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10th Anniversary Celebration Gala at the Nasher Museum of Art on December 6, 2014.

Message from the Program Director

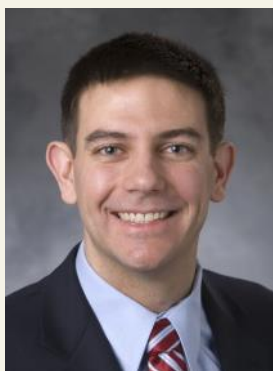
Ten years out from its inception, the Duke Medical Physics Graduate Program has become one of the leading national institutions of Medical Physics. Within that decade, the Program has enabled an extension of Duke's presence in the field through educating the next generation of medical physicists (i.e., that is you!), who will exemplify and improve upon the Duke legacy. These first ten years of the Program have been remarkable, begetting 150+ alumni and 350+ publications, to cite just two measures of its impact. This is a solid foundation upon which the next phase of our Program will be built.

We owe our deep gratitude to our outgoing director, **James Dobbins**, for the dedicated leadership that brought the program to its current state. Jim has exemplified for us how to lead with brains and with heart, not compromising one for the other. His example provides a lasting legacy for each one of us, and particularly for me, both now and on the road ahead.



EHSAN SAMEI, PHD
Program Director

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JOSHUA WILSON, PHD
Alumni President

Our Alumni Community

Another year has come and gone, but not just any year. The 2014-15 academic year has been filled with milestones: a 10-year Celebration Gala of our Program, the inaugural DKU class, the promotion of our first Director, and now welcoming our new Director. By the numbers, this year we admitted our 200th student, graduated our 150th alum, hooded our 26th PhD, and surpassed 45 board-certified medical physicist graduates. Ten years ago it was a game of "Where's Waldo" to find a Duke affiliate at a medical physics conference, and now there is a consistent Duke cohort at all the major conferences. The Duke Medical Physics Program and alumni are leading the field by setting the standard for clinical and academic endeavors.

On the topic of leading the field, I took the opportunity to reflect on the value of leadership before a surprise farewell event for Dr. **James Dobbins**. Without his inspired, steady leadership, it is very hard to imagine that

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**DUKE MEDICAL PHYSICS
ALUMNI NEWSLETTER**

Summer 2015

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Our Departing Program Director

I would like to share a few observations as our medical physics graduate program enters its second decade, especially as we make a transition in directorship. As most of you know, I concluded my second term as director of the graduate program on June 30 of this year, and I have now moved into a position as Associate Vice Provost. I have considered it a tremendous privilege to serve the program for the past decade, and as I make this transition I would like to share a few thoughts on both our past and our future.

First, taking a look at where we have come, I am immensely proud of our faculty, students, and staff for building a program of such high quality. When plans for establishing a program were initially being considered 14 years ago, we could scarcely have imagined that within five years of our launch we would have become the second largest graduate program of medical physics in the U.S. And we have not only achieved success in terms of our size, but more importantly, we have risen to become one of the top three or four programs in quality. There are many reasons for our success. We have one of the largest faculties of medical physics in the world, and have many internationally recognized scholars. Our PhD program especially has been very highly selective, and we have had outstanding students in both the PhD and Masters components of our program. Our graduates have competed very well for further study, either in additional graduate training or in residencies, and we have placed



JAMES DOBBINS III, PHD
Duke Kunshan University,
Associate Vice Provost
and Director

CONTINUED ON PAGE 8

Duke Medical Physics @DukeMedPhys • Mar 20
"Congratulations also to Irene Zawisza on successfully defending her master's thesis this morning!"

Duke Medical Physics Online



alum map



follow



group

Message from the Program Director

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The road ahead is a formidable one. The culture of healthcare is changing in substantial ways that force us to rethink and re-envision how medical physics can be most effective in its role in patient care and innovation in medicine. But medical physics continues to maintain the foundations of key clinical disciplines. And as we have done in the past, we now have an even greater opportunity to serve as scientific agents of value, precision, and innovation in medicine, all of which are in high demand in the current healthcare “economy.” Building upon these core values, our Duke Medical Physics enterprise has the opportunity to set the standard for how medical physics can be most effectively developed, taught, and practiced, to the benefit of our patients.

This task is not one that can be safely delegated to a “program.” It requires effort on the part of all of us. Our program is a collection of individuals. And each one of you, as a program alumnus, has the opportunity *to set the standard* in the way you do medical physics. The program, as strong as we wish to make it, is just a springboard for the talent and dedication of the individuals who are willing to invest their treasure and will towards that leadership. Our program, and I call it *our* program as it is as much yours as it belongs to ours current students and faculty, will succeed to the extent that we each, individually, contribute our best.

Within these two months that I have been in the office, I have had the privilege of an exhaustive review of our program, taking stock of its strengths and its opportunities for growth. I have also met with nearly all faculty and students of the program to seek their wisdom and perspective. These efforts have brought to focus exciting opportunities to enhance our program. A number of initiatives are now in works to give shape to that momentum. These initiatives include an increasing focus on educational excellence, upgrades to the curriculum and the track design, professional training, robust administration, and re-visioning the field of medical physics.

