physics flash
news and events from ASU Physics vol.2 | no.6
ASU College of Liberal Arts & Sciences
Arizona State University

In the news…

Matthew Kolopanis, a junior studying both physics and math, was recently elected to membership in Phi Beta Kappa Society for Fall 2010. Phi Beta Kappa is the oldest undergraduate honors organization in the United States. The prestigious Society has pursued a mission of fostering and recognizing excellence in the liberal arts and sciences since 1776. Its campus chapters invite for induction the most outstanding arts and sciences students at America's leading colleges and universities. The Society sponsors activities to advance the humanities, the social sciences, and the natural sciences in higher education and in society.

Matt Kolopanis

Kolopanis was born in Munster, Indiana and lived in the Chicago area until moving to Arizona when he was 6 years old. Before coming to ASU in 2008, he attended and graduated from Desert Vista High School in Phoenix. He is an Eagle Scout, a member of the National Society of Collegiate Scholars, and also a member of Golden Key International. He was awarded the Vesto M. Slipher scholarship through the Department of Physics in 2010. After completing his studies at ASU, he hopes to attend the University of Chicago for graduate studies.

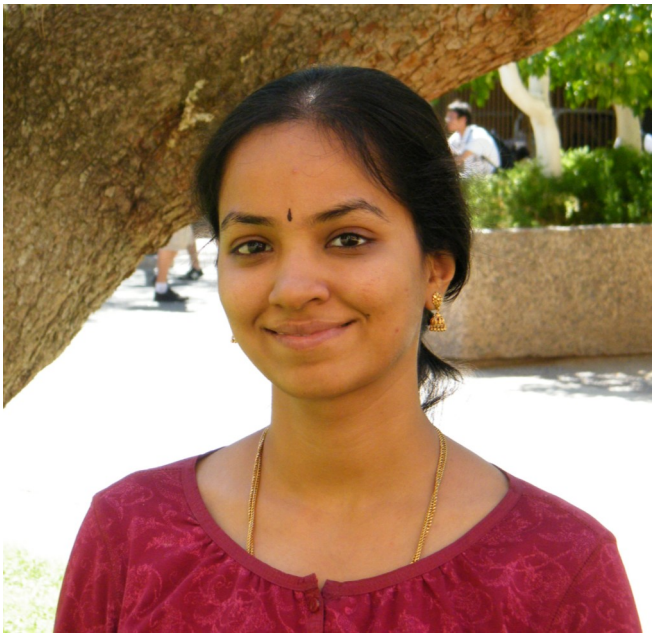
(cont'd on page 4)

Glimpsing the future

Getting to know ASU Physics majors

Graduate student —Padmini Krishnakumar

Padmini Krishnakumar arrived at ASU in Spring of 2008 from Chennai, a city in southern India. Now in her third year of the Ph.D. program, she chose ASU because of the department's robust focus on both biophysics and nanophysics. With an interest in both areas, Krishnakumar joined Professor Stuart Lindsay's research lab as part of the carbon nanotube group where her project work involves nanotubes forest synthesis and characterization. She stays focused on her work by concentrating on the daily research, her studies, and trying to be as accurate as possible in all she does.



Padmini Krishnakumar

"As I pick up skills and learn new things, I hope to add some value and insight to existing knowledge through my research, " said Krishakumar.

Throughout her time at ASU, Krishnakumar has maintained an excellent GPA– well above 3.0—and has successfully passed the comprehensive examinations. Her dedication to her studies and research does not go unnoticed. In recognition of her academic excellence, she received the Department of Physics Graduate Fellowship in 2008 and a University Graduate Fellowship in 2009.

Because she is always thinking ahead and preparing herself for what comes next, Krishnakumar is able to navigate the rigorous ASU Physics graduate program and is confident that she will be ready for the many new challenges the future will bring.

