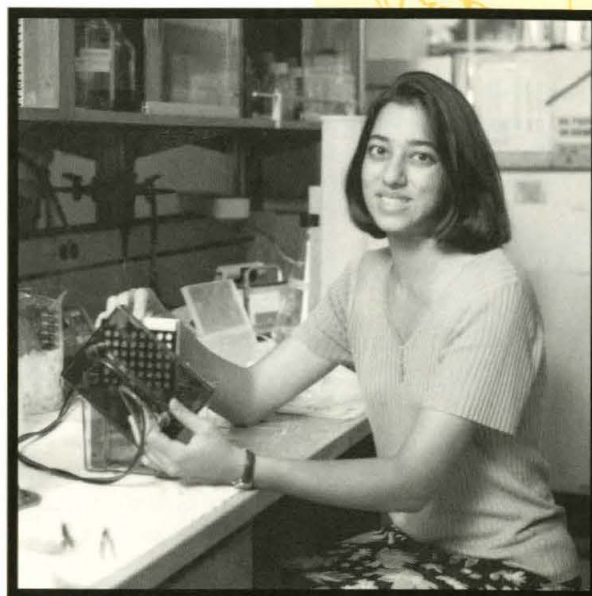
49% of the 1996 graduating class participated in SURF at least once

58% of the students graduating with honor were SURFers

77% of the Caltech Prize and Carnation Scholarships were won by former SURFers

Minority Undergraduate Research Fellowships (MURF)

Eleven students participated in the 1996 MURF program which runs concurrently and is closely associated with SURF. The MURF program provides support for talented non-Caltech undergraduates to spend a summer working in a research laboratory and is aimed at improving the representation of African Americans, Hispanics, Native Americans, Puerto Ricans, and Pacific Islanders in biological, chemical, and engineering sciences. MURF students participate in all aspects of the SURF program.



**SURF PROVIDES THE OPPORTUNITY
FOR A YOUNG SCIENTIST TO EXPLORE
AND SEEK ANSWERS TO THE
MYSTERIOUS QUESTIONS IN SCIENCE.
NOT ONLY DOES SURF PROVIDE AN
INVALUABLE LABORATORY
EXPERIENCE FOR THE
UNDERGRADUATES, BUT IT ALSO
PREPARES THEM FOR A FUTURE
IN SCIENCE.**

*Nasim Afsarmanesh
Mrs. Vernon L. Barrett SURF Fellow*

Small Business Industrial Associates

Six students worked on industrial research projects with company and faculty mentors. This program gives students a unique opportunity to expand their research experiences into the industrial environment with the value-added benefit of the advice and wisdom of faculty co-sponsors. Companies participating are listed on page 35.

SURF FUNDING

SURF is unique among undergraduate research programs in the country in that over half of the stipend funds are raised from external, non-federal sources. We depend upon the gifts from individuals, foundations, and corporations to build a robust financial base. The moneys raised are used to match funds from faculty research grants and contracts. Donors contributing the amount of a full stipend or more are listed with the students supported on pages 12 through 32. All contributors are listed at the back of the annual report. Each student receives a stipend of \$3600 for the ten-week summer period, a total stipend budget of \$892,800 for the 248 participants this year. The Institute pays administrative costs for the program; mentors pay all research costs. All funds raised from outside sources are used for student stipends or special research-related opportunities.

New SURF Endowments

J. Weldon Green SURF Endowment

We are deeply grateful to Doug and Betty Nickerson for creating the J. Weldon Green SURF Endowment in memory of Betty's father and for challenging the Caltech community to raise an additional two endowments to support SURF students in perpetuity. We are delighted to announce that the campaign was more than successful, raising an additional three endowments! This leadership gift demonstrates a deep commitment to the values of research in the undergraduate experience.

Shirley and Carl Larson SURF Endowment

We thank Carl and Shirley Larson for establishing an endowment to support a student annually. The creation of this fund is an important investment in the futures of the students who will be supported. The loyalty of SURF's friends is a strong asset on which the program depends. Carl Larson has served on the SURF Board since 1993, chairing the Board in 1994 and 1995.

Warren and Katharine Schlinger SURF Endowment

We greatly appreciate the generous gift of a SURF endowment by Dr. and Mrs. Warren Schlinger. This gift strengthens the financial foundation of SURF and ensures that each year students will be able to count SURF among the excellent experiences of their Caltech careers.

The Associates SURF Endowment

The Associates responded generously to the SURF endowment challenge, contributing the amount of a full endowment to be known as The Associates SURF Endowment. The students supported by this endowment will benefit from the vision and generosity of this important group.

Annual Funds

SURF depends upon and greatly values the many friends who contribute annually to the program. These many donations cumulatively provide significant support for student stipends and build a robust financial base each year. All funds raised from private sources are used to support Caltech students working with faculty. Donors contributing the amount of a student stipend, or more, by annual gifts or through endowment, are listed with the students supported in all SURF materials. Financial sponsors receive a written introduction to the students and may have the opportunity to meet the students at special events.

Funding Profile

Faculty grants	
and Institute sources	45%
JPL and NASA	17%
Foundations	15%
Endowment	12%
Individuals	5%
Corporations	5%

(Percentages do not total 100% because of rounding.)

1996 SURF PROGRAM AND ACTIVITIES

SURF Student Advisory Council

The SURF Student Advisory Council (SURFSAC) was active and productive this summer. The purpose of the council is to provide a student voice to the planning and implementation of the SURF program and to give feedback from the students to the SURF administration. SURFSAC members continued their role as ombudspople for their peers to answer questions, give advice, and serve as a resource. Sudipta Bardhan coordinated five faculty-student dinners at local restaurants to give participants the chance to interact informally. Nasim Afsarmanesh and Amy Zheng planned several successful social activities. Lin Jia made all arrangements for 23 SURFers for a day at Disneyland. We thank these students for their hard work, good ideas, and effective leadership.

Caltech Undergraduate Research Journal

One of SURFSAC's most important activities was the initiation of the *Caltech Undergraduate Research Journal (CURJ)*. Chou Hung chaired the first *CURJ* committee which will publish the eleven best research papers authored by Caltech undergraduates or students who did their research at Caltech. Each paper submitted received three reviews, the first by the student review board and two by faculty reviewers. The *CURJ* review board members were Chou Hung (SURF '95, BS '96), Mintao Fan (SURF '95, BS '96), Diana King (SURF '95), and Priya Rai (SURF '95, '96); Pamela Bjorkman (Biology), Kim Border (Social Sciences), Charles Brokaw (Biology), Jerrold Marsden (Engineering and Applied Science), Robert McKeown (Physics), and John Roberts (Chemistry).



**SURF ALLOWS STUDENTS TO GET A FEEL
FOR WHAT THE WORLD OF RESEARCH IS
REALLY LIKE WHILE STILL IN SCHOOL.
THE VALUABLE THINGS I HAVE LEARNED
AND WILL CONTINUE TO LEARN THIS
SUMMER HAVE SPARKED MY INTEREST
IN RESEARCH AND HAVE HELPED
PREPARE ME FOR THE FUTURE.**

*Steven P. Bennett
Mr. and Mrs. Francis V. Pesenti SURF Fellow*

The second *CURJ* will be published in April, 1997. Carlos Maldonado will chair this year's *CURJ* committee.

Professional Development Seminars

Eight Monday evening sessions addressed issues students will face as they prepare for and commence their professional careers. This series, created and coordinated by alumnus William M. Whitney, encourages students to make short-term decisions in the context of long-term career and life goals. Bill has presented the substantive message of this series at the National Conference on Undergraduate Research and at the Southern California Conference on Undergraduate Research. This summer's sessions and their participants were:

On Planning Your Career: Logic versus Reality

Dr. William M. Whitney, Division Technologist, Observational Systems Division, JPL; Julia Kornfield, Associate Professor of Chemical Engineering; Kathleen Bartle-Schulweis, Director, Caltech Women's Center; John Davis, graduate student, electrical engineering, SURF '91.

The Role of Communication in Careers: Introduction to the Communication Program

Mary Ann Smith, President, Applied Leadership Systems; Steve Bennett, '95-96 SURF student; Carolyn Merkel, Director, SURF program.

Alternative Careers: What Can You Do with a Technical Background?

Sally Asmundson, Director, Career Development Center; with Bonnie Wallace, Science Writer, California Science Museum; Kevin Archie, USC graduate student in neuroscience; David Ritchie, attorney, D'Alessandro, Frazzini & Ritchie; Susan Murakami-Fisher, pathologist, Huntington Memorial Hospital; Betina Pavri, Member of the Technical Staff, JPL; Randy Pollack, in process of deciding between graduate school and work options.

Myers-Briggs Type Indicator

Lauren Stolper, Director, Fellowships Office; Rosana Madrid Gatti, Assistant Director, Career Development Center.

Balancing Family and Career

Charlene Liebau, Director, Admissions Office; Kathleen Bartle Schulweis; with Laura Hoopes, Provost, Pomona College; and Shenda Baker, Assistant Professor of Chemistry, Harvey Mudd College.

Scientists as Speakers

Thomas J. Meade, Senior Research Fellow, Biology; John Davis.

Dilemmas of the Workplace: Do the Right Thing! [But What Is the Right Thing?]

Bill Whitney; Helen Hasenfeld, Ombudsperson; Priya Rai, SURF student; Douglas Sanders, Ethics Officer, JPL.

Graduate School

Rosana Madrid Gatti, with panelists John Davis, Delwyn Elder, graduate student in chemistry; and Ivett Leyva, graduate student in aeronautics.