In these initiatives, there is a strong reason and desire to seek as much input and contribution from our alumni as possible. I thus implore you to maintain and foster your relationship with the program. Let your (now working) experience inform the future of the program that you can rightly claim as your own. Any beyond that, remember that every year, new alumni are added to your ranks. Their excellence can make you even more proud and prosperous.

As always, we love to hear from you, and value your contributions and good will. ♦

Current Research | State of the Art CTs at DUMC



JUSTIN SOLOMON (MS '12, PHD student) is a PhD student working with Dr. Ehsan Samei. Justin's research focuses on developing phantoms, simulation tools, and analysis techniques to extract task-based image quality metrics for modern CT systems. He also serves as a member of AAPM TG 233 – Performance Evaluation of Computed Tomography Systems.

Duke Radiology recently announced their plans to purchase two state-of-the-art CT scanners, the GE Revolution and Siemens SOMATOM Force. Both systems represent the cutting-edge of modern CT technology and offer improved hardware and software compared to previous generations. The GE Revolution scanner features a new wide detector (160 mm of z-axis coverage), ultra-fast rotation times (< 0.3 s), a fast kVp switching x-ray tube for dual energy exams, and a new iterative reconstruction algorithm (ASiR-V). The Siemens SOMATOM Force scanner is a dual-source/detector system allowing for dual energy acquisitions, high temporal resolution, and high pitch (>3) scan modes (especially good for squirmy kids). This system also features Siemens' next

generation iterative reconstruction algorithm (ADMIRE). Both systems have the potential to improve patient care at Duke by allowing for improved image quality, lower doses, and even new imaging protocols that were previously impossible on older systems.

Along with this new technology comes new challenges and opportunities for medical physics research to objectively characterize system performance and ensure proper clinical implementation. Through collaborations cultivated between Dr. **Ehsan Samei** and these vendors, Duke medical physics students have been among the first to access the new CT systems and perform comprehensive physics assessments. Using the latest iteration of the Mercury phantom platform (see figure) designed in the Carl. E. Ravin Advanced Imaging Laboratories, we have performed physics testing on the new scanners to characterize their intrinsic image quality in terms of noise, resolution, and detectability, with a particular focus on the potential for low-dose imaging using iterative reconstruction. Some of the results of his work can be seen in a recent Radiology publication featured on the “This month in Radiology” page of the journal's June 2015 issue. That paper demonstrated a dose reduction potential of about 40% when using iterative reconstruction on the Siemens Force scanner (compared to traditional FBP

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StAB Update | Adjusting to the “Match”



CHUNHAO WANG (PHD student) is a 4th-year PhD student in radiation therapy under the supervision by Dr. Fang-Fang Yin and Dr. Zheng Chang. Chunhao focuses on projects where radiation treatment is assessed using MR techniques.

In the academic year 2014-2015, the Student Advisory Board (StAB) has met multiple times with the Director of Graduate Studies, Dr. **Timothy Turkington**, and the student representative in the Medical Physics Administrative Council (MPAC), **Javian Malcolm**, to address issues and concerns from our students.

In the past year, we continued the annual beach retreat at Carolina Beach in September. We conducted a survey about the students' preferences for our next retreat, and we are evaluating the results with our program coordinator, Dr. **Olga Baranova**. On the

last International Day of Medical Physics, we held a large potluck dinner at our Hock medical physics suite. We also introduced a new social events named Thirsty Thursday organized by the social event coordinator, **Jack Shaw**.

In terms of academic related activities, the StAB and other student bodies have continued the annual scientific writing workshop and the Matlab Introduction workshop. This year's writing workshop included more medical physics specific topics. Through the communication with our students, StAB has spent more time on improving the academic learning experience of our students. Specifically, we have discussed with Dr. Turkington about a more convenient test paper reviewing policy for students' qualifying exam preparation. We have also discussed the issue of the potential curriculum improvement. In the next academic year, we will contribute our future endeavors in the initiation of student coordinated seminar. We will also work with the MPAC to develop comprehensive mechanisms for increasing our students competitiveness in the recently implemented medical physics residency match. ♦



Students and faculty celebrating the International Day of Medical Physics, November 7, 2014, with a potluck and presentations in the Medical Physics space at Hock Plaza.



TIMOTHY TURKINGTON, PHD
Director of Graduate Studies

From the Desk of the DGS

I want to express my great sense of appreciation for the work that **Jim Dobbins** has done in leading the Medical Physics program through its first 10 years. It is has been a privilege working with him in my role as a faculty member, the nuclear medicine track director, and the Director of Graduate Studies. Jim's care about the program and the entire community of people involved in it has shown in many ways. I look forward now to working closely with **Ehsan Samei** as the new director.

I had the opportunity to speak with many alumni at the AAPM meeting this summer. It's great to hear about the diverse things you're doing. It's also great to hear about your interest in helping our current students. As you may know, those who seek ABR certification now have the challenge of a required residency, and there are not as many residencies as there are medical physics graduates. These are uncertain times for students who seek a clinically-oriented career. There are several ways you can help in their job/residency search, including reading over résumés and being the interviewer in mock phone, Skype, and in-person interviews. Our students will also benefit from hearing about the broad range of job opportunities that exist for graduates of our program - jobs that you found and enjoy.

