



Career Cornerstone News

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Students Head to Science Camps

This summer, Exxon Mobil, in conjunction with Dr. Bernard Harris and the Harris Foundation, are expanding the ExxonMobil Bernard Harris Summer Science Camp program to thirty residential camps. The two-week camps are designed for under-privileged middle school students across the country and provide a fun-filled setting for them to gain a deeper understanding of science, technology, engineering and mathematics and to promote exciting careers in these fields. Dr. Harris, a former NASA astronaut and the first

African American to walk in space, created the camps four years ago with support from ExxonMobil. More than 1,500



students will take part in this year's camps and explore themes such as "Mission to Mars," "Revolutionary Robotics," and "Energy and Motion." The camps are free and all student expenses are paid for by the program.

While not all summer science camps are free, or residential, they are

available all across the country and provide great experiences for middle and high school students to enjoy first hand experiences in science and engineering.

Explore state-by-state lists of precollege camps, and find out more at www.careercornerstone.org/pcsumcamps.htm.

Visualization Challenge

Some of science's most powerful statements are not made in words. From the diagrams of DaVinci to Rosalind Franklin's x-rays, visualization of research has a long and literally illustrious history. The International Science and Engineering Visualization Challenge is a competition focused on communicating science, engineering and technology for education and journalistic purposes. One first place award will be made in each of the following five categories: Photography,

Illustrations, Informational Graphics, Interactive Media, and Non-Interactive Media.

As an example, the photography category can include film or digital photographs and photomicrographs, as well as images obtained from electron microscopes, STMs, AFMs, telescopes and similar instruments. The image to the right is the 2008 photography winner, "The Glass Forest" by Mario De Stefano of The Second University of Naples, Italy. De Stefano



used a scanning electron microscope to capture these images of the diatom *Licmophora ehrenbergii* from the Mediterranean Sea off the coast of Italy.

The deadline for this year is September 15, 2009. Find out more at www.nsf.gov/news/special_reports/scivis.

How NASA Technologies Impact Daily Life

NASA has launched an interactive site that allows users to discover some of the many NASA technologies that positively impact everyday life. "NASA at Home" and "NASA City" (www.nasa.gov/city) take users on an illustrated tour of the commercial technologies and products that trace their origins to NASA's investment in space and aeronautics research and development. Visitors can scroll more than 100 technologies grouped by themes such as home, airport, grocery store, sports arena, hospital, public safety and manufacturing. After entering an area, users can experience the impact NASA has on their lives and find descriptions of such

technologies as temperature-regulated clothing from materials designed for astronaut suits and gloves, wireless headset telephone technology pioneered to transmit the first words from the moon, fire-resistant paint and steel coatings from NASA's heat shield technology, and remote-controlled ovens based on technology used aboard the International Space Station.

NASA has documented more than 1,600 examples of how technologies have been used to



improve life on Earth in its annual "Spinoff" publication. The technologies are available in an online searchable database at http://ipp.nasa.gov/pd_spinoff.htm.

Find out more about careers in aerospace engineering and the aerospace industry at www.careercornerstone.org.

Degree Profile: Physics

Physics is everywhere. It describes the world around us, from explaining the workings and making possible the luxuries and conveniences inside our homes such as energy efficient heat pumps, cel phones, microwave ovens, and iPods - - to describing the motions of the galaxies in our universe. Physicists find answers to almost everything.

Their studies range from the tiniest particles of matter to the largest objects in our universe. Their research has a range of applications which includes the computers



that allow us to communicate with others across the globe, as well as the vehicles that allow us to traverse the globe faster, more safely, and more efficiently than would be possible without advances in physics. Physicists of the future will move society even faster along the information superhighway and drive further

progress in the area of transportation. It is the physics students of today who will make contributions to improving the quality of lives in many, many areas.

Physics underlies all other basic sciences and is the basis for much of technology because it is concerned with the most fundamental aspects of

matter and energy as well as the laws that govern their interactions - - the interactions which make the physical universe work.

Physicists and astronomers hold about 18,000 jobs in the United States. Physicists accounted for about 17,000 of these, while astronomers accounted for only about 1,700 jobs.

Where you are likely to work will differ by the level of your highest degree. Thus, the private sector (including large corporations, small companies and the self-employed) employs 60% of physics bachelors and masters compared to 30% of physics PhDs.

More information about careers in physics are available at www.careercornerstone.org.

The Promise of Carbon Nanotubes

Carbon is the fourth most abundant element in the universe by weight, and without it, there would be no life on Earth. Depending on its crystal structure--how its atoms bond together--carbon can form several different substances, ranging from sooty coal to glittering diamonds to slippery-smooth graphite. Slice a chunk of graphite into a flat, single-atom thick sheet, and you get another form of carbon: graphene. Take a sheet of graphene and roll it up like a newspaper, and you get a carbon nanotube (CNT).