Communication Program

For many students, the SURF presentation at the conclusion of the summer is their first opportunity to give a technical talk. The assignment is particularly challenging because the presentation is given to a general audience comprised of people in the student's field and lay people. Mary Ann Smith created the SURF communication program to help students prepare for the required presentation. The program is aimed for students at all levels of experience and comfort with public speaking.

Peer Coach Workshops

Ms. Smith trained eleven Caltech SURFers to facilitate workshops to help students organize and prepare their oral presentations, to learn public speaking skills and techniques, and to develop analogies to explain technical material to a lay audience. Peer coaches meet with small groups of SURF students for three sessions.

Through group interaction and exercises, students gain confidence and experience in talking about their research. This process has led students to ask more probing questions of their mentors, improving the educational quality of their research experiences.

Audio Visual Workshop

Wayne Waller, Director, Media Integration Laboratory, trained peer coaches in the creation of electronic and computer-based visual aids. These resources will be increasingly prominent in the workplace, and SURF students have the chance to develop experience and skill in using them to enhance their oral presentations.

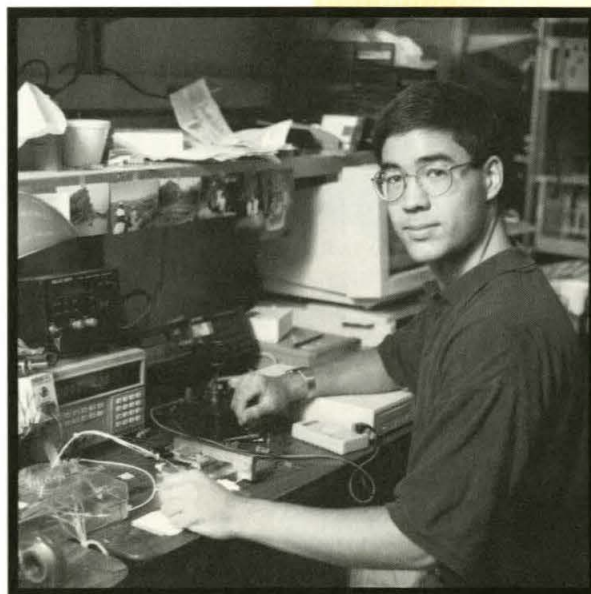
Scientists as Speakers

Thomas J. Meade gave two short technical presentations to the SURF students on his work in developmental biology. Following his presentation, he discussed how he created visual aids to help his audience understand his work; he pointed out the transitions from one part of his talk to another; he talked about how to communicate technical material; and he answered many questions.

John Davis, a former SURF student and now graduate student in electrical engineering, spoke briefly about his experiences with giving talks and seminars. His advice: when preparing a talk, step back from your work to regain the big picture of your project and report only the highlights, not all the details.

Doris S. Perpall SURF Speaking Awards

Jeremy Darling, Samson Timoner, and Jane Brock were the winners of the third annual Doris S. Perpall SURF speaking competition. The winners were chosen after a three-round competition judged by faculty members, JPL staff, alumni, and graduate students. Robert C. Perpall, BS '52, MS '56, endowed the prizes in memory of his late wife as an incentive for students to give outstanding presentations.



**SURF MAY TAKE YOU INTO NEW
TERRITORY. I STARTED MY SUMMER
EXPECTING TO DO PURELY
EXPERIMENTAL WORK; BY THE END,
I WAS HACKING OUT A MATHEMATICAL
MODEL OF MY WORK.**

*Andrew S. Huntington
Warren and Katharine Schlinger
SURF Endowment*

Conferences

SURF Seminar Day

Saturday, October 19, SURF students presented the results of their research in a symposium modeled on a professional scientific meeting. Students, faculty, mentors, JPL staff, donors, alumni, and parents of SURFers attended the oral and poster presentations. Seminar Day is the first round in the Perpall competition, and the best presenters advanced to the semi-final round.

National Conference on Undergraduate Research

The tenth National Conference on Undergraduate Research (NCUR) was held in April, 1996, at the University of North Carolina at Asheville, the institution that started the conferences in 1987. More than 2400 students, faculty, and administrators from colleges and universities nationwide participated in NCUR with approximately 1800 students giving oral or poster presentations of their research. These conferences are multi-disciplinary, including the sciences, math, engineering, humanities, fine and performing arts. Students have the opportunity to find out how research is conducted and reported in other disciplines. Ten students represented Caltech at NCUR. Caltech hosted the 1991 National Conference on Undergraduate Research.

Southern California Conference on Undergraduate Research

The third annual Southern California Conference on Undergraduate Research was held at Pomona College in November, 1995. SCCUR was attended by more than 400 undergraduate students, faculty, and administrators from colleges and universities in the region including a delegation of Caltech students. SCCUR was started by SURF and held at Caltech in 1993 and 1994; the fourth annual SCCUR will be held at Occidental College in 1996.

Seminar Series

Each Wednesday at noon, members of the Caltech faculty or JPL staff presented seminars giving an overview of their areas of research. Speakers and their topics were:

R. Michael Alvarez, Associate Professor of Political Science, *Why Do Political Candidates Sling Mud, Attack Each Other, and Avoid Substantive Discussion?*

Glen R. Cass, Professor of Environmental Engineering and Mechanical Engineering, *Air Pollution in the Los Angeles Basin*

Andrea Goldsmith, Assistant Professor of Electrical Engineering, *Wireless Communication in the 21st Century*

Adriana Ocampo, Research Scientist, JPL, *Dead Dinosaurs Tell No Tales, But Rocks Do*

David L. Goodstein, Professor of Physics and Applied Physics; Frank J. Gilloon Distinguished Teaching and Service Professor; Vice Provost, *Scientific Fraud*

Barbara Imperiali, Associate Professor of Chemistry, *Protein Architecture: Understanding and Utilizing Nature's Blueprints*

John P. Preskill, Professor of Theoretical Physics, *Quantum Communication and Quantum Computation*

Ellen Rothenberg, Professor of Biology, *How Does the Immune System Work?*

David J. Stevenson, Professor of Planetary Science, *The Early Earth: Conditions for the Origin of Life*

Each Friday at noon, members of the JPL staff presented seminars giving an overview of their areas of research to the JPL SURF students. Speakers and their topics were:

Patricia M. Beauchamp, Observational Systems Division, *Miniature, Low Power Instruments for a New Millennium*

Bonnie J. Buratti, Earth and Space Sciences Division, *Comets: Rosetta Stones of the Solar System*

David H. Collins, Systems Division, *Miniature, Low-Cost, Highly Autonomous Spacecraft*

Andrea Donnellan, Telecommunications Science and Engineering Division, *The Northridge Earthquake: GPS Results*

Kevin R. Heim, Avionic Systems and Technology Division, *Tiny Bubbles: Memories that Don't Ho Never Had*

Sammy A. Kayali, Office of Engineering and Mission Assurance, *GaAs Reliability and Related Research*

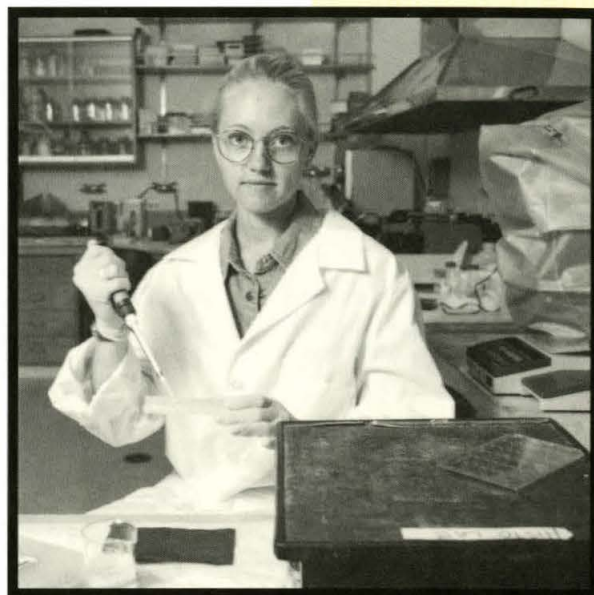
Eric M. Slimko, Mechanical Systems Engineering and Research Division, *Mars Pathfinder and New Millennium: Two Faster-Better-Cheaper Mars Missions*

Ben Smith, Information Systems Development and Operations Division, *Autonomous Spacecraft for the Next Millennium*

Stephanie D. Wilson, Avionic Systems and Technology Division, *One Way of Getting from Jupiter to Earth Orbit*

Roundtable

Professor of Physics Thomas Tombrello; Ms. Louise Wannier, President and CEO, DEX Information Systems; and Dr. Jean de Pruneda, Division Leader, Chemical Sciences Division, Lawrence Livermore National Laboratory, presented an informative session contrasting the research environments in academia, industry, national laboratories, and start-up companies.



MY EXPERIENCES AS A SURF RESEARCHER WERE VERY POSITIVE AND REWARDING. I GAINED A LOT OF THINGS I WILL NEED FOR A FUTURE CAREER IN SCIENCE: SOME BASIC KNOWLEDGE IN NEUROBIOLOGY, TECHNICAL LAB SKILLS, AND ABOVE ALL – PATIENCE, PATIENCE, PATIENCE!

