

# SYNERGY

BECKMAN INSTITUTE FOR ADVANCED SCIENCE AND TECHNOLOGY

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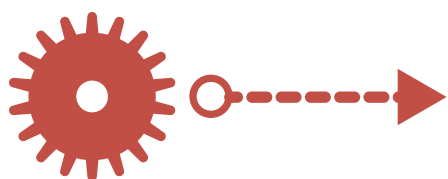
Running a human psychology experiments provide another type of education for the students running them.  
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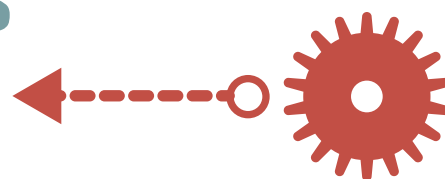
Melissa Duff's experience as a Ph.D. student at the Beckman Institute helped seed her own research program as a faculty member at the University of Iowa.  
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Beckman faculty member Ling Meng changed his research focus in order to make the kind of impact in the medical world that benefits people.  
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# I-Corps Prepares Scientists for the Business World



Faculty members running a research group are often required to play many roles other than just that of being a good scientist, from fund-raiser to personnel manager to student counselor. More and more researchers are also adding the title of entrepreneur to their curriculum vitae.

The list of Beckman Institute faculty members who have taken their discoveries out of the lab and into the business world is rapidly growing. Many of their startup companies are at the University of Illinois Research Park, in the EnterpriseWorks technology business incubator or as part of its iStart program for brand new ventures.

The goal at EnterpriseWorks is to grow successful businesses from startups that sprouted from novel technologies developed at Illinois. Cultivating entrepreneurs from scientists is a different challenge.

Gabriel Popescu and Yi Lu are two of many Beckman Institute researchers who have discovered the trials of adding “founder of a startup company” to their CV. Fortunately, their transition has been eased through a new and unique government program in which both have taken part. Popescu even testified before Congress recently on his experience.

Popescu and Lu were principal investigators for separate University of Illinois teams that participated in a National Science Foundation (NSF) sponsored program called Innovation Corps, or I-Corps. ([www.nsf.gov/i-corps](http://www.nsf.gov/i-corps)).

The I-Corps program is designed to facilitate and speed up the translation of research to the marketplace through educational programs and activities that include real-life exposure to the world of a startup business. Popescu said he was not fully familiar with the realities of starting a business when he began the initial steps toward translating novel microscopy technologies developed in his Beckman lab into products ready for the marketplace.

“For me, personally, it’s a challenge,” Popescu said with a laugh. “Basically I’ve been in schools all my life as a student or faculty, with zero industry experience. On the other hand, challenges are good. Entrepreneurship is a completely different world. I talk about the same things, like the SLIM microscope, but from two different perspectives. I learned that the hard way during the program.

“Trying to explain the technology to an investor is totally different than trying to present the microscope to somebody in my area, so it is quite challenging. I’m not going to quit my day job, that’s for sure. I’m not going to be running the company but I think it’s important that faculty learn a little bit about what businesses are interested in and how they evaluate certain technologies.”

## Smarter Tech Transfer

The I-Corps program has the general goal of broadening the impact of NSF research; topping the list of several hoped-for outcomes is the development of new startup businesses. It also serves as a feeder to the NSF Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs.

The aim is to focus on NSF-funded research that the agency says shows “immediate potential for broader applicability and impact in the commercial world.” The I-Corps program includes two components: teams made up of a PI, an entrepreneurial lead, and a mentor, and University-based nodes that serve as hubs for the educational program. Popescu’s team, called Phi Optics, also included Dr. Catalin Chiritescu (Entrepreneurial Lead), Tim Hoerr (Business Mentor), and Research Park entrepreneur in residence (EIR) Jed Taylor.

Much like the reality TV show *Shark Tank*, researchers and their teams “pitch” their discoveries and technologies to both a “teaching team” from I-Corps that includes

highly successful investors, and to real-world potential investors. The goal, said Taylor, is to work out the bugs *before* investors start funding a startup to the tune of millions.

“One of the things it does is, it makes you fail faster,” Taylor said. “Instead of taking a lot of money and failing over two years, or finding out you are going in the wrong direction, it compresses that and you do it over three months.

“So you can make those adjustments quicker before you’ve taken on \$2M in funding and then figure out, ‘oh we made a mistake.’ You take a little bit of money, figure that out quicker, make those adjustments, then start going in the right direction. What you are doing is validating your ideas up front and making the necessary changes beforehand.”

“The team goes through an assessment of how ready the technology is for the market, for commercialization, and basically it’s not required to have a company in place,” Popescu added. “But it happened that we did.”

Popescu’s company, also called Phi Optics, is built around his development of a novel class of light microscopy technologies that are fast, accurate, low-cost, and non-destructive to tissue samples since they don’t require staining or laboratory work.