I'm always happy to hear from you, whether it's to let me know what you're up to or whether it's about thoughts you have about how we can improve, or (especially!) what you'd like to do to help. ♦

Catching Up | Serving on an AAPM Subcommittee



ADRIA VIDOVIC (MS '13) is a Medical Physicist with the Arizona Center for Cancer Care. She recently completed her residency with Landauer Medical Physics at the Cancer Treatment Centers of America in Newnan, GA. Adria also serves as the IT/Communication Chair on the AAPM Students and Trainees Subcommittee.

Duke Medical Physics Alumni Newsletter: Adria, you've been serving on the AAPM Students and Trainees Subcommittee, so what is it like on an AAPM committee?

Adria Vidovic I have been the IT/Communications Chair for the Students and Trainees Subcommittee (STSC) for two years now, and I really enjoy it. Serving on an AAPM committee is a great experience. It allowed me to stay updated on topics relevant to students and trainees and has allowed me to network with people across the U.S. The STSC is a good resource for students interested in learning more about the AAPM and the field of medical physics: we post news and topics relevant to students and trainees on our Facebook, Twitter and blog. The committee meets once to twice a year at AAPM meetings, and we hold phone calls quarterly to discuss progress on projects within the committee.

DMPAN: What did you think would be relevant and important to address on the committee?

AV: I joined the committee in the summer of 2013, just after I graduated from the Duke Medical Physics Program. At the time I was interested in the residency match program and disseminating more information about the field of medical physics for future med-

ical physicists. I was also interested in non-clinical career paths for applicants who did not find a residency. I was hopeful for the match program, and just like other new graduates in my position, I was excited that the medical physics field was moving toward such a program.

DMPAN: Now that you've been a "new professional" for 2 years, has your perspective changed? If so, how so?

AV: I graduated from my residency with Landauer Medical Physics this July, and I will be starting my first job as a medical physicist for the Arizona Center for Cancer Care in August. My perspective on the topics I was passionate about two years ago has not changed much. I am still hopeful that the match program will continue to improve, and I am proud of the STSC and what we have accomplished in the past two years. We have a lot of work to do in terms of increasing student involvement and membership in the AAPM, and we will continue to be an advocate for students and trainees in the field of medical physics.

DMPAN: So, you've just come through a residency. What was that experience like? Do you have new priorities that you think the AAPM Students and Trainees Subcommittee should address?

AV: My residency with Landauer Medical Physics was a great experience. Coming in with a strong didactic/research background from Duke, but little clinical background made it a challenge in the beginning. However, I was quickly able to relate what I had learned at Duke to what I was learning in the clinic. I was lucky to be at a center with a wide variety of techniques and technologies available as well as helpful and knowledgeable mentors. I think a continuing priority for the AAPM New Professionals Committee should be to act as an advocate for new professionals looking to make an impact in the AAPM. ♦

Our Alumni Community

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Duke Medical Physics would have the same long list of accomplishments. I know that the concept of Leadership (capital "L") is a topic he both studies carefully and instills in his mentees. During my early days at Duke, he led a forum on leadership, and the curriculum included a book by Ronald A. Heifetz, "Leadership Without Easy Answers." Looking back, I still come back to sentence 1 of chapter 1, which I believe, sums up a key leadership lesson I've seen Dr. Dobbins embody these past 10 years: "Leadership arouses passion."

Passion can be awoken in the followers and in the leader. Think back to your first open house and program orientation, which is probably the first time you heard Dr. Dobbins describe "What is

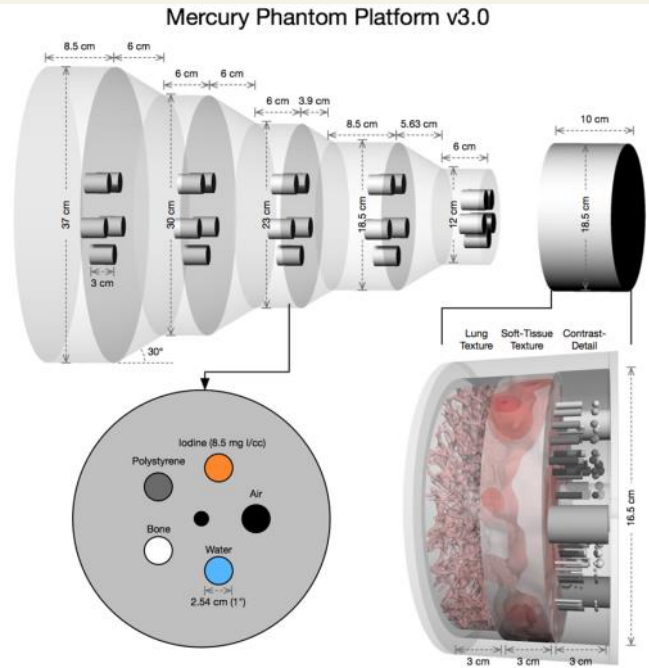
Medical Physics?" Do you recall the excitement you felt realizing *this* is what you wanted to do? A medical physicist is *who* you wanted to be? Now think about this morning. As you brewed your tea or sipped your coffee, were you still in touch with that excitement? Are you able to cut through some of the mundanity of QCs, chart checks, staff meetings, and reports, to feel passionate about the important work that you perform for your patients and colleagues? I believe we all can learn from how Dr. Dobbins directed the course of our program and will continue to as Associate Vice Provost for DKU; It is not an easy lesson, but it is an incredibly important one: inspire and empower your peers, be a leader, arouse people's passions. ♦