Mary L. Mosier
Mr. and Mrs. Downie D. Muir III SURF Fellow

SURF INDEX OF STUDENTS AND MENTORS

STUDENT	TOPIC	MENTOR
Lada A. Adamic <i>Senior, Ph</i>	Reduction of Particulates in Film Growth with Liquid Targets	Harry A. Atwater, Jr. <i>Associate Professor of Applied Physics</i>
Nasim Afsarmanesh <i>Sophomore, Bi</i> <i>Mrs. Vernon L. Barrett</i> <i>SURF Fellow</i>	The Detection of the Cellular Receptor for the Yellow Fever Virus	Robbert van der Most <i>Research Fellow in Biology</i> James H. Strauss <i>Ethel Wilson Bowles and Robert Bowles Professor of Biology</i>
Reginald C. Ajakwe <i>University of Redlands</i> <i>Junior, Ch/Bi</i> <i>MURF</i>	Analysis of Essential Proteins Involved in the Cell Cycle Progression from G1 to S Phase	Raymond Deshaies <i>Assistant Professor of Biology</i>
Xenia Amashukeli <i>Brown University</i> <i>Senior, Ch</i>	Nonlinear Optical Properties in Organic Materials	William A. Goddard III <i>Charles and Mary Ferkel</i> <i>Professor of Chemistry and Applied Physics</i>
Timothy K. Anderson <i>University of California, San Diego</i> <i>Sophomore, Bi</i>	14-3-3 Antibody Test for Creutzfeldt-Jakobs Disease	Michael G. Harrington <i>Member of the Beckman Institute</i>
Noah Arribas-Layton <i>Sophomore, EAS</i>	An Engineering Project for High School Students: An Introduction to Aerodynamics	Paul A. Robinson, Jr. <i>Professor of Physics,</i> <i>Principia College</i>
Michael D. Astle <i>Sophomore, EAS</i>	Wavelets in Java	Peter Schröder <i>Assistant Professor of Computer Science</i>
C. Michael Atkin <i>Sophomore, EE</i> <i>Ford Motor Company SURF Fellow</i>	Designing Advanced Cruise Control	Joseph Weber <i>Postdoctoral Scholar in Electrical Engineering</i>
Daniel I. Azuma <i>Senior, CS</i> <i>Northern California Associates SURF Endowment Fund</i>	The Chemistry Animation Project: Molecular Orbitals	Nathan S. Lewis <i>Professor of Chemistry</i>
Matthew P. Bachmann <i>Sophomore, Ge/Env Eng</i> <i>Sidney R. and Nancy M. Petersen</i> <i>SURF Endowment</i>	Analysis of Damaging Earthquake Ground Motions	David J. Wald <i>Visiting Associate in Geophysics</i>
Dave M. Bacon <i>Senior, Ph/Lit</i> <i>Mr. John Glanville and Ms. Teri Oldknow SURF Fellow</i>	Quantum Computers and NP-Complete Problems	Nicolas Cerf <i>Research Fellow in Physics</i> Christoph Adami <i>Division Research Fellow in Physics</i>
Milena Banjevic <i>University of Toronto</i> <i>Senior, CS/Ma</i>	Algorithm Development for Simultaneous Temperature and Cloud Property Retrieval from Thermal Infrared Data	Glenn S. Orton <i>Senior Research Scientist, JPL</i>

STUDENT**Sudipta Bardhan***Junior, Bi**Mr. and Mrs. Robert L. Noland
SURF Fellow***Jason W. Barnes***Junior, Ay***Matthew E. Barnett***Sophomore, ChE**Mr. and Mrs. John E. Young SURF
Fellow***Klejda Bega***Sophomore, Ph**Samuel P. and Frances Krown
SURF Endowment Fund***Cyrus H. Behrooz***Senior, Ph**Samuel P. and Frances Krown
SURF Endowment Fund***Steven P. Bennett***Senior, Bi/Ch**Mr. and Mrs. Francis V. Pesenti
SURF Fellow***Ronak J. Bhatt***Junior, Ph**Richter Scholar***Christopher Bisbee***Junior, Ch**Dreyfus Foundation SURF Fellow***Christopher A. Brichford***Sophomore, CS/EE**Samuel P. and Frances Krown
SURF Endowment Fund***Andrew S. Brown***Swarthmore College**Senior, CS***Jonathan O. Burrows***Sophomore, APh**Donald S. Clark SURF Endowment
Fund***Jun Cai***Senior, Ph**Richter Scholar***TOPIC**

An Exploration of the Binuclear Copper Site
of the Cu_A Protein

History of the Impacts of the Comet
Shoemaker-Levy 9 Fragments as Seen from
the AAT

Engineered Protein-Membrane Interactions

Development of an Electromagnetic
Calorimeter for SLAC E155

Dynamics of Trapped Magnetic Particles
and Fluids

Optimization and Characterization of a
Semiconductor-Based Photoreactor in Terms
of Organic Substrate Mineralization in
Aqueous Systems

Analysis of Pulse Profiles of X-Ray Binaries

Conformational Changes of
3-Methoxypentanedioic Acid as a Function
of pH

LIGO FFT User-Interface

Scalable Concurrent Programming on the
Avalon A12 Multicomputer

Metallic Glass in Microfabrication Processes

Flux Conservative Formulation of Numerical
Relativity and Gravitational Collapse

MENTOR**John H. Richards***Professor of Organic Chemistry***Glenn S. Orton***Senior Research Scientist, JPL***Frances H. Arnold***Associate Professor of Chemical
Engineering***Robert D. McKeown***Professor of Physics**Todd Averett
Research Fellow in Physics***Kenneth G. Libbrecht***Professor of Physics***Michael R. Hoffmann***James Irvine Professor of
Environmental Chemistry***Thomas A. Prince***Professor of Physics***John D. Roberts***Institute Professor of Chemistry,
Emeritus; Lecturer***Rochus E. Vogt***R. Stanton Avery Distinguished
Service Professor and Professor
of Physics***Hiroaki Yamamoto***Senior Scientist in Physics***Stephen Taylor***Assistant Professor of Computer
Science***William L. Johnson***Ruben F. and Donna Mettler
Professor of Engineering and
Applied Science***Kip S. Thorne***Richard P. Feynman Professor
of Physics*

STUDENT	TOPIC	MENTOR
Michaeleen B. Callahan <i>Junior, Bi</i> <i>The Caltech Alumni Association</i> <i>SURF Fellow</i>	Discrimination between Immediate and Indirect Autoregulation of <i>APETALA3</i> in <i>Arabidopsis</i>	Elliot M. Meyerowitz <i>Professor of Biology</i> Robert W.M. Sablowski <i>Research Fellow in Biology</i>
Myfanwy G. Callahan <i>Junior, Env</i> <i>The Lluella Morey Murphey</i> <i>Foundation SURF Fellow</i>	Gaseous Hydrogen Peroxide Levels in the Los Angeles Area	Michael R. Hoffmann <i>James Irvine Professor of</i> <i>Environmental Chemistry</i>
John Joseph M. Carrasco <i>Senior, Ph</i> <i>William H. and Helen Lang SURF</i> <i>Fellow</i>	T^+T^- Decays: An Exploration of Parity Symmetry Violation	Alan J. Weinstein <i>Associate Professor of Physics</i>
Miguel A. Castro <i>University of Redlands</i> <i>Senior, Bi/Ch</i> <i>MURF</i>	Improvement of DNA Sequencing by Site-Directed Mutagenesis of <i>T. aquaticus</i> DNA Polymerase	John H. Richards <i>Professor of Organic Chemistry</i>
Christopher J. Chang <i>Senior, Ch</i> <i>Arthur A. Noyes SURF Endowment</i> <i>Fund</i>	Spectroscopy and Catalytic Properties of Vanadyl Schiff-Base Complexes	Harry B. Gray <i>Arnold O. Beckman Professor</i> <i>of Chemistry</i>
Steven M. Chase <i>Senior, APh</i> <i>Allied Signal SURF Fellow</i>	On the Viability of Nitrogen Dioxide and Acetone as Fluorescent Markers for Studying Gas-Phase Turbulent Mixing	Paul E. Dimotakis <i>John K. Northrup Professor of</i> <i>Aeronautics and Professor of</i> <i>Applied Physics</i>
Ann W. Chen <i>Senior, Bi/H</i> <i>Hugh F. and Audy Lou Colvin</i> <i>International Fellowship Endowment</i>	Stature, Living Standards, and Economic Development	James Z. Lee <i>Associate Professor of History</i>
Shirley S. Chen <i>Senior, Ch</i> <i>Richter Scholar</i>	Observations of N_2H^+ in the Young Stellar Object L1551	Geoffrey A. Blake <i>Associate Professor of</i> <i>Cosmochemistry and Planetary</i> <i>Science</i>
Yebo Chen <i>Sophomore, CS/APh</i>	Automatic Compensation of Drift for Optical Alignment into a Fixed-mirror Fabry-Perot Cavity	Rochus E. Vogt <i>R. Stanton Avery Distinguished</i> <i>Service Professor and Professor</i> <i>of Physics</i> Robert Spero <i>Member of the Professional Staff</i> <i>in Physics</i>
Yeng-Long Chen <i>Junior, ChE</i>	An Investigation of the Flow Induced Alignment in Triblock Copolymers	Julia A. Kornfield <i>Associate Professor of Chemical</i> <i>Engineering</i>
Alwin Y. Chi <i>Sophomore, EE/Ec</i>	Hyper Forum	Bruce C. Murray <i>Professor of Planetary Science</i> <i>and Geology</i>

