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What's Taken Up Residence In Panofsky Grove?

By Shawne Neeper



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heel-to-toe. The sculpture comes to SLAC through the Stanford Panel on Outdoor Art.

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Art Meets Science: SSRL to Join in Stanford Campus-Wide Project

By Davide Castelvecchi

Scientists at SSRL are joining in an unusual collaboration to study and preserve an artistic treasure from the



Disorderly Conduct: The Unusual Behavior of Nanomaterials

By Heather Rock Woods

Extremely small pieces of a material aren't always a chip off a bigger block. How nanomaterials behave is tremendously important to know when trying to understand the roles of mineral nanoparticles in the environment, or design devices for nanotechnology.

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Renaissance.

The focus is the recently restored painting entitled Virgin, Child and St. John, by Jacopo del Sellaio (pronounced YA-coh-poh del Sel-LAH-yo), who lived in Florence from about 1441 to 1493 and was an apprentice of the better-known artist Sandro Botticelli.

[See whole story...](#)



First, he challenged attending scientists to describe how their current work relates to one of the ten great questions—or is otherwise irresistibly fascinating. Second, propose the eleventh puzzle.

“The spirit of those opening remarks was partly that I’m uncomfortable with the idea of ‘great questions’,” Quigg said.

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The artist Abdell—U.S.-born in 1947 and last sighted somewhere in Spain—created a “whole series of these works, these slightly geometric, anthropomorphic sculptures that sort of look like they want to run away—kind of playful,” said Hilarie Faberman, curator of modern and contemporary art for Stanford's Cantor museum.

Like its brothers named Krefe-Aekyad and Aegae-Aekyad which reside at Wichita State University, this piece came into existence in the late 1970's. The sculpture was donated to Stanford University by Gap clothing chain owners and modern art aficionados Doris and Donald Fisher.

“The Fishers are among the foremost collectors of contemporary art—especially large-scale outdoor sculpture—in the country,” said Faberman. “They have fantastic works at the Gap and at their private residences, and have been very generous to Stanford and other institutions throughout America.”

The Fisher's artsy, playful donation caught the attention of Neil Calder (COM), director of communications.

“SLAC is at the very forefront of experimental scientific research,” Calder said. “It's great that our site can reflect the forefront of experimental contemporary art.”

Calder joined the Stanford outdoor art panel last year to pursue his longstanding interest in art and science—an interest cultivated during his tenure as communications head at CERN in Geneva. There, he spearheaded a project that brought artists to CERN to prepare expressions on science, and “our rapidly changing concept of our universe, our world, ourselves.” The resulting exhibition toured leading galleries from London to New York. Calder approached ex-officio Stanford outdoor art panel member and Cantor Arts Center director Tom Seligman with his interest in having sculpture sited on the SLAC campus.

“This is a wonderful change for SLAC,” Calder said. “Thank you to the University Outdoor Art Panel for thinking of SLAC for outdoor sculpture.”



Douglas Abdell's sculpture, Kryeti-Aekyad, stands in Panofsky Grove.
(Photo by Diana Rogers)

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The negotiations that brought this piece to SLAC took more than a year, according to Cantor painting conservator Susan Roberts-Manganelli. "The sculpture was identified as appropriate for SLAC by the Outdoor Art Panel, then Calder ran it by people and found fabricators for the mount, and seismic and materials needs."

Kryeti-Aekyad rests on tiptoe over specially manufactured metal plates and concrete feet, for stability against earthquakes. Each foot starts with a 12-inch deep concrete block, said carpenters Dave Toews and Ryan Kuhn (both of SEM), after installing pine framing for the concrete. Toews said steel plating would be bolted into the concrete, to protect and hold the sculpture's feet.

The steel plates are temporary. SLAC will install silicon bronze foot plates, matched to the sculpture, as soon as material becomes available. Over the years, Aekyad's silicon bronze feet could slowly corrode if left in contact with steel. The difference in metals—steel against bronze—would act like a battery, slowly eroding the bronze by electrolysis.

The sculpture first set foot on SLAC grounds August 6. Next time you're headed to the Cafeteria for a burger, take a short detour to Panofsky Grove and enjoy the view.

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Researchers taking data at SSRL and the Advanced Photon Source (APS) in Illinois recently found that zinc sulfide at 3.5 nanometers (nm) in size (3.5 billionths of a meter) behaves quite differently than 'bulk' zinc sulfide (several hundred nm and up). The method they developed should also prove useful for studying other kinds of nanomaterials.