Yi Lu’s company at EnterpriseWorks is called GlucoSentient, Inc. ([www.GlucoSentient.com](http://www.GlucoSentient.com)). Its breakthrough technology centers on modifying the personal glucose meter into a device for quantitatively and conveniently detecting other targets at a low cost. Lu was one of the first researchers to go through the I-Corps program.

“The biggest thing I learned was that, before developing a product that sounds great, go out and talk to customers to find out whether they really like it or not

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and what features they will like,” Lu said. “By finding out this information before developing products, we can avoid costly mistakes of spending lots of money and time building a product that few if any will buy. I would definitely recommend the program.”

Popescu was impressed enough by his experience with I-Corps that he was more than happy to accept an invitation to testify before a Congressional committee on the value of the program. The hearing, “Innovation Corps: A Review of a New National Science Foundation Program to Leverage Research Investments,” was held by the House of Representatives Committee on Science, Space, and Technology in Chicago July 16.

In his testimony Popescu said this of I-Corps: “Overall, the striking feature of the program is that it offers a ‘scientific’ approach to commercialization. Through interactions with potential customers, we have the opportunity to test certain hypotheses, e.g., what is the proper set of features for our product, how much should it cost, etc. This is precisely our approach in the laboratory, where, in order to understand a certain phenomenon, we perform experimental testing of various hypotheses.”

## Turning Discovery into a Viable Product

Popescu is an Assistant Professor in the Department of Electrical and Computer Engineering at Illinois and a full-time faculty member in the Bioimaging Science and Technology group. His Quantitative Light Imaging (QLI) Laboratory at Beckman works, as stated on their Web site, to develop “novel optical methods based on light scattering, interferometry and microscopy to quantify structure and dynamics of cells and tissues.”

The development by Popescu of a broadband interferometric technique known as Spatial Light Interference Microscopy (SLIM) as an add-on module to a commercial phase contrast microscope is a pillar of the startup. SLIM is a fast, sensitive method for stain-free imaging at multiple scales from

200 nm and up, making it an attractive alternative to other techniques.

“SLIM is the flagship of the technology,” Popescu said.

Translating those technology developments into something that could, for example, aid both researchers studying disease and clinicians treating them depends on turning prototypes into a viable product.

In his testimony, Popescu said that “Our participation in the I-Corps program has made a tremendous impact in the potential for success of Phi Optics. With the knowledge gathered during the program and adjustments we brought to the business model,

in Gabi’s research, Taylor said. “That incremental amount of money that they invested through I-Corps, \$40 or 50K, that little amount of money, just dramatically increases the chances of the \$2M they invested turning into some commercial technology.”

As a professor, Popescu is used to seeing his students’ work. In the I-Corps program, he was forced to show his work, to teaching team member such as prominent “serial entrepreneur” Steve Blank.

“Every week you had to go back and sit in front of Steve Blank and the investors and say, this is who I went out and talked to,” Popescu said. “You had to get up and post your slides and say this is who we went and talked to. So it forced you to get out of the lab and go do it.

“I learned a lot of things,” and he added with a smile, “I was put in a lot of uncomfortable situations, that I wouldn’t have if I hadn’t gotten out of the lab.”

One of those situations involved creating a less than state-of-the-art prototype during their workshop at the Stanford node.

“One of the suggestions by the teaching team, by Steve Blank, was ‘don’t be afraid to make a model or prototype of some sort,’” Popescu said. “He gave an example of him selling computers. I think he put a brick in a box and gave it to somebody to look at.

“So the night before the presentation we went to a Wal-Mart in Palo Alto and we got a Styrofoam cooler and aluminum foil and made it look like a microscope. But inside we put an iPad with our movies of cells. We asked the teachers to come in and look at them and they were blown away.”

Popescu hopes his technologies not only prove to be commercially viable, but also make an impact.

“In our case, hopefully it will turn into an instrument which improves healthcare and that everybody could benefit from,” he said.



*Gabriel Popescu (at far right) and Phi Optics team members (from left) Tim Hoerr, Catalin Chiritescu, and Jed Taylor, pose during a seminar at Stanford with their “prototype” of a microscopy technology that Popescu’s company is developing.*

we are now starting to seek seed investment.”

The swiftness of the translational impact for Popescu was evidenced by a first order for an alpha-prototype from a major life sciences company, and by Phi Optics playing host to a leading microscopy company interested in partnering with the company toward development of commercial products.

The I-Corps grant is \$50,000. Teams in the program take part in educational seminars at one of the nodes and on Skype, and present proposals to teaching teams via Skype. Popescu said the grant was small compared to those he receives for his research work.

“It’s the smallest grant I ever had,” he said. “But it has a catalyst effect.”