STUDENT	TOPIC	MENTOR
Keng-Hwee Chiam University of Michigan Senior, Ph/Computer Eng	Data Acquisition for Measuring Heat Capacity of Helium-3 Near Its Critical Temperature	Inseob Hahn Member of the Technical Staff, JPL
Kai Wai E. Chiu Senior, EE Dr. York Liao SURF Fellow	The Development of a 500W 7MHz Power Amplifier	David B. Rutledge Professor of Electrical Engineering
Nicholas I. Choly Junior, APh Applied Materials SURF Fellow	Modeling Growth and Reflow of Interconnect Lines	Harry A. Atwater, Jr. Associate Professor of Applied Physics
John F. Christensen Junior, ChE Mr. and Mrs. A.A. Burnand SURF Fellow	Volume Reduction of Hazardous Waste Through Molten Metal Processing	Adel F. Sarofim Lammot du Pont Professor of Chemical Engineering, Massachusetts Institute of Technology
Alexander J. Conley Claremont McKenna College Senior, Ph	Computer Modeling of Extreme Scattering Events	John W. Armstrong Member of the Technical Staff, JPL
Christopher W. Connor University of Cambridge Junior, Eng	Streamlining Astronomical Data Reduction	Glenn S. Orton Senior Research Scientist, JPL
Joseph V.L. Cook Sophomore, EE	A Visual Catalog of Near-IR Ground-Based Images of Jupiter – or – Eighty or so Days Around a World	Glenn S. Orton Senior Research Scientist, JPL
Marc A. Coram Senior, CS/Ma Arthur R. Adams SURF Fellowship	Geometric Properties of Siegel Disks	Jacek Graczyk Olga Tausky-John Todd Instructor in Mathematics
Brian R. D'Urso Junior, Ph Samuel P. and Frances Krown SURF Endowment Fund	Electromagnetic Waves in Mixed Dielectric Structures	Axel Scherer Professor of Electrical Engineering
Daryush J. Dawid University of Cambridge Junior, Ph	Thermal Noise in the Suspension of the LIGO Interferometers	Rochus E. Vogt R. Stanton Avery Distinguished Service Professor and Professor of Physics Seiji Kawamura Member of the Professional Staff in Physics
Andreas K. Demetriades University College London Senior, Medicine	An Introduction into Experimental Embryogenesis for YESS Students	Paul A. Robinson, Jr. Professor of Physics, Principia College
Eric M. Dennis Junior, Ph Arthur E. Lamel Memorial SURF Fund	Bragg Reflection of Non-Plane Waves	Amnon Yariv Thomas Myers Professor of Electrical Engineering and Professor of Applied Physics

STUDENT	TOPIC	MENTOR
Vandana R. Desai Senior, Ay Mr. and Mrs. Thomas H. Wiancko SURF Fellow	A Search for High Redshift Quasars	S. George Djorgovski Associate Professor of Astronomy
Ramya N. Dissanayake Senior, EE	Joystick Controlled Miniature Camera System	Eric R. Fossum Senior Research Scientist, JPL
David S. Djambazov Sophomore, Ph	Numerical Thermoelastic Analysis of Complicating Factors in Optics Used in Laser Interferometers for Detection of Gravitational Waves	Rochus E. Vogt R. Stanton Avery Distinguished Service Professor and Professor of Physics Dennis Coyne LIGO Deputy Systems Engineer
Patrick J. Drew Sophomore, Bi Thomas Hunt Morgan SURF Endowment Fund	Neural Activity in Area X of the Adult Zebra Finch	Masakazu Konishi Bing Professor of Behavioral Biology
Arun N. Durairaj Junior, Bi	The Effect of the FORSE-1 Antibody on the Development of the Central Nervous System	Paul H. Patterson Professor of Biology
Daniel A. Eckstein Senior, Bi Bristol-Myers Endowment Fellowship	<i>In Vivo</i> Comparison of GFP Variance Designed for Use in Mammalian Cells	Barbara J. Wold Associate Professor of Biology
Uri T. Eden Sophomore, Ma/EE Richter Scholar	Human Magnetoreception	Joseph L. Kirschvink Professor of Geobiology
Jarah M. Evslin Senior, Ph/Ma	Error Correction Algorithms for Quantum Computers	John P. Preskill Professor of Theoretical Physics
David W. Farnham Junior, Ph Mr. and Mrs. Ralph W. Jones SURF Fellow	Fitting Profiles of Accreting X-ray Pulsars	Thomas A. Prince Professor of Physics
James Farrell Reed College Senior, Interdisciplinary Ch/Ph Howard Hughes Medical Institute SURF Fellow	Loop Modifications to the Designed Peptide Bba1	Barbara Imperiali Associate Professor of Chemistry
Patricio H. Figueredo Universidad de Buenos Aires Senior, Ge	The Crustal Evolution of Ganymede: Preliminary Models and Galileo Observations	Robert Carlson NIMS Principal Investigator, JPL
Michael A. Fisher Sophomore, AMa/CS Richter Scholar	The Chemistry Animation Project: Molecular Orbitals	Nathan S. Lewis Professor of Chemistry

STUDENT	TOPIC	MENTOR
Samantha Foster Senior, EAS Dr. Marcella Bonsall SURF Fellow	History of Parks in Los Angeles	William F. Deverell Visiting Associate in History
Brian E. Frazier Sophomore, EAS	The Chemistry Animation Project: Periodic Trends	Nathan S. Lewis Professor of Chemistry
Margaret A. Gabriel Sophomore, Ch Dreyfus Foundation SURF Fellow	The Conformations of Succinic Acid as Determined by NMR Spectroscopy	John D. Roberts Institute Professor of Chemistry, Emeritus; Lecturer
Samantha S. Gizerian Sophomore, Bi Howard Hughes Medical Institute SURF Fellow	Isolation and Characterization of the Reductase Component of the Particulate Methane Monooxygenase	Sunney I. Chan George Grant Hoag Professor of Biophysical Chemistry
Emma E. Goldberg Sophomore, Ph/Ay Richter Scholar	Development of an Electromagnetic Calorimeter for SLAC E155	Robert D. McKeown Professor of Physics Todd Averett Research Fellow in Physics
Nir Goldman Yale University Senior, Ch Dreyfus Foundation SURF Fellow	Investigation of C-C Bond Rotation Rates in Hexabutylguanidinium Cation	John D. Roberts Institute Professor of Chemistry, Emeritus; Lecturer
Marize A. Gominho Central State University Senior, Water Resources Management	Application of Synthetic Aperture Radar in Hydrology	Anthony Freeman Group Supervisor, JPL
Cynthia-May S. Gong Sophomore, Ge/Bi	Human Magnetoreception?	Joseph L. Kirschvink Professor of Geobiology
Alex Goretsky Junior, ChE Hugh F. and Audy Lou Colvin SURF Endowment Fellowship	Metal Complexing Polymers as Glucose Sensor	Frances H. Arnold Associate Professor of Chemical Engineering
Dustin L. Green Junior, CS	Telescopes in Education	Gilbert A. Clark Program Manager, Telescopes in Education, JPL
Charmaine R. Gregory Rensselaer Polytechnic Institute Senior, Bioch/Bioph MURF	The Integration of Cell Cycle and Differentiation: An Analysis of the Roles of p27 and rux	Barbara J. Wold Associate Professor of Biology
Timothy O. Gunter Senior, Ph Applied Materials SURF Fellow	Aluminum and Copper Reflow for High-Aspect Ratio Integrated Circuit Fabrication	Harry A. Atwater, Jr. Associate Professor of Applied Physics

STUDENT**TOPIC****MENTOR**

Francisco Guzmán
Senior, Ph

Characterization of the Radiation Emitted
by the NIST Synchrotron

Gerald T. Fraser
*Research Scientist, National
Institute of Standards and
Technology*
Angela Hight Walker
*National Institute of Standards
and Technology*
Thomas A. Tombrello
Professor of Physics

David E. Hackenson
Sophomore, ChE
Richter Scholar

Explosives Detection by Particle Deflagration
and Optical Signature Characterization

Jesse L. Beauchamp
Professor of Chemistry

Zoran Hadzibabic
University of Cambridge
Senior, Ph

Modeling the Spectrum of the Hydrogen
Pressurized Ammonia in the Far Infrared

Glenn S. Orton
Senior Research Scientist, JPL

David K. Hammond
Sophomore, Ch
Howard Hughes Medical Institute
SURF Fellow

Development of Co-acacen Derivatives with
Electron-donating Substitutes

Thomas J. Meade
Senior Research Fellow in Biology

Dragos A. Harabor
Senior, CS

Human Magnetoreception

Joseph L. Kirschvink
Professor of Geobiology

Douglas A. Hartley
University of California, Los
Angeles
Senior, Ma

Spectral Properties of Ganymede

G. Edward Danielson
*Member of the Professional Staff
in Planetary Science*

Cailin C. Henderson
Senior, Bi
Northern California Associates SURF
Endowment Fund

The Role of BDNF in LTP

Erin M. Schuman
Assistant Professor of Biology

Benjamin R. Hendricks
Sophomore, Bi
Richter Scholar

The Chemical Nose

Nathan S. Lewis
Professor of Chemistry

Michael J. Herrera
Senior, Ma
Richter Scholar

The Application of New Statistical Methods
on Original Data Collected from Various Fields
in Science

Gary A. Lorden
Professor of Mathematics

Johannes Hess
University of Siegen
Senior, Ph

Lock Acquisition of an Optical-Lever Based
Alignment System in the LIGO 40 m
Interferometer

Rochus E. Vogt
*R. Stanton Avery Distinguished
Service Professor and Professor
of Physics*
Robert Spero
*Member of the Professional Staff
in Physics*

Laura J. Hidas
Stanford University
Sophomore, Bi/Ch

Crystallization of the DNA-Intercalating
Metal Complex $\text{Ir}(\text{phen})_2\text{phi}^{3+}$ Bound to
an Oligonucleotide