"Zinc sulfide is one of a class of materials potentially very useful as a semiconductor; it can also be found in the environment as nanoparticles," said Ben Gilbert, a postdoc working with Jill Banfield at UC Berkeley. The group from Berkeley and LBNL published their results in the July 1 issue of Science.

Their work shows that structural disorder may be common in nanomaterials and that this can modify the material's properties, which are important for designing nanotechnology.

The study uses two types of synchrotron x-ray information: small-angle x-ray scattering (SAXS) at SSRL to get size and shape information, and wide-angle x-ray scattering (WAXS) at APS for structure information. Combining the two sets of data allowed researchers to quantify the difference in behavior between 3.5 nm and bulk zinc sulfide.

"When you play with things at small sizes, one question is: how small is small? Things start to change around 5 to 10 nm," Gilbert said.

Some materials have been shown to have significant changes in structure at nanosizes. Gilbert said that zinc sulfide showed some subtle modifications that nevertheless cause a strong effect on the materials properties.

The structural changes the researchers saw did not follow a simple pattern. The nanomaterial's structure did not change completely, but it did exhibit a good deal of disorder and distortion. The length of bonds between atoms had contracted a little. In addition, the average atomic positions, which define a material's crystal structure, had shifted, so the atoms were in different locations than expected.

An important consequence of these changes is that the atoms were vibrating faster than in the bulk material. Thus, the zinc sulfide nanoparticles they studied are stiffer than bulk version.

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It's difficult to understand what drove the complex change, but it appears to result from surface effects. Atoms on the surface of nanomaterials aren't 'happy' because they don't have enough neighbors to bond to. This surface 'unhappiness' occurs at the surfaces of all materials, but when the material is very small, the surface forces can be relatively very large and can lead to large internal distortions.

"To my knowledge, there are not yet any general rules about what happens to materials at small sizes. The method we used could be a good way to look at this," Gilbert said.

To learn more about this work, attend the 31st Annual SSRL User's Meeting on Oct. 21-22.

For further information, see: http://www-ssrl.slac.stanford.edu/research/highlights_archive/nano.html.

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Shown left to right: Bill Wisniewski (BABAR Technical Coordinator), David MacFarlane (BABAR Spokeperson-elect), Umberto Dosselli (INFN Sezione di Padova), Marcello Giorgi (BABAR Spokesperson), Roberto Petronzio (INFN President), John Seeman (AD). (Photo by Diana Rogers)

Members of Italy's Istituto Nazionale di Fisica Nucleare (INFN) recently visited SLAC. Their visit included a tour of PEP-II and BABAR. INFN is the largest collaborating group in BABAR after the US.

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In his opening address for the SLAC Summer Institute (SSI) entitled Nature's Greatest Puzzles, theorist Chris Quigg of Fermilab set the tone for two weeks' worth of exploration into ten of nature's greatest physics questions. First, he challenged attending scientists to describe how their current work relates to one of the ten great questions—or is otherwise irresistibly fascinating. Second, propose the eleventh puzzle.

"The spirit of those opening remarks was partly that I'm uncomfortable with the idea of 'great questions'," Quigg said. On the one hand, he argued, it's often by asking small questions that scientists find clues to sweeping ideas—as hot-air balloonist Hess's curiosity about air conductivity led him to propose the existence of cosmic radiation. "These people had no idea they were answering a great question. They were just curious about a small thing."

On the flip side, Quigg sought to stir SSI attendees' imaginations about the broad implications of their own experiments. "It's very easy, especially when you're a student and are doing things because someone else told to you, to not think about why the work is so interesting or important."

Enter the Quigg challenge. As homework, Quigg asked attendees to explain their work's importance to a Great Question in only a paragraph or two. Science writers could be lurking behind any tree, Quigg warned; scientists had best be prepared. He was right. Many participants later found themselves facing a reporter's notebook at SSI functions, and most had done their homework.

"The world is made of matter but not antimatter [Question 8] for no apparent reason," said SUNY Stonybrook graduate student Ilektra Christidi of her experiments in rare particle decays. "So we want to explain how it happened" by examining how different flavors of particles mix.