Current Research

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on the same scanner). Further, several other studies (currently in the publication pipeline) provide a characterization of each system's noise and resolution properties across a broad range of clinical operational settings. These studies represent the unique confluence of industry collaboration, scientific rigor, and clinical relevance that has become a hallmark of the Duke medical physics program. ♦

Schematic of the Mercury phantom platform (v3.0) designed in the Carl E. Ravin Advanced Imaging Laboratories. This platform allows for image quality characterization as function of patient size using the observer model paradigm. This method combines the noise and resolution properties of the CT system, along with a specific imaging task, into a clinically relevant metric of image quality. This platform also allows for characterizing the effects of tube-current modulation and inhomogeneous backgrounds on image quality.



DKU Dispatch | The First Class



WEI ZHU (MS student) is one of the first master's students from medical physics graduate program, Duke Kunshan University (DKU). His second year just started in August and he will spend half of a year's study at Duke.

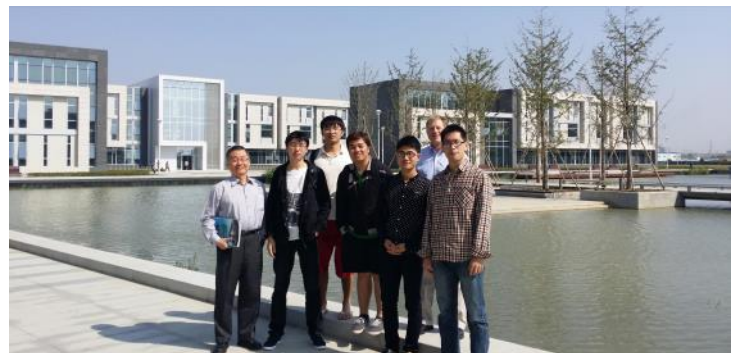
There is always someone or someplace in some particular time in your life, touching your soul, making you change. To me, being a medical physics student at Duke Kunshan University (DKU) is this kind of unique experience, not only because I chose an emerging graduate program that is new for China, entering into an extraordinary sino-foreign cooperative university, but also because as a pioneer, I am growing up with the program through the growing pains and gains.

FROM "CAMPUS" TO CAMPUS

My academic study in medical physics at DKU started in a 5-star "campus", the Swissotel. It was incredible that with the efforts of students and professors, the hotel changed to a pure academic land: study groups were spread over the whole floor; classes, lectures and discussions made a harmonious movement. We did not move into the new DKU campus until finishing the first half of the semester. The new campus was not big, only containing several

buildings in its first construction phase, but it was beautiful, modern and high-tech. We spent the rest of the first year studying in the conference building, where the medical physics program had a team room as its own classroom, big enough for 7 or 8 people performing academic activities, such as classes, seminars and tele-conferences. This year, there will be 6 new graduate students joining the DKU medical physics family and the program will move into the academic building where the classrooms are more spacious.

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Faculty and students from the inaugural class of the DKU medical physics program are beside the water feature, in front of the Student Residence Hall, pictured left-to-right: David Huang, Hongyuan Wang, Tian Li, Edcer Jerecho Laguda, Shangbang Luo, James Bowsher, Wei Zhu.

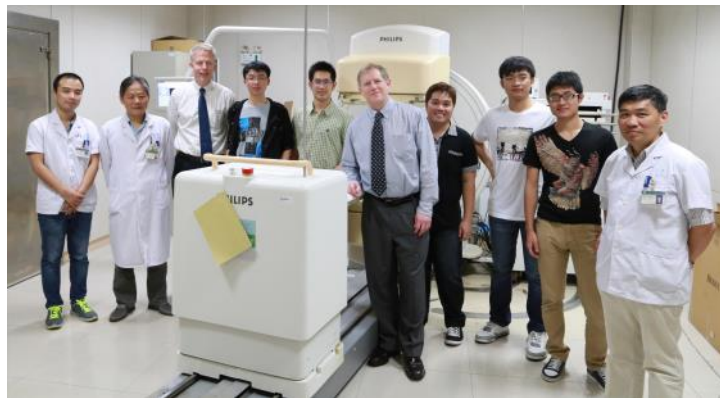
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FROM IN-CLASS TO OUT-OF-CLASS

In the DKU medical physics graduate program, the same courses are offered as those at Duke and two full-time professors, Professor **James Bowsher** (Director of Graduate Studies at DKU) and Professor **David Huang** (Director-in-Residence of MGP-DKU) lead the program. Both of them are knowledgeable and patient. In addition, several local adjunct professors round out the curricula with instruction in anatomy and imaging. Many professors from the Duke medical physics program also visited us, giving lectures and presentations. Thanks to their efforts, we benefited and became more knowledgeable.

The class size at DKU is relatively small which, I think, is an advantage. It is easier for students to interact with professors either in class or out of class. We asked questions, discussed specific topics and even gave short presentations. Scholars from Duke and other research institutes and industries around the world gave lectures every week, face-to-face or teleconference, on frontier research. In order to increase students' clinical experience, DKU medical physics program also organized many field trips to the nearby hospitals and industries. For example, at United Imaging, a Chinese medical equipment company, we saw the process of making MRI, PET and CT machines; in the First Affiliated Hospital of Soochow University, we had a practicum in PET-CT diagnosis instructed by Dr. **Tim Turkington**.