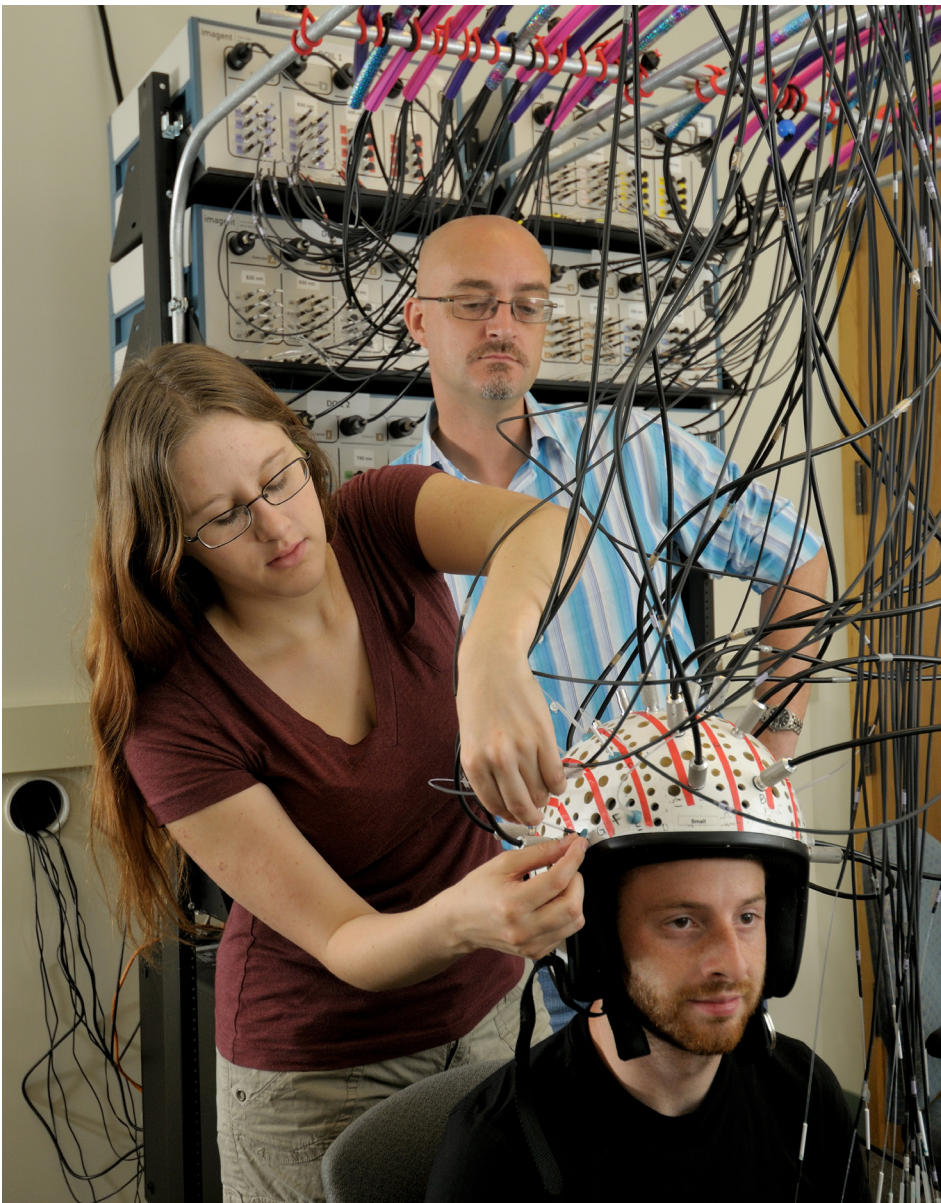
Taylor expounded on the benefits of the I-Corps grants.

“So NSF has invested about \$2M



# THE HUMAN EQUATION

## Psychology Experiments Provide More than Data to Those Who Run Them



Graduate student Jenessa Seymour (at left) attaches cables from a frequency-domain diffusive optical imaging system to a helmet worn by fellow researcher George Kartheiser. Beckman researcher Matt Dye, whose lab is running the experiment, looks on.

They toil in windowless rooms full of strange contraptions sprouting dozens of tendrils of black spaghetti-like cables. They are working with people unsure of their surroundings and starting to wonder why they ever agreed to take part in a human psychology experiment. The students and other research lab members who run those experiments are calming fears, adjusting equipment, and gathering data. They are also getting an education not found in the classroom.

Running a human psychology experiment can be just as educational as attending classes, according to some of those doing the day-to-day laboratory grunt work that turns hypothesis into data and, eventually, research papers.

Jenessa Seymour is earning a Ph.D. in the Neuroscience Program at the University of Illinois, working with deaf populations in Beckman researcher Matt Dye's Cross-Modal Plasticity Laboratory. They are using the new neuroimaging system in the Diffuse Optical Imaging Laboratory (DOIL) at Beckman to study the effects of deafness on visual functions at the behavioral and neural levels. It is a far different lab experience than Seymour had as an undergraduate in upstate New York.

"I did experiments but they were mostly paper and pencil," Seymour said. "You had to get very creative because we didn't have equipment. Beckman is a whole other world."

But the biggest learning curve for Seymour has been working with a population she had never encountered before, the hearing impaired.

"It gives you a very interesting perspective on a very unique culture," Seymour said. "It's really interesting to hear the way they use language; it's very different from ours. People have this misconception that ASL is just signs for English words and that it's English grammar, but it's totally different. It has its own grammar and they have their own way of communicating."