Chris Quigg (Photo by Shawne Neeper)

**2004 SSI Topics:
Nature's Greatest Puzzles**

"If inflation occurred at all [Question 10], it was at energies that we wouldn't be able to probe with

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1. **Where and what is dark matter?**
2. **How massive are neutrinos?**
3. **What are the implications of the neutrino mass?**
4. **What are the origins of mass?**
5. **Why is there a spectrum of Fermion masses?**
6. **Why is gravity so weak?**
7. **Is nature supersymmetric?**
8. **Why is the Universe made of matter and not anti-matter?**
9. **Where do ultra-high-energy cosmic rays come from?**
10. **Did the Universe inflate at birth?**

present [high-energy physics] technologies," said Caltech graduate student Tristan Smith. His thesis project explores how future experiments in NASA's Beyond Einstein program could measure faint ripples in the geometry of space—proof that inflation did take place. "That would tell you how the large-scale structures of the universe—galaxies, clusters of galaxies—formed."

One of the mysteries of neutrinos is exactly how heavy they are [Question 2]. University of Kentucky's Susan Gardner is trying to improve estimates on their mass by looking at tritium decay. The ultimate goal? "There is an intrinsic joy in human understanding," she said, quoting Latin poet Lucretius: "Happy is he who understands the nature of things."

The next leap in understanding nature was the focus of the second—but also eleventh—challenge. In his

opening address, Quigg presented a list of ten great physics puzzles, from CP violation to the flat universe, and challenged his audience to come up with an eleventh. Quigg received 37 entries from SSI's array of physicists, students, university faculty and someone claiming to be George Bush.

The winning entry won neutrino theorist Yasaman Farzan a bottle of Iron Horse Brut California sparkling wine, signed by SLAC director Jonathan Dorfan and other physics noteworthies. Honorable mention and a copy of Peter Galison's *Einstein's Clocks, Poincare's Maps: Empires of Time* went to Marco Zanetti, a student at Padova University in Italy, for his question about time, and to Thomas Topel, a Colorado State graduate student, for his question about symmetry breaking in grand unified theories.

On August 11, Farzan presented an 11-minute talk on her eleventh great question, Is the Lorentz invariance exact? Lorentz invariance—a principle of special relativity—states that laws of physics are identical for observers moving at constant velocity relative to each other. "Hopefully in the future we will learn that this is not the final word, and we will find something even stranger," said Farzan, who will defend her Ph.D. thesis at the Sissa Institute in Trieste, Italy in October, "and this will help us to revolutionize physics again."

For further information on SSI, see: <http://www-conf.slac.stanford.edu/ssi/2004/program.htm>

For more on the 11th Challenge entries, see: <http://boudin.fnal.gov/NNP>

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Art Meets Science: SSRL to Join in Stanford Campus-Wide Project

By Davide Castelvechi

Scientists at SSRL are joining in an unusual collaboration to study and preserve an artistic treasure from the Renaissance.

The focus is the recently restored painting entitled Virgin, Child and St. John, by Jacopo del Sellaio (pronounced YA-coh-poh del Sel-LAH-yo), who lived in Florence from about 1441 to 1493 and was an apprentice of the better-known artist Sandro Botticelli.

An exhibition currently at Stanford's Cantor Center for Visual Arts showcases the project, which includes experts from Stanford's Cantor Center and Department of Art and Art History, from the Fine Arts Museums of San Francisco (FAMSF), and even from the Stanford Medical Center.

Later this year, physicist Apurva Mehta of SSRL will analyze microscopic samples of paint from Sellaio's painting.

"What we are hoping to do is starting a wider collaboration to look at paintings from this era," says Mehta. Together with materials scientists from the University of Texas at El Paso last year, he helped unlock the secrets of Maya blue, a pigment used in ancient Meso American murals.

"The whole point of doing this is to create a community that has a common language," crossing the boundaries between different disciplines, he says.

The Cantor project was inspired in part by the Workshop on Synchrotron Radiation in Art and Archeology, organized at SSRL by Herman Winick in 2000. "I tried to stimulate people in different departments," says Winick, "to tell them that they can understand (ancient artifacts) using x-rays."

The data produced by SPEAR3's intense, precise x-ray beams can help reveal the composition and fabrication process of the paint.



The Cantor Center exhibit runs from August 4 to November 28 and will feature this restored 15th century painting by Jacopo del Sellaio. (Image courtesy of the Cantor Center)

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Mehta will start with x-ray fluorescence to reveal the chemical elements present in the sample—even in infinitesimal traces—and their oxidation state.