Jacqueline K. Barton
Professor of Chemistry

STUDENT	TOPIC	MENTOR
Aaron K. Higgins <i>Sophomore, EE</i>	The Chemistry Animation Project: Hybridization and Resonance	Nathan S. Lewis <i>Professor of Chemistry</i>
Sasha Hinkley Reed College <i>Junior, Ph</i>	Ground Based Support for the First Ganymede Encounter in the Thermal Infrared	Glenn S. Orton <i>Senior Research Scientist, JPL</i>
Holly A. Hofer Delaware Valley College <i>Sophomore, Small Animal Science</i>	Odor Preferences in Rodents	James M. Bower <i>Associate Professor of Biology</i> Christine Chee-Ruiter <i>Graduate Student in Biology</i>
Amanda K. Hoffman Furman University <i>Junior, CS/Ma</i>	Formal Methods in Software Safety Techniques	John C. Kelly <i>Group Leader, JPL</i>
Mingjing Huang <i>Junior, EAS</i> <i>Logicon RDA SURF Fellow</i>	Computer Assisted Analysis of CMV Retinopathy	Douglas Yoon <i>Research Scientist, Logicon RDA</i>
Sung H. Huh <i>Sophomore, Ch/CS</i>	The Chemistry Animation Project	Nathan S. Lewis <i>Professor of Chemistry</i>
Andrew S. Huntington <i>Senior, Ch</i> <i>Warren and Katharine Schlinger</i> <i>SURF Endowment</i>	Charge Carrier Dynamics Within a Ni-Si Schottky Barrier Photonic Displacement Sensor	John D. Baldeschwieler <i>Professor of Chemistry</i>
Jae H. Hur <i>Junior, Bi</i> <i>Howard Hughes Medical Institute</i> <i>SURF Fellow</i>	The Genetic Identification of Factors that Interact with LEAFY in <i>Arabidopsis thaliana</i>	Elliot M. Meyerowitz <i>Professor of Biology</i> Doris Wagner <i>Research Fellow in Biology</i>
Jennifer K. Hutchings University College London <i>Senior, Ph</i>	Spectral Modelling of Shoemaker-Levy 9, Fragment K, Main Event	Glenn S. Orton <i>Senior Research Scientist, JPL</i>
Minneola P. Ingersoll Stanford University <i>Junior, CS</i>	Efficient Auction Design and Packaging	David P. Porter <i>Visiting Associate in Economics</i>
Mark G. Jackson Duke University <i>Sophomore, EE/Ph</i>	Measurement of the Complex Dielectric Constant at Microwave Frequencies	Martin Barmatz <i>Technical Group Leader, JPL</i>
Nicole M. Jackson Occidental College <i>Junior, Ch</i>	Electrochemistry of Methylene Blue Bound to a DNA-Modified Electrode	Jacqueline K. Barton <i>Professor of Chemistry</i>
Joanne W. Jang <i>Sophomore, Bi</i>	CRABS CLAW Gene Family	John L. Bowman <i>Assistant Professor of Plant</i> <i>Biology, University of California</i> <i>at Davis</i> Barbara J. Wold <i>Associate Professor of Biology</i>

STUDENT	TOPIC	MENTOR
Brian S. Jenkins Senior, Ch Howard Hughes Medical Institute SURF Fellow	A Study of the Effects of Salt Concentration on the Stability of Rubredoxin from <i>Pyrococcus</i> <i>Furiosus</i>	Sunney I. Chan George Grant Hoag Professor of Biophysical Chemistry
Lin Z. Jia Senior, Bi Glenn Foundation SURF Fellow	Localization by Immunocytochemistry of Neurotrophins BDNF and NT-3 and their Respective Trk Receptors in Hippocampal Tissues	Erin M. Schuman Assistant Professor of Biology
Conrad A. Jones Southern University Junior, Ch/ChE MURF	The Role of <i>Xenopus</i> Orc2 Gene in Cell Cycle Control	William G. Dunphy Associate Professor of Biology; Associate Investigator, Howard Hughes Medical Institute
Neil C. Jones Senior, Ch Mr. Robert M. Abbey SURF Fellow	A Versatile New Sensing Diode	John D. Baldeschwieler Professor of Chemistry
Brandy N. Justice Furman University Senior, CS	Technology Transfer	John C. Kelly Group Leader, JPL
Sham M. Kakade Senior, Ph Richter Scholar	Efficiency of Error Correction in Quantum Computing	John P. Preskill Professor of Theoretical Physics
Dae W. Kang Junior, CS	Exploration of Java and Its Wavelet	Peter Schröder Assistant Professor of Computer Science
Anuraag R. Kansal Senior, ChE Semiconductor Systems, Inc. SURF Fellow	Rheology of Spin-Coating	Peter Haaland Research Physicist, Semiconductor Systems, Inc. Julia A. Kornfield Associate Professor of Chemical Engineering
Pinar Karaca Swarthmore College Junior, Ec/Ma	Combinatorial Auction Design	David P. Porter Visiting Associate in Economics
Hee S. Kim Senior, Ec Richter Scholar	The Economics of Television Network-Affiliate Relationship	Simon J. Wilkie Assistant Professor of Economics
Sung H. Kim Occidental College Junior, Ph	Three-Dimensional Behavior of Granular Materials Under Vertical Vibration	Theodore Y. Wu Professor of Engineering Sciences Mingming Wu Assistant Professor of Physics, Occidental College

STUDENT**TOPIC****MENTOR**

Clay H. Kishiyama

Senior, ME

AeroVironment, Inc. SURF Fellow

Chain Efficiency and Idler Drag

Paul MacCready

Chairman, AeroVironment, Inc.

Erik K. Antonsson

Associate Professor of Mechanical Engineering

Daniel M. Kleiman

Junior, Ma/Ec

First Quadrant SURF Fellow

Time-Series and Non-Linear Market Analysis

David Krider

Associate, First Quadrant

Corporation

Scott Page

Assistant Professor of Economics

Kurt A. Klein

Sophomore, Ch

Alternate Synthesis of 4'-(4''-Ferrocenylphenyl)-
2,2':6',2''-terpyridine

Fred C. Anson

Professor of Chemistry

Minoree Kohwi

Sophomore, Bi

Glenn Foundation SURF Fellow

LIF and Neuropeptide Expression Regulation

Paul H. Patterson

Professor of Biology

Tai A. Lam

Junior, Ph

LIGO: The Mirror Contamination Test

Rochus E. Vogt

*R. Stanton Avery Distinguished
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Andreas C. Kuhnert

*Member of the Professional Staff
in Physics*

Benjamin F. Lane

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Richter Scholar

The Binary Millisecond Pulsar Companions
of B1957+20 and J2051-0821

Shrinivas R. Kulkarni

Professor of Astronomy

John C. Langford

Senior, Ph/CS

Richter Scholar

Finding Heavy Neutrino Signatures at LEP2

Harvey B. Newman

Professor of Physics

Gretchen M. Larson

Senior, Ch

Edward W. Hughes SURF Endowment

Metal Regulation of DNA Binding Polyamides

Peter B. Dervan

Bren Professor of Chemistry

Andrew S. Laucius

Junior, EAS

Optimizing a Program that Simulates a LIGO
Interferometer

Rochus E. Vogt

*R. Stanton Avery Distinguished
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Kent Blackburn

Senior Engineer

Alana M. Laurence

Sophomore, ME

Erika C. Vote SURF Endowment

LIGA Metrology

Michael Hecht

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Ted A. Laurence

Senior, Ph

Richter Scholar

EXPOSE (EX POst facto Synthesis Experiment)

Christopher Martin

Professor of Physics

STUDENT	TOPIC	MENTOR
Luis A. Lesmes University of Southern California <i>Senior, Psychobi/Ch</i> <i>MURF</i>	Size Constancy and Object Recognition	John M. Allman <i>Hixon Professor of Psychobiology</i> <i>and Professor of Biology</i>
Yu-chun Liao Imperial College <i>Sophomore, Ch</i> <i>Dreyfus Foundation SURF Fellow</i>	The Effect of Hydrogen Bonding and Change in pH on Conformational Equilibria	John D. Roberts <i>Institute Professor of Chemistry,</i> <i>Emeritus; Lecturer</i>
Brian N. Limketkai <i>Junior, EE</i>	Tiny Transponder	Dimitrios Antsos <i>Member of the Technical Staff,</i> <i>JPL; Lecturer in Electrical</i> <i>Engineering</i>
James Lin <i>Senior, CS</i> <i>Arthur Rock SURF Endowment</i>	A Problem Solving Environment to Aid in the Evaluation and Simplification of Vector Equations	James R. Arvo <i>Associate Professor of Computer</i> <i>Science</i>
Frank H. Ling <i>Senior, ChE</i>	Degradation of PNP, 4CP, and NB by Sonication and Ozonolysis	Michael R. Hoffmann <i>James Irvine Professor of</i> <i>Environmental Chemistry</i>
Christianto Liu <i>Sophomore, EE</i>	Optimization of the JPL Mid-Infrared Camera Software	Michael E. Ressler <i>Research Scientist, JPL</i>
Erin M. Lynch <i>Junior, Ph</i>	Rotational Period of Nereid	Bonnie J. Buratti <i>Research Scientist, JPL</i>
Robert S. Lyons <i>Senior, Ay</i> <i>Flintridge Foundation SURF Fellow</i>	An Analysis of the Absorption Spectrum of Q1442+2931	Wallace L.W. Sargent <i>Ira S. Bowen Professor</i> <i>of Astronomy</i>
Carlos Maldonado <i>Senior, ChE</i> <i>William N. Lacey SURF Endowment</i> <i>Fund</i>	Vapor Sensing Based on Stress Compensated Quartz Oscillators	Mark E. Davis <i>Warren and Katharine Schlinger</i> <i>Professor of Chemical Engineering</i>
Noah Malmstadt <i>Senior, ChE</i>	Directed Evolution of a Thermostable Subtilisin	Frances H. Arnold <i>Associate Professor of Chemical</i> <i>Engineering</i>
Vuk Mandic <i>Junior, Ph</i>	Analysis of Signal and Background for Higgs Production	Harvey B. Newman <i>Professor of Physics</i>
Obadiah J. Manley <i>Senior, APh</i> <i>Logicon RDA SURF Fellow</i>	Neural Network Prediction of Manufacturing Processes	Gregg Wilensky <i>Senior Scientist, Logicon RDA</i>
James C. Manners University College London <i>Senior, Ph</i>	Molecular Absorption and Modelling the Jovian Atmosphere	Glenn S. Orton <i>Senior Research Scientist, JPL</i>