Apart from academic activities, we also participated in a series of



Faculty and students are visiting the Nuclear Medicine Dept. at Suzhou Municipal Hospital. Group photo including Dr. Pan Lvde (far left), Director of Nuclear Medicine Dept. at Suzhou Municipal Hospital, Dr. Tim Turkington (2nd left), Dr. Wu Jinchang (far right), Director of Radiation Oncology Dept. at Suzhou Municipal Hospital, Dr. James Bowsher (middle), and DKU students.

extracurricular events. For example, **Li Tian** and I formed a DKU basketball team and had a wonderful game against New York University, Shanghai. My classmate **Jerecho Laguda** was one of the hosts in an international fair and **Hongyuan Wang** organized a 21-mile bicycle trip from Kunshan to Suzhou city.

FROM DKU TO DUKE

As a part of our course of study, my classmates and I came to Duke in early July, 2015, to continue our training and research after which we will return to China in the spring semester. We have been looking forward to this six months' study and research at Duke for a long time because we believe the experience will enrich our knowledge in medical physics, help us gain and enhance necessary academic and clinical skills and extend our international horizon as well. With the help of the current medical physics students at Duke and the faculty who supported DKU before, we have quickly adjusted to the new environment. On the Fourth of July, **Li Tian** and I enjoyed a Durham Bulls ballgame and amazing fireworks. Two other students, Hongyuan and **Shangbang Luo**, gathered with some Duke medical physics students atop Hock Plaza and were excited by the fireworks, too. The following six months will be extremely busy, taking the qualifier, having classes and practicums, and doing research, but my classmates and I have confidence that we will greatly benefit during this period and make this experience unique, wonderful, and indelible. ♦

Congrats to DKU men's basketball for a great game



The newly-formed DKU men's basketball team (blue) had a great game against NYU Shanghai (white) on their home court.

CONGRATULATIONS! 2015 Diplomates of the ABR

Christopher Busselberg
Olav Christianson
Jacob Hoberg

Kelly McGrady
Erich Schnell
Lincoln Webb

Our Departing Program Director

CONTINUED FROM PAGE 2

graduates in a great array of positions – including both academic and clinical, as well as in industry and government service. We have enrolled over 200 students and graduated over 140. Our students have produced over 600 publications and presentations and have won awards at the regional and national level for their scholarship. We have seen our students take on leadership roles, both while here in Durham and after graduation. And we have also built a program on a sound financial footing, with a funding model that ensures sustainability into the future. By any measure, we have been a great success.

As grateful as I am for the success we have shown, I am perhaps even more proud of the fact that we have achieved this success while maintaining a core set of values and principles. These values have included interdisciplinarity – which was the theme of our NIH training grant – and innovation – encouraging students and faculty to pursue research ideas that will make a difference. We have exhibited unselfishness and impact, by founding the Society of Directors of Academic Medical Physics Programs, an organization that now works for the benefit of graduate and residency programs everywhere. And perhaps most significant to me, we have tried to live out an ethos of being like a family – meaning that we value and respect one another and care for and about each other outside of the classroom as well as in. I have always said that I care about our students as people first and students second, and I hope that that mindset has been embraced by our graduates as they enter the professional world – out to make the world a better place rather than being concerned primarily with just a paycheck or position. I have been so happy to see our students, faculty, staff, and leadership live out these ideals and values, and I hope that they continue on.

Looking to the future, I am confident that our new director, **Ehsan Samei**, will continue our tradition of excellence in the years

ahead. He is well positioned to help our program chart its course in the coming years, and he brings new ideas that will add greatly to our program's impact. One of the hopes that I have for our program going forward is that we can be instrumental in helping to define the future of the field of medical physics. Our field will likely be very different 30 years from now as medicine becomes increasingly molecular and prospective. We will need to innovate as a field to find the best role for physicists to play in the future of medicine, and I am committed to working on that dialogue on the national level.

I conclude my term as director with both a measure of expectancy and sadness – expectancy in that I am energized and enthused about my work as Associate Vice Provost for the new joint-venture university (Duke Kunshan University) that Duke has started in China, as well as sadness, because I will truly miss the opportunity to be engaged with you as regularly in medical physics activities. I am maintaining my faculty appointments in radiology, biomedical engineering, and physics, and plan to continue teaching my advanced imaging course in medical physics, but will certainly not have the regular involvement in graduate program leadership that I have had for the past decade. I will, however, become chair of the Education Council at AAPM this January, so I will be able to maintain involvement in the landscape of educational activities that will be important to our program and others.

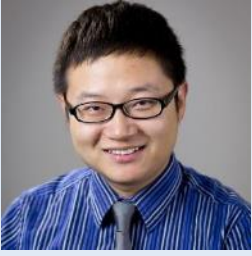
I want to say thank you from the bottom of my heart for the opportunity you have given me to serve you and our institution, and I wish nothing but the best for our students, faculty, and staff going forward. I am particulate grateful to our leadership team – you have been outstanding and have contributed so much to our suc-

cess. I am confident that our program will do great things in the years ahead. Thank you for the blessing of the opportunity these past ten years, and all the best to you! ♦



10th Anniversary Celebration Gala at the Nasher Museum of Art on December 6, 2014. Left-to-right, Dr. Olga Baranova, Dr. Fang-Fang Yin, Dr. James Dobbins III, Dr. Timothy Turkington, and Dr. Ehsan Samei. Photo by Dr. Taoran Li.