The next step will be x-ray microdiffraction, which can decode the crystalline structure of minerals the painter may have ground up to use as pigments. With the help of microdiffraction data, a geologist can trace back a mineral's geographic origin.

Depending on the initial results, another technique that could be useful is the x-ray absorption fine structure (XAFS). "The XAFS is another way of getting information on a compound that's not a good crystal," such as organic materials, explains Piero Pianetta (SSRL).

The Cantor exhibition, Finding Sellaio: Conserving and Attributing a Renaissance Painting, opened August 4 and will be on view through November 28. Admission is free.

The exhibit details the study done by Stanford undergraduate Alisa Eagleston proving that the painting actually is a Sellaio. Eagleston made use of infrared images which show the painter's drawings under the paint. Also on display is a 3D animation of a CT scan of the panel, taken by Stanford radiologist Dr. Robert Mindelzun.

Another theme of the exhibit is the recently completed, two-year restoration project of the painting, done at FAMSF.

The Web site of the exhibit is <http://ccva.stanford.edu/findingsellaio.html>

The Web site of the 2000 workshop is <http://srs.dl.ac.uk/arch/ssrl/archeology-program.html>

Also see the Stanford Report article at <http://news-service.stanford.edu/news/2004/july21/jacopo-721.html>

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The number on our DOE contract has been changed from DE-AC03-76SF00515 to DE-AC02-76SF00515 effective July 29, 2004. Please be sure to use this new number.

For more information, contact: Jerry Jobe, Business Services Division, Ext. 4245,
jjj@slac.stanford.edu

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Making 911 and 9-911 Calls at SLAC

By Robert Reek

In the past, 911/9-911 calls made from SLAC phones could not be traced to the location of the call. This was potentially dangerous for anyone who might be alone in an emergency and unable to respond to questions, preventing emergency personnel from locating the victim or emergency.

Recently, however, SCS has provided new technology that allows SLAC Safeguards and Security (now monitoring the fire alarm system) to locate the phone from which a 911/9-911 call is made. If the caller does not respond to the dispatcher, Security's policy is to dispatch an officer who can then direct fire and other emergency personnel to the exact location.

But with this added protection comes added responsibility. To ensure that an emergency response is not initiated unnecessarily, whenever you call 911/9-911 please stay on the line to give complete information to the operator. The following is an example of what can happen when a 911 call is received with a hang up and no additional information is available.

On July 14, 2004, SLAC received a 911 hang-up call from a phone in the tunnel between CEH (Bldg. 750) and the north adit. The person making the call left the scene and did not provide any additional information. Security and Palo Alto Fire Department (PAFD) Engine 7 responded to the location identified by Security personnel using the new system. Upon entering the tunnel, the Engine 7 fire crew's gas detector indicated elevated levels of hydrogen sulfide, forcing the crew to retreat. Without knowing exactly what they had (a fire, rescue or both), the engine captain requested additional personnel and equipment.

When backup arrived, the crew put on their self-contained breathing apparatus (SCBA), reentered the tunnel, and conducted a search of the entire tunnel area. They discovered there was no fire or rescue situation.

Although it is comforting to know that SLAC can depend on a quick and thorough response from the PAFD, in this case it was unnecessary. The department was forced to dispatch equipment and 11 personnel to handle a fire and rescue, including a battalion chief, two engines, one truck and a rescue trailer. This meant they were unavailable to respond to other emergencies.

So to avoid tying up emergency resources and possibly endangering others, if you make a 911/9-911 call, stay on the line. If you must leave the scene for any reason, please contact the operator or Security as soon as possible and advise them of the extent of the emergency. If you dial a 911/9-911 operator by mistake, please remain on the line and advise the operator of the mistake to avoid unnecessary emergency response.

If you have any questions about 911/9-911 procedures, please call Safeguards and Security (Ext. 2551) or the SLAC Fire Marshal (Ext. 4509).

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Bicycle Safety Reminder for Sand Hill Road

By Janice Dabney

SLAC car drivers entering the site from Sand Hill Road (going west) have observed quite a number of near misses between bicycles and cars because of the following practice. Bicycle riders are cutting over quickly from the bike lane on the right and merging into fast traffic 80-100 feet before the light to make a left turn into SLAC.