STUDENT	TOPIC	MENTOR
Jeremiah M. Mans <i>Junior, APh</i> <i>Richter Scholar</i>	Microdevices for Electrophoretic Analysis	Michael L. Roukes <i>Associate Professor of Physics</i>
Milena Marinova <i>Junior, CS</i>	Refinement and Implementation of Image Reconstruction Techniques on Jupiter Images	Glenn S. Orton <i>Senior Research Scientist, JPL</i>
Benjamin P. Marriage <i>Leicester University</i> <i>Junior, Ph</i>	Reduction of Ground Based Observations of Jupiter in Support of the Jupiter/Galileo s/c Mission	Glenn S. Orton <i>Senior Research Scientist, JPL</i>
Ellen L. Martin <i>Sophomore, Bi</i>	Territorial Expression and Cis-regulatory Organization of CyIIa in the Sea Urchin Embryo	Maria Ina Arnone <i>Research Fellow in Biology</i>
Sebastian M. Maurer <i>Senior, Ph</i> <i>Dr. and Mrs. Samuel P. Morgan</i> <i>SURF Fellow</i>	Vortex Pinning by Cylindrical Defects in Type-II Superconductors - Numerical Solutions to the Ginzburg-Landau Equations	Thomas A. Tombrello <i>Professor of Physics</i> Nai-Chang Yeh <i>Associate Professor of Physics</i>
Dennis D. Maxwell, Jr. <i>College of Charleston</i> <i>Senior, Ph/Eng</i>	Radial Velocities of Five CSPN Binary Candidates	James K. McCarthy <i>Assistant Professor of Astronomy</i>
Devon J. McClain <i>Junior, Ay</i> <i>Richter Scholar</i>	Characteristics of a High Dispersion 1200GR/MM Grism Optimized Using Electromagnetic Theory	James K. McCarthy <i>Assistant Professor of Astronomy</i>
Ryan L. McCorvie <i>Sophomore, AMa</i>	Decision Analysis and Optimization for F-B-C Missions	Ralph F. Miles, Jr. <i>Senior Member of the Technical Staff, JPL</i>
Jeffrey M. Mendez <i>Sophomore, Ch</i> <i>Richter Scholar</i>	Two Photon Induced Fluorescence for Tumor Imaging	Seth R. Marder <i>Member of the Beckman Institute</i>
Steven S. Michael <i>Junior, APh</i> <i>Howell N. Tyson, Sr. SURF Fund</i>	LIF Imaging of Transverse Jet Flow	Paul E. Dimotakis <i>John K. Northrup Professor of Aeronautics and Professor of Applied Physics</i>
Jeffrey C. Miller <i>Senior, Bi</i> <i>Class of '36 Endowment Fund</i>	Insertion of a More Efficient Caged Compound into Membrane Proteins	Henry A. Lester <i>Professor of Biology</i>
Sonia L. Minassian <i>Harvey Mudd College</i> <i>Senior, Ma</i>	Analysis of Reflectance Spectra	William D. Smythe <i>Member of the Technical Staff, JPL</i>
Benjamin H. Mok <i>Sophomore, Ph/Bi</i> <i>Samuel P. and Frances Krown</i> <i>SURF Endowment Fund</i>	Analysis of the Sea Urchin <i>TEF-1</i> Transcription Enhancer Factor Gene	Eric H. Davidson <i>Chandler Professor of Cell Biology</i>

STUDENT	TOPIC	MENTOR
Christina Molodowitch <i>Junior, Ch</i> <i>Howard Hughes Medical Institute</i> <i>SURF Fellow</i>	Analysis of Promoter Function in Living <i>Drosophila</i> Embryos	Carl S. Parker <i>Professor of Chemical Biology</i>
Brian M. Monroe <i>Junior, Ay</i>	Near-Infrared Study of Interacting Galaxies	B. Thomas Soifer <i>Professor of Physics</i>
Deimetra L. Moore <i>Tennessee State University</i> <i>Senior, EE</i> <i>MURF</i>	Design of an Intelligent Flight Control System for Helicopter Roll-Axis Control	Rodney M.F. Goodman <i>Professor of Electrical Engineering</i>
Mary L. Mosier <i>Junior, Bi</i> <i>Mr. and Mrs. Downie D. Muir III</i> <i>SURF Fellow</i>	Visualization of CaMK II in Mammalian Brain Slices	Mary B. Kennedy <i>Professor of Biology</i>
Carter M. Moursund <i>Senior, EE</i> <i>AstroTerra Corporation SURF Fellow</i>	Video Compression for Transfer Over a Noisy Channel	Eric Korevaar <i>President, AstroTerra</i> <i>Corporation</i> Glen A. George <i>Lecturer in Computer Science and</i> <i>Electrical Engineering</i>
Hai Ah Nam <i>Scripps College</i> <i>Senior, Ph</i>	Numerical Simulations of Charge Transport in a CZT Detector	William A. Mahoney <i>Senior Scientist, JPL</i>
Maksim V. Narovlyansky <i>Sophomore, Ch</i> <i>Richter Scholar</i>	Quantum Calculation of Streamlines of Probability Current Density and Application to Chemical Reactions	Aron Kuppermann <i>Professor of Chemical Physics</i>
Mark L. Neidengard <i>Senior, EAS</i> <i>Dr. and Mrs. Gordon E. Moore</i> <i>SURF Fellow</i>	An Asynchronous, Quasi-Delay Insensitive Floating Point Multiplier	Alain J. Martin <i>Professor of Computer Science</i>
Bradley D. Nelson <i>Junior, CS</i>	Portable Graphical Tools for Concurrent Plasma Simulation	Stephen Taylor <i>Assistant Professor of Computer</i> <i>Science</i>
Thomas A. Niday <i>Senior, Ph</i> <i>Richter Scholar</i>	Analysis of Spiral Chaos	Michael C. Cross <i>Professor of Theoretical Physics</i>
Matthew M. Noble <i>Senior, ME</i> <i>Dr. Chandler C. Ross SURF Fellowship</i>	Particle-Wall Collisions in a Two Phase Particle Fluid Flow	Melany L. Hunt <i>Associate Professor of Mechanical</i> <i>Engineering</i>

STUDENT

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Mr. and Mrs. Fred M. Wells SURF
Fellow

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Florida Institute of Technology
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Barbara
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Richter Scholar

Kpemike Ogouma
Central State University
Senior, Water Resources Management

Siddhartha Padmanabha
Junior, Bi
Howard Hughes Medical Institute
SURF Fellow

Oon-Gil Paik
Senior, EAS

Payam Pakzad
Junior, EE

Jeremy M. Pallotta
University of New Hampshire
Senior, CS

Kartik C. Parija
Drake University
Senior, CS/Ma

Linda J. Park
Junior, ChE
Richter Scholar

TOPIC

Solving the NP-Complete 3-SAT Problem
Through Simulation of a Quantum Computer

Planetary Meteorology on Jupiter

A New Drive Technology for Chronic Tetrode
Recording in Mammals

Construction of a Full-length cDNA Clone of
the Dengue Type 2 Viral Genome

Application of Synthetic Aperture Radar in
Hydrology

Search for Pistillata Expression Factors

A Smart Internet Search Engine

Tiny Transmitter

Analysis of Freeze/Thaw Conditions Over
Alaskan Transects Through ERS-1 Satellite

Effects of Atmospheric Changes in the Jovian
System due to the Impact of Comet Shoemaker
Levy 9 with Jupiter
Focus: Temperature Perturbations

Analysis of Melting and Crystallization
Characteristics of PHB

MENTOR

Nicolas Cerf
Research Fellow in Physics
Christoph Adami
Division Research Fellow
in Physics
Steven E. Koonin
Vice President and Provost;
Professor of Theoretical Physics

Glenn S. Orton
Senior Research Scientist, JPL

Gilles Laurent
Assistant Professor of Biology and
Computation & Neural Systems

Ellen G. Strauss
Senior Research Associate
in Biology

Anthony Freeman
Group Supervisor, JPL

Elliot M. Meyerowitz
Professor of Biology
Xuemei Chen
Postdoctoral Research Fellow

Glen A. George
Lecturer in Computer Science
and Electrical Engineering

Dimitrios Antsos
Member of the Technical Staff,
JPL; Lecturer in Electrical
Engineering