Undergraduate student —Eboni Jones

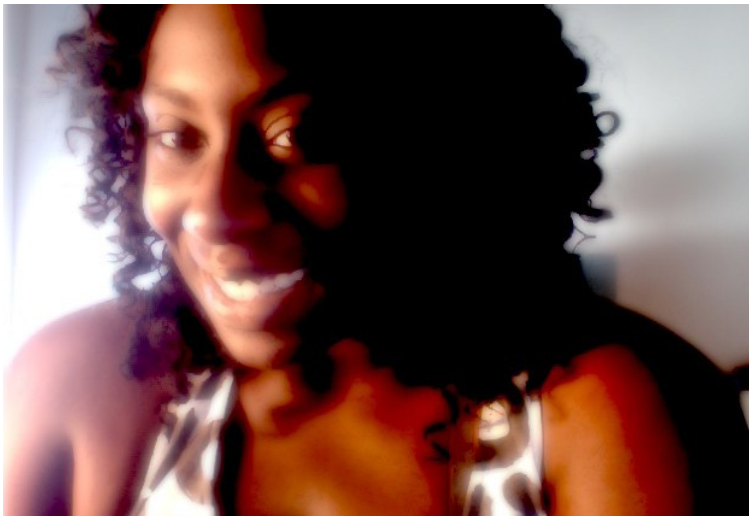
Freshman Eboni Jones came to ASU from Los Angeles this Fall. An only child and the only person in her immediate family to attend a four-year institution, it was a difficult decision for her to attend an out-of-state school and leave her family. But being at Arizona State University has helped Eboni spread her wings and find her independence.

(cont'd on page 2)

Glimpsing the future

ASU Physics majors (cont'd from page 1)

In high school, Eboni was actively involved in student government and a dance group. Although she is a self-proclaimed procrastinator, her mother was always there to push her to do better in school. Her mother's prodding coupled with hard work resulted in Eboni's e success in school and ultimately led to her to ASU.

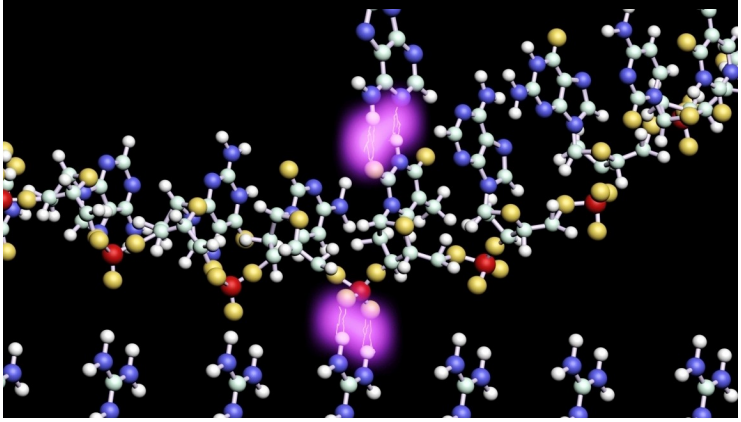


Eboni Jones

Although she is a physics major, Eboni is a typical freshman in that she has multiple interests which play into her long-term planning including a possible career in law. At some point, she would like to study abroad and perhaps renew her high school interest by getting involved in student government at ASU.

In addition to school, Eboni also works about 20-30 hours/week at the Sparky Stadium Shop. Juggling school and work has forced her to manage her time more wisely. With all her interests and goals, that's no easy task. But she stays focused by concentrating on what's most important to her: family, religion, and her education.

Whatever the future holds and regardless of her interests, Eboni hopes to continue to study science along the way.

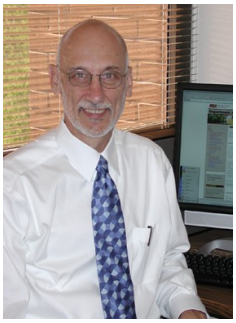


Homecoming 2010: ASU Physics set for a 'devilish' good time'

Family, friends, and physics-lovers alike are all invited to stop by the ASU Physics Homecoming Block Party tent on Saturday, October 30 at 12:30pm! The ASU Physics tent is always the place to be for the young and young-at-heart to tinker, explore, and learn about how current physics research impacts everyday life.

With the 25th anniversary of the Class of 1985 as its inspiration, ASU Physics goes *Back to the Future* to examine the development and use of different kinds of microscopes—including the atomic force, electron, and optical microscopes—and learn how they influenced physics research today. There will be plenty of hands-on activities for adults and special activities for kids.

The Block Party is just one of many homecoming events on October 30 leading up to an afternoon football match-up between the ASU and Washington State. For more information, visit http://homecoming.asu.edu/.