Ongoing Research | On-board Cone-beam CT



YOU ZHANG (PHD '15) is a recent graduate supervised by Dr. Lei Ren and Dr. Fang-Fang Yin. His PhD work on lung cancer IGRT optimization generated 11 peer-reviewed publications and 21 conference talks. He is now a medical physics resident in the University of Texas, Southwestern Medical Center.

On-board imaging techniques, especially the x-ray based techniques, have become very popular nowadays for on-board tumor localization and tracking in radiation therapy. However, the current x-ray based on-board imaging techniques, such as cone-beam CT (CBCT), suffer from considerable imaging time and dose, which limit the efficiency and safety of the image guidance practice. The major research objectives of Dr. **Lei Ren's** lab are to develop novel image acquisition techniques to reduce the imaging time and dose, and to develop advanced image reconstruction techniques to improve the image quality.

My research in Dr. Ren's lab has mainly two focuses: 1. developing a novel dual-detector limited-angle CBCT projection acquisition scheme, that is, to acquire limited-angle ($\leq 30^\circ$) on-board projections from two directions orthogonal to each other to achieve effective sampling and imaging dose/time reduction; and 2. developing an advanced CBCT reconstruction technique through combining patient prior information (for instance, patient planning CT) with limited on-board information. The developed technique has been validated in multiple simulation studies, phantom measurements, and real patient clinical studies. Besides traditional pre-treatment CBCT imaging, we have also successfully extended the technique to enable real-time intra-treatment CBCT imaging using simultaneously acquired kV and MV on-board projections. In general, the technique successfully reduces the CBCT imaging dose/time by more than 10 folds to significantly improve the efficiency and safety of CBCT imaging, and achieves CBCT image quality comparable to that of CT. It also opens a new avenue that makes real-time intra-treatment volumetric imaging feasible.

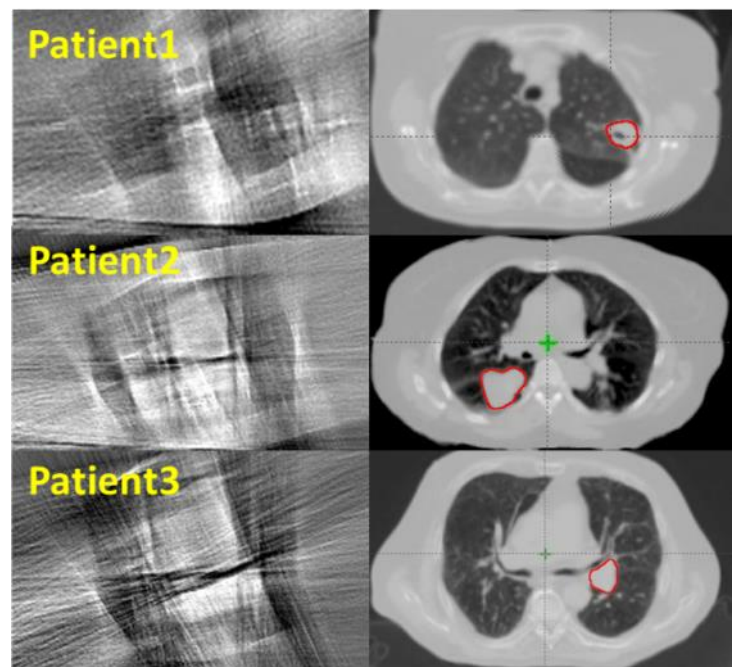
Besides my research, there are also multiple students involved in various exciting research projects in Dr. Ren's lab. **Yingxuan Chen**, an alumnus of Dr. Ren's lab, developed a novel grid-based system to significantly reduce the cross scatter occurred in dual-detector acquisition to improve the image quality. **Xiaolei Xu**, another alumnus, introduced GPU parallel computing to accelerate the CBCT reconstruction speed by more than 70 folds to enable near instantaneous reconstruction for clinical use. **Wendy Harris**, a current lab member, successfully extended the prior knowledge-based CBCT reconstruction technique into the MRI domain and achieved exciting preliminary results. Other current lab members include **Lei Zhang** who worked on a CBCT projection sorting algo-

rithm, **Kyle Lafata** who is working on radiomics for cancer imaging and treatment, **Abhishek Dubey** who is a computer science student working on multi-scale imaging data analysis, and **Yawei Zhang** who is a postdoc working on an intrafraction verification system for lung cancer treatment.