Those of you who have been here since 2001 remember that on July 5 of that year, graduate student Katherine Pope was killed while riding her bicycle to work on Sand Hill Road (See [TIP, August 2001](#)).

Use the Crosswalk

This time of year our site welcomes many summer interns and users who ride bicycles. Everyone should take note of this hazard, but especially visitors who are here for a short time from a more passive environment than Sand Hill Road. Please stay in the bike lane and use the crosswalk or at least merge into the roadway in a safe and responsible manner with the proper caution and signals.

Stop by the SLAC Safeguards and Security Office (in its new location in Bldg. 207, located off the Campus Loop Road) to pick up a bicycle safety brochure.

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New Deadlines for Procurement

The Purchasing Department has identified all GLAST and LCLS related requisitions to be of the highest priority.

Therefore, in order for us to ensure that all of our customer needs are met, Purchasing is requesting all FY 04 procurement actions that are required to be delivered and accepted by September 30 heed the following deadline dates.

For procurement actions \$25,000 or over: Procurements that are non GLAST related must be entered into PeopleSoft by the close of business on Friday, September 3.

For procurement actions less than \$25,000: Purchase requisitions should be entered into PeopleSoft by the close of business on Wednesday, September 15.

Any purchase requisitions entered into PeopleSoft after these dates will be processed with a delivery date of October 1 or later.

For more information please contact Janet Adams, Purchasing Office, Ext. 8515, MS 01

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A Simple Way to Help Others

SLAC participates in a program to provide toiletries to the Support Network for Battered Women.

When you travel, please help by bringing back the complimentary bottles of shampoo or lotion and soap bars that are given out in hotels. Bring these items to the Travel Department in Bldg. 41, Rm. 219.

Your contributions will make a difference!

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Welcome New Employees



Photo by Diana Rogers

Six new SLAC employees attended the latest New Employee Orientation on August 5. Left to right: Mario Zamora (SEM), Yurii Levashov (MET), Matthew Swift (REG), Steve Score (MD). Not pictured: Brijesh Bhatnagar (REG) & Jerry Pfefferkorn (SEM).

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MILESTONES

Service Awards

10 Years

Hopkins-Sandefur, Victoria (PUR), 8/23
Marsh, Darren (REG), 8/22
Principe, Ricardo (EFD), 8/29

15 Years

Scharfenstein, Michael (EP), 8/21
Steele, David (KLY), 8/16

20 Years

Gong, Harry (SEM), 8/23
Pierson Jr., Sandy (RD), 8/16

30 Years

Freytag, Dietrich (REG), 8/19

Deceased

Nolan, James (formerly with ME), on July 27, 2004

To submit a Milestone, see:

<http://www2.slac.stanford.edu/tip/milestonesubmissionguidelines.htm>

See Awards and Honors at <http://www.slac.stanford.edu/slac/award>

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Public Lecture To Explore Metals in Our Lives

By Linda DuShane White

Graham George (University of Saskatchewan) will tell his audience how metals and the molecules that contain them can help or harm us in the next SLAC Public Lecture, 'Metals, Molecules, Life and Death' on **Tuesday, August 31, at 7:30 p.m. in Panofsky Auditorium.**

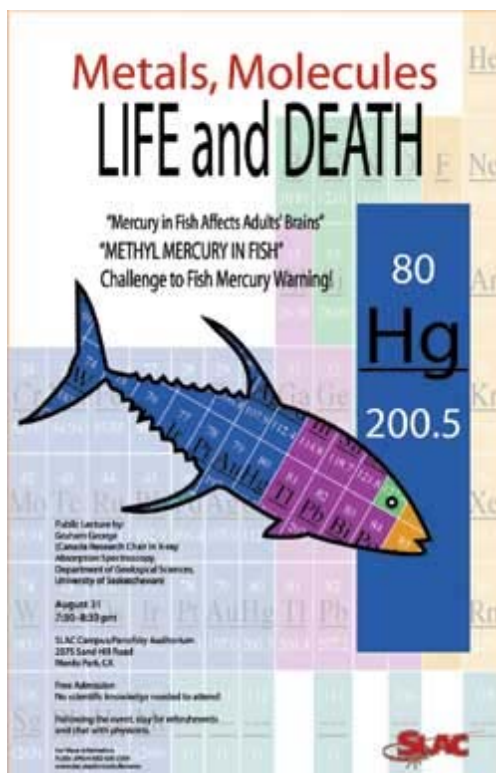


Image Courtesy of TechPubs

Stories abound about real or imagined health dangers caused by metals in our food, our medicine and our environment, issues that affect all of us on a daily basis. According to George, "[Metals are] essential for life. We need them to do the chemical trickery that keeps us alive."