Dye requires his students to learn sign language in order to work in his lab. Seymour is now in her third semester of learning ASL, and does give some instructions to the deaf participants.

"In a lot of ways it can be more efficient sometimes, such as describing directions," she said. "It is very visual. As far as the

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neuroscience goes, that comes more from reading the articles. But the interest in the culture comes from meeting local deaf people and communicating with them.”

## Hands-on Learning

Those kinds of interactions are the types of experiences student researchers get when they begin working with human subjects in a lab. Beckman Institute Director Art Kramer knows about that experience from both ends, from his student days at the University of Illinois to overseeing a wide variety of research projects involving cognition and human factors over the years as a human factors and neuroscience researcher. He said the lab teaches lessons that can’t be learned in the classroom.

“Students who work in labs that focus on human experimentation on issues such as the nature of memory or attention, or the influence of lifestyle factors on brain and cognition, get to learn about science as it actually occurs, rather than the often sterile description of science that is offered in textbooks,” Kramer said. “Advances in science often take place in fits and starts rather than along a linear path. However, the ‘messiness’ of scientific experimentation is what makes it an enjoyable and challenging endeavor.”

Students and laboratory personnel deal most often with other students as study participants, but due to Beckman research in areas like aging, speech, and the effects of exercise or distraction on cognition, many are working with participants of all ages and backgrounds. That



*Aubrey Lutz.*

work can involve calming the concerns of an older study volunteer, or hooking up a bundle of wires to a child on a treadmill. Aubrey Lutz is the Lab Manager for Kramer’s Lifelong Brain and Cognition Laboratory, specializing in experiments done at Beckman’s Illinois Simulator Laboratory.

As part of those experiments, Lutz has worked with children and older populations, as well as college students. Many of the experiments done in ISL’s CAVE – a 3-D immersive, virtual reality environment – have involved a modified treadmill featuring wall screens displaying a city intersection for testing topics such as pedestrian distraction. The experiments have involved subjects of almost all ages.

“It is a very different experience in terms of the interactions I have with the subjects,” Lutz said. “The children are the most enjoyable. Those conversations were the most fun and entertaining. The college age subjects are the lowest maintenance. They pick up on tasks very quickly.”

ISL director Hank Kaczmarek said the studies involving children can be the most challenging for one reason.

“They have their parents and sometimes their siblings because there is no babysitter,” he said. “It’s a little more complicated than

The variety of settings and equipment used in human experiments run by Beckman faculty members are as varied as the technology used in them is advanced. Ryan Shosted, Fatima Husain, and Chilin Shih are Beckman faculty members who use advanced but very different technologies in studying speech and linguistics.

Shosted is an experimental phonologist who studies the aerodynamics of speech, using an oral mask to study air as flows through the vocal tract. Husain has a soundproof room for behavioral experiments



*A child takes part in a street crossing study at the Illinois Simulator Laboratory.*

just having a student show up.”

Seymour hooks up test subjects wearing a helmet with sensors to an optical imaging system. Her job also requires her to analyze data, as well as scheduling test times and recruiting participants, not an easy job in a smaller community like Urbana-Champaign. But one of the most challenging tasks is to give directions and to communicate other information to the deaf participants.

George Kartheiser, who is deaf and is fluent in ASL, was the Visiting Research Coordinator in Dye’s lab before leaving this summer to earn a Ph.D. at Gallaudet University in Washington, D.C. Seymour said it will be tough to replace him.

“That’s actually an issue we are working on right now,” she said. “With Geo in the lab, he would usually be the one to explain directions. If I was explaining to the hearing people in my native language, then went and explained the directions to a deaf person in my garbled ASL, that could seriously impact things.

“Plus, if I’ve got both my hands busy working on the helmet, I can’t talk to them too. No matter how good my signing gets if I don’t have my hands free, I can’t sign.”

looking at auditory, speech, and language processing in the brain. Shih uses a 3-D electromagnetic articulometer – a cube-like clear plastic device placed over the shoulders and head – to measure physical movements during speech production.

All of this advanced equipment and cutting-edge research lines require students and research associates to make them work.

“It can be a little intimidating because there are so many people doing advanced stuff at Beckman, it’s insane,” Seymour said. “It’s all the stuff I read about as a little kid and thought was so cool. Having all those resources available means anything you can dream up, any study you can think of, there is a way to do it at the Beckman.”

It also means a different kind of experience for the students and others in the labs at Beckman, and elsewhere on campus.

“It’s been really great for my people skills,” Lutz said. “I feel like I can talk to any person anywhere.”

“She gets a master’s in psychology, just for doing this,” Kaczmarek said with a laugh.

“That would be awesome,” Lutz said.