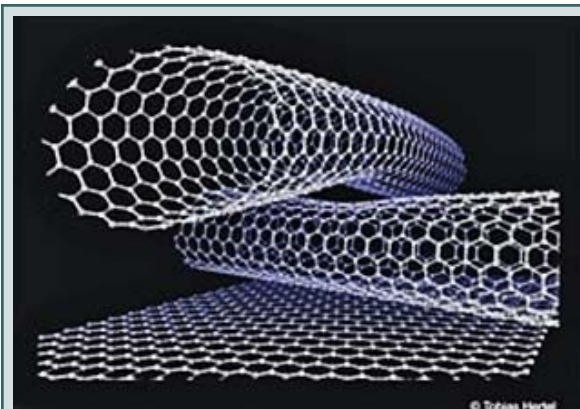
CNTs are nanoscale molecules made up of large numbers of carbon atoms, each bonded to three other atoms in a hexagonal (six-sided) pattern, resembling a roll of chicken wire. The pattern can be aligned with the tube's central axis, or it can be twisted. Although a CNT may reach a few centimeters in length, the entire tube is only a few nanometers across, or about 100,000 times thinner than a human hair. At this size, it behaves as if it were one-

dimensional. But why are CNTs making headlines in fields as diverse as aerospace, optoelectronics and biomedicine? In a word, properties. Because of their superior structural, chemical, optical and electrical properties, carbon nanotubes are among the most promising candidates for use in tomorrow's ever-shrinking technology.

Mechanically, CNTs are five to 50 times stronger than steel, even though they are incredibly small and light. They also conduct heat extremely well.

But it's their optical and electrical characteristics that have many scientists and engineers proposing applications ranging from flexible electronics and photovoltaics, to sensing and fluorescent markers in life sciences.

"CNTs have potential for complementing or replacing many



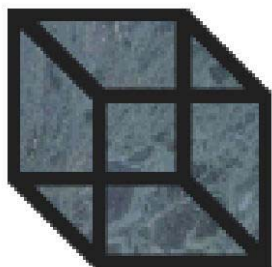
Ball and stick model of two crossing (10, 10) carbon nanotubes on a graphite surface.
Credit: Tobias Hertel, Institute for Physical Chemistry, University of Wurzburg

current technologies," said Oscar O. Bernal, NSF program director for condensed matter physics.

"For instance, they could one day become the main components in lighting devices and consumer electronics. They could represent savings in energy usage and would have the advantage of being very small, allowing miniaturization beyond current limits."

Find out more about careers in engineering and science at www.careercornerstone.org.

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Bioengineering Students Win Design Award

It would be terrible if the first humans to reach Mars stepped onto the surface to discover their legs could no longer hold them. A team of Rice University students is working to make sure that doesn't happen.

Five senior bioengineering students have designed a device to help astronauts keep their skeletons strong and healthy by measuring bone mineral density loss, literally on the fly. Their design of a bone-remodeling monitor for use in microgravity shared the top prize in NASA's third annual Systems Engineering Competition.

Charlie Foucar, Shannon Moore, Evan Williams, Bodin Hon and Leslie Goldberg came up with a noninvasive device that measures the concentration of deoxyypyridinoline, a bone marker found in urine. For nearly a half-century of spaceflight, astronauts have been found to lose bone mass

at a rate of up to 2 percent per month while in space.

That's not a big deal on an orbital jaunt of a week or two, but future travelers to Mars face a six-month trip -- and that's just one-way. When it comes to strong bones, humans are built to use them or lose them.

Moore said even though bone-density markers can be found in blood, sweat and saliva, the team decided on urine because of their experience and because it can be collected noninvasively.

The team's working prototype has three stages: a collection unit that ties into the spacecraft's waste-disposal system, an immunoassay process that combines the urine with nanoshells and antibodies, and



a photometer that reads the absorbance spectra of the combined solution and feeds a PDA running an analysis program personalized for each astronaut. Resulting data can be downloaded to NASA or analyzed on the spot.

The team received cash prizes and an invitation to a future space shuttle launch.

Find out more about careers in bioengineering at www.careercornerstone.org.

Salary Offers to College Class of 2009

Starting salary offers to the college Class of 2009 have fallen slightly compared to offers received by the Class of 2008, according to new report from the National Association of Colleges and Employers (NACE). According to the group's current Salary Survey report, the overall average offer to a 2009 bachelor's degree graduate stands at \$48,515 — down 2.2% from the average of \$49,624 posted in Spring 2008. More disciplines are seeing their starting salary average fall compared to last year at this time -- but the engineering disciplines fared best, as a group, posting a 2.3% increase in their overall average offer, which now stands at \$58,438. By specific engineering discipline, chemical engineering graduates posted the largest increase among the engineering fields. Their average offer rose 2.8% to \$65,403. Computer engineering graduates posted a 1.8% increase, pushing their average salary offer to \$61,017. Experiencing similar increases were civil engineering grads (up 1.7% for an average of \$51,793) and mechanical engineering graduates (up 1.6% for an average of \$58,749). Find out more about salaries for over 170 fields in science, technology, engineering, mathematics, computing, and healthcare at www.careercornerstone.org.