Kyle C. McDonald
Research Scientist, JPL

Glenn S. Orton
Senior Research Scientist, JPL

Julia A. Kornfield
Associate Professor of Chemical
Engineering

STUDENT	TOPIC	MENTOR
Hiranya V. Peiris University of Cambridge <i>Junior, Ph</i>	The Galileo PPR Experiment	Terry Z. Martin <i>Member of the Technical Staff, JPL</i>
Adam G. Petrie <i>Junior, Ay</i>	The Search for High Redshift Galaxies: Designing Effective Selection Criteria	Charles C. Steidel <i>Assistant Professor of Astronomy</i>
Lena Petrovic <i>Senior, CS</i> <i>Samuel P. and Frances Krown SURF Endowment Fund</i>	Subdivision Surface Editor	Peter Schröder <i>Assistant Professor of Computer Science</i>
Zachary S. Pitkow Princeton University <i>Senior, Ph</i>	Fluorescence Measurement of Neurotransmitter Transporter Conformational Change and Proton Leak Current	Henry A. Lester <i>Professor of Biology</i>
Alexei Polichtchouk <i>Senior, Ph</i> <i>Richter Scholar</i>	Electron Propagation in Semiconductor Nanostructures	Michael C. Cross <i>Professor of Theoretical Physics</i> Michael L. Roukes <i>Associate Professor of Physics</i>
Lea Popovic University of Toronto <i>Senior, Ma</i>	Data Reduction of Near Infra-red Images of Saturn	Glenn S. Orton <i>Senior Research Scientist, JPL</i>
Mason A. Porter <i>Junior, AMa</i> <i>Richter Scholar</i>	Cross Cultural Efforts Between Mathematics and Engineering	Jerrold E. Marsden <i>Professor of Control and Dynamical Systems</i>
Wei Qin <i>Senior, EE</i>	A 200W 13.56MHz Class-E Power Amplifier for Communications	David B. Rutledge <i>Professor of Electrical Engineering</i>
James J. Quallen <i>Senior, Ch</i> <i>Howard Hughes Medical Institute SURF Fellow</i>	Creation of Magnetic Beads for GST-Fusion Protein Purification	John N. Abelson <i>George Beadle Professor of Biology</i>
Vincent R. Quitoriano <i>Junior, PI Sci</i>	Modeling the Landers Earthquake: Basin Response in Simulated and Recorded Ground Motions	David J. Wald <i>Visiting Associate in Geophysics</i>
Priyamvada Rai <i>Senior, Bi</i> <i>Mr. and Mrs. Victor V. Veysey SURF Fellow</i>	<i>In vivo</i> Comparison of Charged and Uncharged Levels of Human Mitochondrial tRNAs	Giuseppe Attardi <i>Grace C. Steele Professor of Molecular Biology</i>
Kumar S. Raman <i>Senior, Ph</i> <i>Lester Lees Aeronautics SURF Fellowship</i>	Flame Speed Measurements During Unsteady Combustion	Joseph E. Shepherd <i>Associate Professor of Aeronautics</i>

STUDENT**TOPIC****MENTOR**

David R. Relyea

Senior, Ph

*Dr. and Mrs. Lew Allen, Jr. SURF
Fellow*

Finding Correlations within the LIGO 40-m
Interferometer Slow Monitoring System

Rochus E. Vogt

*R. Stanton Avery Distinguished
Service Professor and Professor
of Physics
Andreas C. Kuhnert
Member of the Professional Staff
in Physics*

Michelle Rojas-Soto

*University of Puerto Rico,
Rio Piedras
Senior, Bi
MURF*

The Preparation of a Neurogenin Fusion
Protein

David J. Anderson

*Associate Professor of Biology;
Associate Investigator, Howard
Hughes Medical Institute*

Jason A. Roth

Sophomore, CS

The Chemistry Animation Project:
Molecular Orbitals

Nathan S. Lewis

Professor of Chemistry

Keri L. Ryan

Junior, CE

Demonstrations for AM35

John F. Hall

*Associate Professor of Civil
Engineering*

Saurabh Saha

Junior, Bi

Gene Expression and Protein Localization
in *Leishmania* with the Green Fluorescence
Protein

Stephen M. Beverley

*Hsien Wu and Daisy Wen Yu
Professor, Department of
Biological Chemistry and
Molecular Pharmacology,
Harvard Medical School*

Anna M. Salazar

Senior, Bi

Richter Scholar

Selection of RNA Ligand to DbpA

John N. Abelson

George Beadle Professor of Biology

Richard H. Salvador

*Stanford University
Junior, CS
MURF*

Image Processing for Computer Navigation
and Obstacle Avoidance: The Floor
Recognition Approach

Demetri Psaltis

Professor of Electrical Engineering

Wes T. Salzillo

Junior, APh

Allied Signal SURF Fellow

Imaging of a Transverse Jet in Cross-Flow

Paul E. Dimotakis

*John K. Northrup Professor of
Aeronautics and Professor of
Applied Physics*

Glenn M. Sammis

*Stanford University
Sophomore, Ch*

Towards the Synthesis of an Oxytocin Analog
Using Ring-Closing Metathesis

Robert H. Grubbs

*Victor and Elizabeth Atkins
Professor of Chemistry*

Maria F. Satterwhite

Junior, Ch

Mrs. Edwin L. Cline SURF Fellow

Excited States in Stratospheric Chemistry

Mitchio Okumura

*Associate Professor of Chemical
Physics*

Gina L. Serraiocco

Senior, Bi

Shirley and Carl Larson SURF Fellow

CLARK KENT: Epi-genetic Phenomenon
Explains Paradox?

Elliot M. Meyerowitz

Professor of Biology

STUDENT	TOPIC	MENTOR
Barry Shapira <i>Junior, Ch</i> <i>Mr. and Mrs. Clayton H. Englar</i> <i>SURF Fellow</i>	Synthesis and Study of Annulene	Andrew G. Myers <i>Professor of Chemistry</i>
Kanna Shimizu <i>Senior, EE</i> <i>Richter Scholar</i>	Non-Realtime Voice Compression	Glen A. George <i>Lecturer in Computer Science</i> <i>and Electrical Engineering</i>
Andrew C. Silberfarb <i>Junior, Ph</i>	Resistive Plate Counter Detectors	Douglas Michael <i>Senior Research Fellow in High</i> <i>Energy Physics</i>
Manish Sinha <i>Imperial College</i> <i>Senior, Ae</i>	How and Why Aircraft Fly	Paul A. Robinson, Jr. <i>Professor of Physics,</i> <i>Principia College</i>
Ben A. Siron <i>Senior, APh</i>	High Resolution Electron Projection Lithography Using Cyclotron Orbits	Axel Scherer <i>Professor of Electrical Engineering</i>
Frances M. Siu <i>Junior, EE</i> <i>Ford Motor Company SURF Fellow</i>	Improved Boundary Conditions of Surface Micromachined Diaphragms	Yu-Chong Tai <i>Associate Professor of Electrical</i> <i>Engineering</i>
Douglas A. Smith <i>Rensselaer Polytechnic Institute</i> <i>Senior, EE</i>	Automating a TIE Telescope on Palomar Mountain	Gilbert A. Clark <i>Program Manager, Telescopes in</i> <i>Education, JPL</i>
Edwin Soedarmadji <i>Senior, EE/APh</i>	Ghost-Canceling Antenna System for DirecTV	William B. Bridges <i>Carl F Braun Professor</i> <i>of Engineering</i>
Michael D. Stage <i>Senior, Ph</i> <i>Dr. and Mrs. Michael J. Callaghan</i> <i>SURF Fellow</i>	12.5 μm Imaging of the Galactic Center: A Mid-IR Search for a Central Black Hole	Michael W. Werner <i>Senior Research Scientist, JPL</i>
Ann M. Stimmler <i>Sophomore, EAS</i> <i>Ernest H. Swift SURF Endowment</i> <i>Fund</i>	The Design and Construction of an Odor Discrimination Device for Rats	Nathan S. Lewis <i>Professor of Chemistry</i> James M. Bower <i>Associate Professor of Biology</i>
Kathryn A. Stofer <i>Junior, Bi</i> <i>Mr. and Mrs. William B. Hicks</i> <i>SURF Fellow</i>	Optimization of a Technique for Visualizing an Activated Protein Kinase in Neural Tissue	Mary B. Kennedy <i>Professor of Biology</i>
Paul O. Storaasli <i>Junior, EE</i>	Design of Recycling Mirror Servo Electronics for 40m LIGO	Rochus E. Vogt <i>R. Stanton Avery Distinguished</i> <i>Service Professor and Professor</i> <i>of Physics</i> Jay Heefner <i>Project Engineer in Physics</i>

STUDENT	TOPIC	MENTOR
Ronald H. Stowell <i>Senior, Ph/AMa</i>	Linear Response of a Pure-Electron Plasma in a Magnetic Field Due to a Current-carrying Wire	Noel R. Corngold <i>Professor of Applied Physics</i>
Andrew K. Strauss <i>Sophomore, EAS</i> <i>Mrs. Hannah Bradley SURF Fellow</i>	Shift Multiplexing – A Method of Mass Holographic Storage	Demetri Psaltis <i>Professor of Electrical Engineering</i>
Erik W. Streed <i>Sophomore, Ph</i> <i>Dreyfus Foundation SURF Fellow</i>	Electrostatic Attraction's Effect on the Conformational Distribution of β -alanine ($+NH_3CH_2CH_2CO_2^-$)	John D. Roberts <i>Institute Professor of Chemistry, Emeritus; Lecturer</i>
Advoquita P. Stude <i>Junior, Env</i>	Chemical Characterization of Ambient Aerosols over the Atlantic Ocean	Michael R. Hoffmann <i>James Irvine Professor of Environmental Chemistry</i>
Julius T. Su <i>Junior, Ph</i>	Femtosecond Elementary Processes in Chemical and Biological Systems	Ahmed H. Zewail <i>Linus Pauling Professor of Chemistry and Professor of Physics</i>
Winston Y. Su <i>Stanford University</i> <i>Sophomore</i>	The Study of Particulate Air Pollution Control as a Supplement to High School Science Curricula	Paul A. Robinson, Jr. <i>Professor of Physics, Principia College</i>
Ki-Young Suh <i>Senior, Bi</i> <i>Glenn Foundation SURF Fellow</i>	Occlusion Experiment for BDNF and NT-3	Erin M. Schuman <i>Assistant Professor of Biology</i>
Toufic M. Suidan <i>Senior, AMa/Ma</i>	Nonlinear Molecular Dynamics	Stephen Wiggins <i>Professor of Applied Mechanics</i>
Philip M. Sutton <i>Senior, CS</i> <i>Samuel P. and Frances Krown SURF Endowment Fund</i>	Rendering Microsurface-Based Textures Using Texels	Alan H. Barr <i>Associate Professor of Computer Science</i>
Kai-hsu Tai <i>Junior, Ch</i>	Simulation of DNA Intercalation by Rhodium(III) Polyamine Complexes	William A. Goddard III <i>Charles and Mary Ferkel Professor of Chemistry and Applied Physics</i>
Miguel A. Talavera <i>University of Puerto Rico, Mayaguez</i> <i>Senior, Ch</i> <i>MURF</i>	RNA Aptamer Selection for HLA-B27	Pamela J. Bjorkman <i>Associate Professor of Biology; Associate Investigator, Howard Hughes Medical Institute</i>
Wesley N. Tanaka <i>Sophomore, CS</i>	Caltech Infospheres Project: Bringing Theory to the Marketplace	K. Mani Chandy <i>Professor of Computer Science</i>
Victoria M. Tanusheva <i>Junior, Ma</i> <i>Richter Scholar</i>	Topological Puzzles	Tomasz S. Mrowka <i>Professor of Mathematics</i>