## Beckman Alumni Profile:

# Melissa Duff

**Degree:** Ph.D. in Speech and Hearing Science, Illinois, 2005

**Then:** Earning a Ph.D., working with Neal Cohen's  
Amnesia Research Laboratory

**Now:** Assistant Professor, Department of Communication  
Sciences and Disorders, University of Iowa

For more than two decades young neuroscience and psychology researchers have taken both the research lines pursued and interdisciplinary lessons learned at the Beckman Institute to seed their own programs and careers in academia and the business world. University of Iowa professor Melissa Duff is a perfect example.

Duff said she learned a lot from Beckman neuroscience researcher Neal Cohen during her time at the University of Illinois, where she earned a Ph.D. in Speech and Hearing Science. She also gained an education in the interdisciplinary approach to research that guides Beckman, and collaborations that continue to this day, including with Cohen.

"Although my degree came from another department, Neal has had a profound impact on my work and career," said Duff, who is also certified as a speech and language pathologist. "My interests and research are interdisciplinary, bringing together the study of memory and language from both a clinical and basic science perspective."

An important part of Cohen's research seeks to understand what is going on in the brain by investigating how it works when things go wrong, such as in the memory systems of amnesiacs. It was an approach that proved valuable for Duff when it came time for her doctoral thesis work in speech and hearing science.

"When I started my program at Illinois, I was interested in looking at the contributions of memory to language use and communication and how individuals with brain damage exploit their memory and learning abilities to facilitate rehabilitation and recovery," Duff said. "My thesis turned out to be a project right at the intersection of these two questions."

"We demonstrated that patients with profound memory impairments can show

normal and enduring learning for referential labels across a series of collaborative and interactive sessions with a communication partner, but that close examination of their discourse reveals a number of striking disruptions compared to speakers without brain damage."

After earning her Ph.D., Duff came to Iowa in 2005 for a postdoctoral position in the Neurology Department, then joined the faculty there in 2009. She has a primary appointment in the Department of Communication Sciences and Disorders at Iowa, with a joint appointment in the Department of Neurology and is a member of the Neuroscience Training Program.

Along with an interdisciplinary approach, making a real-world impact is another hallmark of the Institute and that also is true for Duff. In 2011 she founded the Iowa Traumatic Brain Injury Registry for gathering and analyzing neuropsychological, neuroanatomical, and empirical data from experiments of memory, learning, language, driving, and other domains. Duff said the goal is to improve the quality of care provided to individuals with traumatic brain injury.

"Working with individuals with memory impairments is important to my work and to me," Duff said. "Before I came to the University of Illinois, I was a speech-language pathologist and I worked with many clients with traumatic brain injury and dementia."

"The lack of theories to account for the difficulties they were having using language and communicating and the lack of effective interventions to improve their everyday functioning are what motivated me to go back to school."

Today, Duff is working on both theory and practice. Her research interests include the cognitive processes and neural substrates

supporting real-world learning, complex communication, and social interaction. She continues to publish papers with Cohen, as well as with Beckman faculty member Sarah Brown-Schmidt from the Cognitive Science group.

"My work at the Beckman laid the groundwork for the bulk of my work today," Duff said. "My work with Neal and Sarah are extensions of the work I began during my thesis. Sarah and I are both interested in language processing and communication. Bringing together my expertise in the study of memory and language and her expertise in language and eye-tracking, we just got an NIH grant to examine the contributions of memory to language use and processing."

Duff's work includes looking at deficits in language and communication in patients with severe but selective memory impairments. Duff said those deficits have rarely been attributed to memory, but two of her recent studies showed that patients who have only memory impairment are impaired in using language but the patients with frontal lobe damage are not.

"These findings are important because they tell us something new about the role of memory in language use, but also because they will change how we approach treating these language impairments knowing the real underlying source of the deficit," Duff said.

Duff is also looking to collaborate with another Beckman expatriate who just joined the Iowa Department of Psychology, Michelle Voss. A former Beckman Fellow, Voss also does neuroscience research.

"We are meeting frequently and have lots of ideas for collaboration!" Duff said. "I'm really looking forward to working with Michelle."

A collaboration that will, no doubt, sprout more research lines from seeds planted at Beckman.



# FACULTY PROFILE:

## Ling Meng

Ling Meng earned a Ph.D. by changing his research focus from outer space to the inner workings of the human body, turning detector technology developed for satellite missions into something useful for medical applications.

As a researcher at the University of Illinois and the Beckman Institute, Meng continues to seek out new applications in the field of nuclear medicine. He is currently developing future generation nuclear (or radiological) imaging systems that could be used, for example, to detect cancer at scales and at resolutions that enable truly effective treatments.

Meng earned a Ph.D. in Detector Physics at the University of London, starting off in astrophysics before his advisor changed research directions, leading Meng on a path he continues to tread today. He works to develop novel radiation imaging sensors and application-specific imaging systems such as single photon emission computed tomography (SPECT) and positron emission tomography (PET).

For Meng, it was more than a research or career decision.

"I wanted to make a real difference in the world, in people's lives," Meng said. "I had this idea from the very beginning: to

help people diagnose cancer. Even today, this is my primary desire."

And that motivation is deeply rooted.