Robert Nemanich

From the Chair…

The 2010 Nobel Prize in Physics: Graphene—Simple Material, Elegant Physics

This is an exciting time of the year when science takes center stage with the awarding of the Nobel Prize. This year the Nobel Prize in Physics was awarded to two Russian-born scientists who discovered the unusual electronic properties of a material called *graphene*; a single layer of carbon atoms arranged in a hexagonal array. In 2004, Andre Geim and Konstantin Novoselov published an article presenting their electrical measurements of graphene samples. The article instantly caught the attention of researchers worldwide, and now, the Nobel Committee.

In forming this honeycomb network, each carbon atom is bonded to three nearby carbon atoms. While there are many ways to visualize the network, one of my favorites comes from my first trip to New York City where I was intrigued by the sidewalks around Central Park. They were paved with dark colored hexagonal tiles. As I stood in the center of the sidewalk, I imagined the perspective of shrinking to a height of a few nanometers and standing on the surface of graphite (which I was studying at the time).

What is special about graphene is that the carbon-carbon bonds are exceedingly strong leading to high thermal conductivity and material's strength. In addition, the layer is very flat and the weakly bonded pi-electrons are highly mobile in an electric field. This effect is quite elegant and is reflected in the unusual electronic band structure of graphene that is characterized as a surface with six double cones, one at each of the hexagon vertexes. This property of graphene is probably the most exciting and hundreds of researchers are now studying ways to develop new integrated circuits based on graphene transistors that take advantage of this effect.

In many ways graphene is related to carbon fullerenes (or carbon "buckeyball" molecules) and carbon nanotubes. Interestingly, the 1996 Nobel Prize in Chemistry was awarded to three researchers for their discovery of carbon fullerene molecules. These materials, which were also recognized in the Nobel Prize rather soon after their discovery, generated tremendous interest in the research community. Fullerenes are often associated with the beginning of nanotechnology, a field that spans physics, chemistry, biology, materials and engineering. It is interesting to note that fullerenes were recognized for the award in Chemistry and graphene in Physics.

I have been so excited about graphene that I focused one lecture on the material in my seminar course to our first-year students. It seemed almost prescient that the Nobel Prize was awarded a few weeks later. In my research group, we have worked on various forms of carbon. Recently, we have been mostly focused on the less important form of carbon, namely diamond.

The research of Andre Geim and Konstantin Novoselov is exciting to scientists around the world. At the 2010 March Meeting of the American Physical Society– one of the largest physics conferences, in the world—there were more sessions on graphene than any other material or topic.

The simplicity of the material and the elegance of the physics that describes its properties are strong attractions to scientists across many fields. There is much excitement about the research discoveries and the potential for innovations that will inevitably affect our lives.

Welcome little Emma Ke!

Born : August 20, 2010
Weight: 8 lbs/9 oz
Length: 22 inches long

Congratulations to ASU Physics assistant research scientist Lin Zhou and her husband, Liqin, on their new addition!

In the news (cont'd from page 1)

In a recent television news segment, ASU Physics grad Amber Straughn (Ph.D. 2008) discussed the challenges extreme cold presents for the Goddard Space Flight Center team as they work to build the James Webb Space Telescope (JWST). The large, infrared-optimized telescope which will be sent to orbit about 1 million miles from Earth will have to endure temperatures of –300 degrees. The telescope is scheduled to launch in 2014 and will help scientists study the early universe.

Straughn is a postdoctoral fellow with NASA and Lead Scientist for the James Webb Space Telescope Education and Public Outreach where she works to design and implement outreach activities. In addition to her work with JWST, her research focuses on interacting and star-forming galaxies in the context of galaxy assembly, and she has most recently been working on data from the new Wide Field Camera 3 on Hubble Space Telescope.

Click the image below or go to http://www.azcentral.com/video/#/NASA%20space%20telescope/627355129001 to hear Straughn talk about the JWST and conduct an on-air temperature demonstration for viewers.

Snapshot Fall 2010: *Supporting United Way!*

ASU Physics academic advisor Jessica Pauls gets a thank-you hug from Sparky for her contribution to the United Way. Join Jessica and the rest of ASU Physics in supporting the 2010 ASU United Way Campaign. To learn more, visit http://unitedway.asu.edu/index.html.