STUDENT	TOPIC	MENTOR
Michael P. Thelen Loyola Marymount University <i>Junior, ME</i>	Ion Engine Gas Flow Calibration	John R. Brophy <i>Technical Group Supervisor, JPL</i>
Devi M. Thota <i>Sophomore, ME</i>	The Morphological Changes in Hippocampal Neurons Due to Extracellular Stimulation	Jerome Pine <i>Professor of Physics</i>
Matthew S. Tiscareno <i>Junior, Ph</i>	Analysis of Data of Jupiter's Moon Ganymede Received from the Near Infrared Mapping Spectrometer on the Galileo Spacecraft	G. Edward Danielson <i>Member of the Professional Staff in Planetary Science</i>
Sara M. Tolaney Princeton University <i>Junior, Molecular Bi</i> <i>Howard Hughes Medical Institute SURF Fellow</i>	Determining Protein-Protein Interaction Partners of Leafy, a Plant Developmental Switch	Elliot M. Meyerowitz <i>Professor of Biology</i>
Tony V. Tran <i>Junior, ChE</i>	Backbone and Spacer Length Effects on Side-Chain Liquid Crystal Polymers	Julia A. Kornfield <i>Associate Professor of Chemical Engineering</i>
Stephen P. Trowell University of Leicester <i>Senior, Ph</i>	Advanced Spacecraft Design: A Mission to Europa	Joan C. Horvath <i>Industry Liaison Officer, JPL</i>
James M. Turner <i>Junior, Ch</i> <i>Richter Scholar</i>	Recognition of 7 Base Pairs of DNA by a 5- γ -5 Pyrrole-Imidazole Polyamide Hairpin Motif	Peter B. Dervan <i>Bren Professor of Chemistry</i>
David E. Tytell <i>Sophomore, Ay/Ge</i> <i>Arthur R. Adams SURF Fellowship</i>	Interpretation of the Effects of Helium in the Jovian Interior	David J. Stevenson <i>Professor of Planetary Science</i>
Elwyn T. Uy <i>Senior, APh</i> <i>Mr. and Mrs. Robert L. Noland SURF Fellow</i>	The Holographic Sneaker Tracker	Demetri Psaltis <i>Professor of Electrical Engineering</i>
Diederik M. van Rappard Stanford University <i>Senior, Ch</i>	Protostars in the Rho Ophiuchus Cloud	Thomas G. Phillips <i>Professor of Physics</i>
Chris K. Varma <i>Sophomore, Bi</i>	Rapid Detection of Antigen Specific T-Cell Hybridomas	Leroy Hood <i>Professor and Chairman, Department of Molecular Biotechnology, University of Washington</i>
Anna N. Varshavsky <i>Junior, Bi</i> <i>Howard Hughes Medical Institute SURF Fellow</i>	Intracellular Signaling of Protein Tyrosine Phosphatase DPTP69D	Kai Zinn <i>Associate Professor of Biology</i>

STUDENT	TOPIC	MENTOR
Daniel Velez Junior, ChE Professor Fredrick H. Shair SURF Endowment	Novel Enzyme Substrate Specificities Through Directed Molecular Evolution on Sequences of Structurally Related Substrates	Frances H. Arnold Associate Professor of Chemical Engineering
Kwanchanok Viravaidya Junior, ChE	The Relative Importance of the Two Specific Binding Domains of Laminin in Extracellular Adhesion	Jeffrey A. Hubbell Professor of Chemical Engineering
Keely L. Walker Senior, Bi Richter Scholar	A Genetic Analysis of the Roles of Tyrosine Kinases and Tyrosine Phosphatases in Controlling Motor Axon Guidance in <i>Drosophila</i>	Kai Zinn Associate Professor of Biology
D. William Ward Principia College Senior, Ch/English	Modeling Pollution	Paul A. Robinson, Jr. Professor of Physics, Principia College
Rachel C. Weathers Senior, ME/SES J. Weldon Green SURF Endowment	Behavior of Granular Material in a Horizontally Vibrating Hopper	Melany L. Hunt Associate Professor of Mechanical Engineering
Lorenz G. Wegener University of Cambridge Senior, Ph	Reduction of Auticorrelation Between Temperature and Predictions for the Mixing Ratios of C ₂ H ₂ and C ₂ H ₆ on Jupiter	Glenn S. Orton Senior Research Scientist, JPL
Sindy H. Wei Junior, Bi Dreyfus Foundation SURF Fellow	Rotational Conformations of β -Alanine from NMR Spectroscopy	John D. Roberts Institute Professor of Chemistry, Emeritus; Lecturer
Barbara A. Weir Senior, Bi Richter Scholar	Purification and Characterization of 2 Kinases, <i>Thermotoga maritima</i> CheA and <i>Neurospora crassa</i> nik-2	Melvin I. Simon Anne P. and Benjamin F. Biaggini Professor of Biological Sciences; Chair, Division of Biology
Michael J. Westover Sophomore, Ay Richter Scholar	Reduction of Spectroscopic Data from Radio-Selected Quasars	Limin Lu Research Fellow in Astronomy
Eileen R. Wexler Senior, EAS Richter Scholar	The Chemistry Animation Project	Nathan S. Lewis Professor of Chemistry
Aloysius A. Wild Senior, Ph	Low Energy Nuclear Reactions Studied in the Presence of Target and Projectile Electrons	Karlheinz Langanke Senior Research Associate in Theoretical Physics
James A. Wild University of Leicester Senior, Ph	Advanced Spacecraft Design: Mission to Europa	Joan C. Horvath Industry Liaison Officer, JPL
Tamara S. Williams Tennessee State University Junior, Ph MURF	Towards Compositional Rules in Image Analysis	Pietro Perona Assistant Professor of Electrical Engineering

STUDENT	TOPIC	MENTOR
Travis J. Williams <i>Sophomore, Ch</i> <i>Dreyfus Foundation SURF Fellow</i>	Macroscale Synthesis of (+)-1-Trimethylsilyl-1,2-pentadiene-5-ol	Erick M. Carreira <i>Assistant Professor of Chemistry</i>
Toby A.J. Wiseman <i>University of Cambridge</i> <i>Junior, Ph</i>	Low Temperature Magnetostrictive Actuator	Robert G. Chave <i>Applied Physicist, JPL</i>
Winston C. Yang <i>Senior, Ma</i> <i>SURF Alumni Fellowship</i>	Derivatives of Self-Compositions of Functions	Richard M. Wilson <i>Professor of Mathematics</i>
Johanna A. Yao <i>Junior, Ch</i> <i>Peter A. Lindstrom SURF Endowment</i>	Novel Complexes of Osmium as Molecular Probes for DNA	Jacqueline K. Barton <i>Professor of Chemistry</i>
Wen X. Yin <i>University of Cambridge</i> <i>Senior, Ph</i>	Multiple Cavity Locking Sequence in a LIGO Interferometer	Rochus E. Vogt <i>R. Stanton Avery Distinguished Service Professor and Professor of Physics</i> Lisa Sievers <i>Member of the Professional Staff in Physics</i>
Simon Y. Yu <i>Senior, EAS</i> <i>Toshi Kubota Aeronautics SURF Fellowship</i>	High-Strain-Rate Behavior of Metals at High Temperatures	Guruswaminaidu Ravichandran <i>Associate Professor of Aeronautics</i>
Alan H. Yue <i>Junior, Ph</i> <i>Richter Scholar</i>	Design and Construction of a Single-Frequency High-Power Diode Laser Amplifier	H. Jeff Kimble <i>Professor of Physics</i>
Veronica A. Zamudio <i>University of Texas at El Paso</i> <i>Junior, ME</i> <i>NASA Minority SURF</i>	The Telescopes in Education (TIE) Project	Gilbert A. Clark <i>Program Manager, Telescopes in Education, JPL</i>
Yuan Zhang <i>Claremont McKenna College</i> <i>Junior, Bioch</i> <i>Howard Hughes Medical Institute SURF Fellow</i>	The Synthesis of pdCpA and Tetrafluorotyrosine-Compounds Useful for the Study of Nicotinic Acetylcholine Receptors and Other Ion Channels	Dennis A. Dougherty <i>Professor of Chemistry</i>
Amy M. Zheng <i>Junior, Bi</i>	I. Prepare Monoclonal Antibody against UL18 Heavy Chain; II. Deglycosylation of UL18 by Site Specific Mutagenesis	Pamela J. Bjorkman <i>Associate Professor of Biology; Associate Investigator, Howard Hughes Medical Institute</i>

Ae Aeronautics
 AMa Applied Mathematics
 APh Applied Physics
 Ay Astronomy
 Bi Biology
 BioPh Biophysics
 CE Civil Engineering
 Ch Chemistry
 ChE Chemical Engineering

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