The current stage of research in Dr. Ren's lab involves developing more advanced optimization algorithms to further improve the image reconstruction accuracy and speed, applying prior information to solve other problems like respiratory phase sorting, and improving the stability and accuracy of intra-treatment kV/MV volumetric imaging. A clinical trial is also under design to translate the developed techniques into real patient benefits. The long-term objective is to improve and combine these techniques to enable simultaneous tumor tracking and treatment dose verification during the radiation therapy treatment, which can potentially boost the tumor control and reduce the normal tissue toxicity to benefit millions of cancer patients receiving radiation therapy every year. ♦

Traditional FDK reconstruction

Our prior-knowledge based reconstruction



The comparison of reconstruction results between the traditional FDK approach and our recently developed prior-knowledge based approach. As only dual-detector limited-angle on-board projections were used for reconstruction, the FDK image exhibits excessive noise and artifacts due to the lack of information. Combining prior information and iterative optimization, our new method reconstructs CBCT images with image quality comparable to CT and with target shapes/ locations matching well with the fully-sampled gold-standard images.

Alumni News

2007

Brian Swartz graduated from ECU in May 2015 with his PhD in Biomedical Physics. He has started working with Texas Health in Dallas as of June 2015. His daughter Brielle just turned 18 mos. on June 16th.

Matt Goss co-authored an abstract that was submitted to ASTRO for 2015. He continues to travel the globe, most recently to Costa Rica, Nepal, and Patagonia.

2008

Chris Zatwarnicki recently interviewed for a segment on advanced technology in radiation oncology, specifically respiratory gating, to be aired during commercial breaks of local broadcasts.

Robert Ike just began work at ProPhysics in April and recently received board certification in Nuclear Medical Physics.

Victor Hosfeld has been focusing on philanthropy in the last couple of years in an effort to better understand his community's needs. He has been privileged to sit on the board for Kettering University Department of Physics, Midland's Open Door Soup Kitchen and Homeless Shelters, Midland United Way, and Midland United Way Young Leaders United. His primary focus involves sparking the philanthropic spirit and engaging the next generation of leadership in the community, as well as collaborating with local businesses and schools to ensure career success for the students in the community. He's excited to report that he and his incredible wife just recently celebrated their third anniversary.

2009

Corey Cliff managed to convince Shilpa Modi to marry him on May 16, 2015.

Jason Paisley was one of the recipients of the 2015 American Brachytherapy Society HDR scholarship for physicists.

Jennifer Seger and he bought a house near the beach, and their daughter just turned 1.

Lei Ren received an NIH R01 grant for 2014-2018 to develop an intrafraction verification technique for hypofractionated radiotherapy treatment.

Maryann Abogunde received a promotion and is now working at the NRC Headquarters in the Office of Nuclear Material Safety and Safeguards with the Medical Radiation



Lei Ren's (PhD '09) daughter Allison was born on July 3, 2014.

Maryann Abogunde (MS '09) after a 10-miler in Baltimore, MD this June. She is preparing for her first full marathon at the Baltimore Running Festival this October; she recently completed a half-marathon in Frederick, MD, this March.



Safety Team (MRST). She relocated and now lives in Maryland.

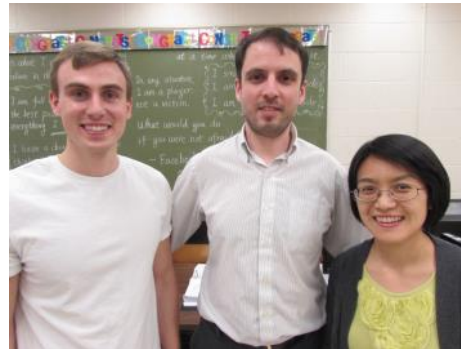
2010

Erich Schnell passed ABR Part 3 this year!

Lee Stunja's daughter, Elliana, is 3 years old now, and his son, Lucas, is 9 months old.

Lincoln Webb has a new job and is now a DABR.

Sam Brady received a faculty appointment as Assistant Professor.



Xiang Li (PhD '10) with her two students, Andrey and John, celebrating their placements in CAMPEP Residency Programs.

Scott Senick has a new baby boy: Liam John, who just turned 1 year old, and his older son is Graydon Scott.

Xiang Li is excited to report that two of the students she supervised in the past year got into CAMPEP-accredited residency programs!

2011

Jessica Salazar Kelley was married to Ryan Kelley in March, 2015.

Olav Christianson just moved into a house, and he and his wife are expecting their second child in August. He passed ABR Part 3 this past May.

2012

Fan Zhang has relocated to Texas to begin a Medical Physics Residency at Scott & White.

Jake Hoberg passed ABR Part 3 and is enjoying working without exam stress!

Andrew Scott left active duty military service and joined West

Alumni News

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Scott Senick (MS '10) and his wife now have two sons, Liam John (Left), who just turned 1 year old, and his older brother Graydon Scott (Right).

Physics, doing clinical DI physics in their Chicago field office, as of July 2015. **Nicole Murphy** and he got married on March 14, 2015 (pi Day!). He has a paper under review for HPJ.

Ryan Wargo is getting married on October 10th, 2015.

Zhengzheng Xu is currently pursuing a Ph.D. degree in Medical Physics at University at Buffalo.

Nicole Murphy will be transitioning out of the military into a civilian career. **Andrew Scott** and she were married on Pi day!

2013

Adria Vidovic has been hired as a full time Medical Physicist at the Arizona Center for Cancer Care. She and her husband are finally taking their honeymoon in Europe at the end of this summer!

Allison Mitchell Lindsey has a new job starting July 20th at Lancaster General Health where she will be a staff physicist.

Gretchen Raterman has a half year remaining in her residency.