"I have family, direct relatives getting cancer, actually quite a few in my family," he added. "So it's very personal for me. I thought I have to somehow do something to help people diagnose cancer.

**"I had this idea from the very beginning: to help people diagnose cancer. Even today, this is my primary desire."  
— Ling Meng**

"So that's probably driven my own research in nuclear engineering. I could do so many different things but, I said 'I am not going to focus on anything else; I will just focus on developing instruments for cancer diagnosis.'"

A native of China, Meng is an Associate Professor in the Department of Nuclear, Plasma and Radiological Engineering, and a member of the Bioimaging Science and Technology group at Beckman. He works to make room-temperature semiconductor materials and complementary readout electronics for future radiation sensors,

creates designs of future nuclear imaging systems, and combines multiple imaging modalities into a system with capabilities not found with current technologies.

In one project, Meng is working with Beckman's Biomedical Imaging Center.

"One of our projects is to develop a high-performance SPECT system that can operate inside MRI scanners, so it will let people make use of the strengths of both of those modalities," Meng said.

By adapting a traditional technique to more modern systems, Meng wants to optimize the powerful capabilities such as greater sensitivity found with nuclear imaging. Nuclear imaging is a field that some have turned away from in recent years.

"I am fully aware of the limitations of this technique," Meng said. "So, I thought that part of my duty is to find a way of dramatically improving the performance, and putting them into the new era of imaging. We are trying to reshape this field by providing some dramatically new instruments and bringing them into this particular research area."

Meng said they are constructing a full-size MRC-SPECT system and expect to have it ready this fall. They are also constructing a prototype PET system that would enable high-resolution PET images inside an MR scanner.

"I'm among very few faculty members in this department to rely on NIH grants," Meng said. "I want to get this message out: I think we are in the position to reshape this field. I want to broadcast that message to not only people who do not know this field, but also to colleagues; some of my colleagues are moving away and they are being pessimistic, but what I would say is that by using new radiation sensor technology, you can bring this modality back to life again in the mainstream."

Meng said the technology he is working on could lead to future nuclear imaging systems used alongside other modalities, and potentially for early detection of diseases other than cancer, like Alzheimer's, Parkinson's, and diabetes. The overall mission is making the best use of nuclear imaging technology, in service of Meng's larger motivation.

"The bigger picture of what I do is to reshape and consolidate nuclear imaging as a direct, highly sensitive non-invasive technique for visualizing various diseases deep inside living objects," he said.



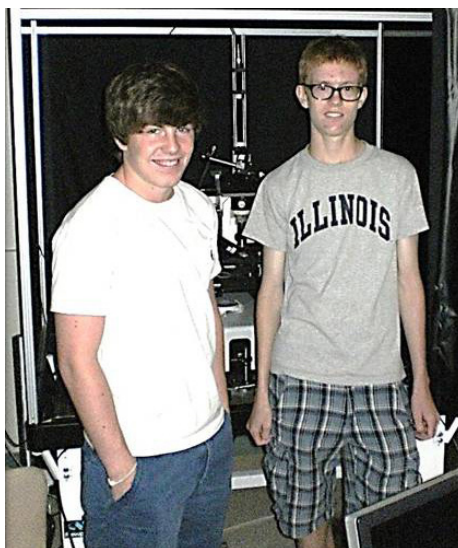
# Beckman Educational Outreach – *in the Summertime*

Educational outreach is an important part of the Beckman Institute's mission. Many programs involving Beckman faculty, staff, and research groups take place over the summer. In one of those programs, Beckman played host to a group of fifth, sixth, and seventh grade girls taking part in the Campus Middle School for Girls Exploring Science and Engineering Summer Camp. Associate Director for Research Patty Jones presented a talk to the girls during their visit to the Institute.

Faculty member Rohit Bhargava and his research group began an informal program this past summer that lets local high school students be a part of the science done in his Chemical Imaging and Structures Laboratory at Beckman. It began with two students from the I-STEM educational program at Illinois working with the group in 2011, and a talk by lab member Sarah Holton to University High students in February of this year.

"I spoke at Uni High about my experiences with cancer research at their Coaches vs. Cancer' day," Holton said. "I mentioned that I had gotten my research start during one high school summer. Several students came up to me afterwards and expressed interest in doing the same."

That led to Bhargava meeting with several students, and 11 high schoolers working at the lab this summer, shadowing a different graduate student or postdoc. The students were involved in projects that included the development of three-dimensional computer renderings of different microscopes in the lab and the use of Raman imaging to analyze samples. They also attended and participated in the group's regular meetings.



*At left, students William Smith, left, and Brooks Hauser worked on Dark Field Raman imaging for their summer project.*



*(Above) Associate Director for Research Patty Jones talks to the Campus Middle School for Girls Exploring Science and Engineering Summer Camp.*

*At right, Mark Gryka of Rohit Bhargava's group poses with Megan McBride from University High. McBride worked on a project using tissue phantoms.*







# HONORS & AWARDS

## BOPPART HONORED WITH HANS SIGRIST AWARD

Integrative Imaging Co-chair Stephen Boppart has been honored with the Hans



*Boppart*

Sigrist Award, an international prize presented annually to a distinguished scientist in a selected field. The Hans Sigrist Foundation established the award at the University of Bern, Switzerland, to promote scientific research.