This is a complex subject, as George says on his Web site. "It's not only the dose that makes the poison, it's the form ...the metallic liquid mercury in thermometers is relatively benign. Dimethyl mercury, on the other hand, causes severe, permanent damage, especially to the nervous system."

George is using x-ray absorption spectroscopy at SSRL to study how metals function in both their beneficial roles and when acting as poisons. He hopes to discover an effective way to remove mercury poisons from the body. Other potential applications include the removal of metal from drinking water and decontaminating industrial sites.

Educated at the Universities of London and Sussex, George visited SLAC as part of his doctoral work at Sussex in 1983. He regularly returns to the Laboratory to do research and to regale children at activities such as SLAC Kids Day where he is known as Dr. Boom. He is currently Canada Research Chair in X-ray Absorption Spectroscopy in the Department of Geological Sciences at the University of Saskatchewan. For more information on George's work, see: <http://www.usask.ca/geology/nfaculty/gg/intro.htm>

Speakers for the Public Lecture series are chosen for their ability to bring scientific issues to the public in a clear and entertaining way. The lecture is free of charge and reservations are not required. Please bring a picture ID for entry into the Laboratory.

For information on the Public Lecture Series, see: <http://www2.slac.stanford.edu/lectures>

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Voice Recognition Software Demo on August 25

By Doug Kreitz

BSD, in partnership with the Medical Department and SCS, will sponsor a one-hour open discussion and live demonstration of voice recognition software on **Wednesday, August 25, at 2:00 p.m. in Panofsky Auditorium**. The meeting is open to everyone in the SLAC community who would like to learn more about this innovative technology.

Voice recognition software allows a PC user to use his/her voice as an input device. It may be used to dictate text into the computer or to give computer commands (such as opening application programs, pulling down menus or saving work).

For routine tasks such as creating documents, entering data, launching applications, sending e-mail, completing forms and browsing the Web, this software is especially useful for avoiding Repetitive Strain Injuries (RSI). It assists those who currently suffer from any repetitive stress problems in the hands, arms or wrists. This technology also addresses Americans with Disabilities Act (ADA) and Section 508 mandates.

For more information, see: http://www.dragon-medical-transcription.com/Dragon_Professional.html

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Family Day Will be Out of This World

By Davide Castelvecchi

'Our Universe, Large and Small' is the theme for the 2004 SLAC Family Day and it is coming up soon. It is fun for everyone, so be sure not to miss it!

Reserve the date and time: September 18, from 11 a.m. to 3 p.m.

"Family Day is a giant picnic for all SLAC employees and their families," says planning committee co-chair Erin Smith (HR). "Come alone or bring family. There will be great food and activities for all ages."

Attractions include:

- Star Search Talent Show—we all juggle priorities, but can you juggle or sing or do a tap dance? Be sure to sign up with Pauline Wethington (MS 58, Ext. 4559).
- Casino Royale (ages 18 and up)—if you can't make it to Vegas, this is the next best thing! Bring your lucky charm with you and play in our casino!
- Kids Korral—features Krafts for Kids, such as creating candy necklaces and solar system mobiles, face painting and much more. Grown-ups allowed in the Korral if accompanied by a kid.
- Fun things to do—an inflatable giant slide, midway games, a basketball shoot and ping pong. Or get a team to participate in the volleyball tournament.
- Classic Cars—Bring in your classic set of wheels to show off.
- Try the popcorn, sno cones and cotton candy.
- Science demonstrations, talks and tours are always popular.

DJ Eddie McGee will spin and introduce gigs by rock bands, The Seventh Season and Nocturnal.

And did we mention free food!

There will be two tents to sit in the shade and enjoy the different styles of food: Andromeda (Traditional BBQ), Cygnus-1 (Indian) Vega (Asian) and Saturn (Mediterranean).

Please return the flyer or go online to let us know if you will be attending. This will help us order enough food for all attendees.

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The complete program and lunch menu will be available on the Web at:
<http://www-project.slac.stanford.edu/familyday/>

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