Irina Vergalasova started a new job July 1 in Duke Radiation Oncology as a medical physicist. She was married in August 2014!

Matt Schmidt has a new publication: Schmidt, M., Lo, J.Y., Grzetic, S., Lutzky, C., Brizel, D.M., Das, S.K, "Semiautomated head-and-neck IMRT planning using dose warping and scaling to robustly

adapt plans in a knowledge database containing potentially suboptimal plans" Med. Phys. 42(8) August 2015. He also has a new home in Henderson, NV.

2014

Jake Jackson has a new publication in Physics in Medicine and Biology: "An investigation of PRES-AGE® 3D dosimetry



Andrew Scott (MS '12) and Nicole Murphy (MS '12) were married on March 14, 2015 (i.e., pi day). Duke Medical Physics alum in attendance included (left-to-right) Hannah Norris ('MS 12), Nicole Murphy ('MS 12), Andrew Scott (MS '12), Jake Hoberg (MS '12), and Alex Smith (MS '12).

for IMRT and VMAT radiation therapy treatment verification."

Jered Wells and his wife Aimee bought a new home in north Durham to fit his growing family, including the latest addition - Holland Ann Wells! She was born on November 5, 2014, and is now a bright and bubbly 8 month-old.

Kelsey Chisholm was married on July 18th, 2015.

Steven Bache is finishing the 1st year of a 2-year Imaging Physics residency at MD Anderson in Houston, TX, He is now a member of SNMMI and presented at this year's conference in June in Baltimore, MD.

2015

Alex Price started his residency at Chapel Hill on July 1, 2015, and he had a talk and poster presentation at this year's AAPM.

Anna Rodrigues just completed her PhD and is starting her residency on July 1 in Duke Radiation Oncology! As of July 11, she has been married for 2 years to **Justin Solomon** :)

Irene Joan Zawisza is now a resident in radiation therapy at Montefiore Medical Center and Moses Campuses, so she relocated to the Bronx, NY. She was a recipient of the Duke Medical Physics Directors Award for Excellent Leadership and Service to the graduate program. She attended the AAPM in Anaheim to present "An Investigation of Respiratory Signal Parameters for Multiple-Step Ahead Prediction of Surrogate Motion".

Javian Malcolm is now working towards a PhD. He is relocating to England and has received several awards from Oxford: Cancer Research UK Fellowship, Clarendon Fellowship, Oxford Medical Sciences Division - Oncology Fellowship.

Jeff Nawrocki is interviewing for jobs including Data Scientist and Bio-mathematician. He moved home to Salt Lake City, Utah, and



Jessica Salazar Kelley (MS '11) received the James E. Swander Memorial Award this year from the Nuclear Engineering Department at the University of Florida.

Alumni News

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Jered Wells (PhD '14) and his wife Aimee welcomed their latest addition, Holland Ann Wells, on Nov. 5, 2014. She has an older brother, Durham, and sister, Juniper. Program's Annual Retreat.

Ryan Davis received his PhD in Biomedical Engineering from Duke University, with Warren S. Warren as his advisor. He will be beginning a postdoc at Stanford in the lab of Sam Gambhir.

has been getting back into rock climbing, mountain biking, and whitewater kayaking.

Kyle Lafata received 3 different awards this year for his research: "Development of an Image-Guided Dosimetric Planning System for Injectable Brachytherapy using ELP Nanoparticles." Specifically, the program's 2015 Excellence in Research Award, 1st Place in the 2015 Student Paper Competition at the North Carolina Health Physics Society Spring Meeting, and the Physics Poster Winner at the 2015 DCI Radiation Oncology & Imaging

You Zhang is starting a 3-year residency at UT Southwestern. He recently moved to Dallas and also has a new baby girl!

Steve Mann completed his PhD, with Martin Tornai as his advisor, and began a position at Duke with the CIPG. Steve received the Douglas Wagenaar Breast Imaging Fellowship in Fall 2014. Holli and Steve had their first child in July 2014, a boy they named Ender. They also closed on their first home in Durham earlier this summer.




Ryan Davis (MS '09, PhD '15) married Elena G. Davis in May, 2013.






















Steve Mann (PhD '15) and his wife Holli welcomed their first child, Ender, in July, 2014.

2015 MEDICAL PHYSICS GRADUATE PROGRAM



MS GRADUATES

 Fihan Van Crockett 2013 - 2015	 Taoran Cui 2013 - 2015	 Dean Floyd Darnell 2013 - 2015	 Irene Joan Zawiza 2013 - 2015	 Kyle John Higgins 2013 - 2015	 Kyle Jon Lafata 2013 - 2015	
 Gen Joo Lee 2013 - 2015	 Kelly Karhleen Lonsan 2012 - 2015	 Javian Cecil John Malcolm 2013 - 2015		 Jeff Wade Nawrocki 2013 - 2015	 Linda Jean Poplawski 2013 - 2015	 Alex Tyler Price 2013 - 2015
 Carl William Stanhope 2013 - 2015	 James Thomas Guam Ward 2013 - 2015	<h3>PhD GRADUATES</h3>		 Kenneth Roland Womack 2013 - 2015	 David William Erickson 2013 - 2015	
		 You Zhang 2010 - 2015	 Matthew S. Ircman 2010 - 2015			