Boppart will receive the honor during a ceremony at the University of Bern in December.

## ROGERS PROJECT RECEIVES GATES FOUNDATION GRANT

John Rogers of the 3D Micro- and Nanosystems group and former Beckman faculty member Todd Coleman are among the



*Rogers*

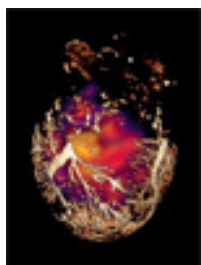
recipients of a cutting-edge global health grant from the Bill & Melinda Gates Foundation. Their project using a temporary electronic tattoo for health monitoring of pregnant women was awarded funding as part of the Foundation's Grand Challenges in Global Health initiative.

## REDDY WINS PRESTIGIOUS AWARD

Rohith Reddy of Rohit Bhargava's research group has been awarded the Tomas Hirschfeld Award from the Federation of Analytical Chemistry and Spectroscopy Societies. Reddy is the third student from Bhargava's Chemical Imaging and Structures Laboratory to win the prestigious award.



*Reddy*



*Part of the award winning image.*

## BECKMAN TEAM WINS SIEMENS TRANSLATIONAL IMAGE AWARD

A team of researchers in the Molecular Imaging Laboratory of the Beckman Institute's Biomedical Imaging Center has received the award for "Translational Image of the Year" in the 2012 Siemens Preclinical Image of the Year contest.

## JAIN CHOSEN BY TECHNOLOGY REVIEW AS A TOP YOUNG INNOVATOR

Beckman Institute researcher Prashant Jain is one of two University of Illinois professors chosen by Technology Review magazine as one of the world's top innovators under the age of 35. Jain is a member of the Nanoelectronics and Nanomaterials group.

## BECKMAN RESEARCHERS NAMED UNIVERSITY SCHOLARS



*Federmeier*

Kara Federmeier has been named a University Scholar. Federmeier is a member of the Institute's Cognitive Neuroscience group. Beckman affiliate Steven LaValle was also named a University Scholar.

## DOLCOS WINS BEST PAPER AWARD



*Dolcos*

A paper by Florin Dolcos of the Cognitive Neuroscience group and his collaborators has won the 2011 Best Paper Award from the Journal of Cognitive Psychology.



## MARK YOUR CALENDAR:

# Beckman Institute Open House 2013

Save the Date! The Beckman Institute Open House is set for March 8-9, 2013. The biennial event featured the largest number of exhibits ever for a Beckman Open House in 2011, drawing more than 8,000 visitors. We expect the 2013 Open House to be the biggest and best ever, thanks to Beckman researchers and staff, and the visitors who come to explore the world-renowned science done at the Institute.

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# RECENT BECKMAN INSTITUTE RESEARCH IN THE NEWS



## EMERGENCE OF PHASE-CHANGE MEMORY CHIPS

August 31 - Phase change memory chips are the great new hope to dethrone flash memory in smart phones and laptops. Last year a group led by Beckman researcher Eric Pop demonstrated how a prototype PCM memory cell could be made that was just 10 nanometers across, bridging a gap between two carbon-nanotube electrodes.

*The Economist*

## METABOLISM PLAYS A ROLE IN BRAIN TIMEKEEPING

August 29 - Martha Gillette led a study that included four other Beckman Institute colleagues which showed an intrinsic oscillation metabolism plays a role in the region of the brain that keeps time of the body's cycles, or circadian rhythms. Gillette said the research breaks new ground in showing that metabolism is part of brain function.

*Medical Express*

## SIMONS WRITES ABOUT INATTENTIONAL BLINDNESS

August 28 - Daniel Simons of the Human Perception and Performance group penned an article for Smithsonian magazine about his research into the topic of inattentional blindness.

*Smithsonian*

## THE BEAT GOES ON IN THE BRAIN

August 28 - Like a melody that keeps playing in your head even after the music stops, researchers at the Beckman Institute have shown that the beat goes on when it comes to the human visual system.

*Medical Xpress*

## SMART SUTURES DETECT INFECTION

August 27 - John Rogers reports on the invention of surgical sutures with ultrathin silicon sensors that can measure temperature and deliver heat to a wound site.

*Technology Review*

## HEALTH WEBSITE IMAGES CAN DETER COMPREHENSION

August 27 - Dan Morrow co-authored a study that found that older patients had more trouble comprehending important health information on websites if the site includes irrelevant material such as pictures of smiling faces.

*U of I News Bureau*

## JAIN CHOSEN BY TECHNOLOGY REVIEW AS A TOP YOUNG INNOVATOR

August 21 - Beckman Institute researcher Prashant Jain is one of two University of Illinois professors chosen by Technology Review magazine as one of the world's top innovators under the age of 35. Jain is a member of the Nanoelectronics and Nanomaterials group.

*U of I News Bureau*

## SWEEDLER TALKS TO ACS ABOUT NANOSCALE ANALYSIS OF BRAIN CELLS

August 21 - Beckman Institute researcher Jonathan Sweedler talked about his work and that of others who have developed methods to analyze brain cells at the nanoscale during the National Meeting and Exposition of the American Chemical Society (ACS), the world's largest scientific society.

*American Chemical Society*

## ELECTRONICS AT YOUR FINGERTIPS

August 10 - John Rogers of the 3D Micro- and Nanosystems group and his collaborators in a multi-university project reported on using semiconductor devices to mimic the properties of human fingertips. The method is a first step toward developing smart surgical gloves.

*Institute of Physics News*

## DNA CODE SHAPES GOLD NANOPARTICLES

August 9 - Beckman Institute researcher Yi Lu discovered that DNA can be used to shape gold nanoparticles with predictable shapes and properties. Lu is a member of the

3D Micro- and Nanosystems group.

*U of I News Bureau*

## NEW FINDINGS INVOLVING LONG- TERM HORMONE TREATMENT

July 10 - Janice Juraska, a member of Beckman's NeuroTech group, reports on research involving estrogen and a synthetic progesterone that appears to contradict the findings from a well-known study on hormone therapy for older women.

*U of I News Bureau*

## NOVEL ULTRASHARP MICROSCOPY PROBES CREATED

July 5 - Joe Lyding and Gregory Girolami of the Nanoelectronics and Nanomaterials group led a team that created a technique for making ultrasharp microscopy probes that have applications in everything from nanotechnology to cellular biology. They reported the new technology in Nature Communications.

*U of I News Bureau*

## LU CREATES SIMPLE DIAGNOSTIC SENSOR FOR USE IN DEVELOPING COUNTRIES

June 21 - Beckman Institute researcher Yi Lu and his collaborators used a biosensor based on paper and origami to create a test for point-of-care diagnostics that could be used in developing countries.

*Nanowerk News*

## FORMER ILLINI AND CURRENT BECKMAN RESEARCHER OUT TO STOP HEAD TRAUMA

June 21 - Kevin Jackson is a senior research scientist at the Beckman Institute and former Illinois running back. He works with Beckman researcher John Wang in a project that seeks to develop a cooling helmet that could help reduce the severity of head trauma, such as those occurring from football-related concussions.

*Big Ten Network*

*more on page 11*



# RECENT BECKMAN INSTITUTE RESEARCH IN THE NEWS

## SIMONS TALKS ABOUT PUSH FOR SCIENCE THAT SURPRISES

June 21– Dan Simons talks about the push to come up with surprising new results that is affecting both science and the media, such as in a recent scandal involving a well-known science writer.

*New York Times*

## IMAGING METHOD TROLLS IN QUIET CELLULAR SEAS

June 14 – Min-Feng Yu, a member of Beckman's Nanoelectronics and Nanomaterials group, reports on a project he led that developed a microscopy technique for studying soft biological samples in liquid with high resolution and high quality. The microscopy method is for use with atomic force microscopes and has been dubbed "trolling AFM."

*U of I News Bureau*

## LESSONS FROM EPIGENOME EVOLUTION

June 12 – Sheng Zhong wrote about using comparative epigenomics as an approach for annotation of the regulatory genome for the journal *Cell*. Zhong is a member of Beckman's Bioimaging Science and Technology group.

*IGB*

## NEW IMAGING DEVICE SEES BEHIND THE EARDRUM

May 30 – Integrative Imaging Co-chair Stephen Boppart has developed a multipurpose medical diagnostic device for non-invasive imaging use by primary care physicians. The technology has now been successfully demonstrated for diagnosing and treating ear infections, as reported in the *Proceedings of the National Academy of Sciences*.

*U OF I NEWS BUREAU*

## ROGERS COMMENTS ON PLASTIC LOGIC

May 22 – Beckman Institute researcher John Rogers comments on a company that focuses on selling plastic displays.

*Nature*

## ROGERS PROJECT RECEIVES GATES FOUNDATION GRANT

May 11 – John Rogers of the 3D Micro- and Nanosystems group and former Beckman faculty member Todd Coleman are among the recipients of a cutting-edge global health grant from the Bill & Melinda Gates Foundation. Their project using a temporary electronic tattoo for health monitoring of pregnant women was awarded funding as part of the Foundation's Grand Challenges in Global Health initiative.

*Medical Xpress*



## EFFICIENT, LONG-LASTING ENZYMES DEVELOPED

May 7 – Yi Lu of the 3D Micro- and Nanosystems group worked with the Institute of Biophysics of the Chinese Academy of Sciences in Beijing to design metalloenzymes with heme-copper centers, unusual efficiency, and more than 1,000 turnovers in catalyzing the reduction of oxygen to water.

*Chemical and Engineering News*



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