2017 ALUMNI NEWSLETTER

The Official Newsletter of the Duke Medical Physics Alumni Association (DUMPAA)

IN THIS ISSUE

2017 Annual Medical Physics Retreat

Irina Vergalasova PhD, DABR
DUMPAA President

DUMPAA President

This year's annual alumni event dinner for our graduate program was held on Sunday, July 30 in Denver, Colorado at Marlowe's. We had a large turnout with a total of 75 guests, including faculty, current students and alumni. It was a wonderful event and I want to thank the DUMPAA executive board for their assistance in venue research and in particular, Irene Zawisza, for her help at the venue getting everyone checked in. One major difference from past events was the increase in ticket cost to $50. In previous years, the graduate program subsidized a portion of the dinner thereby reducing the cost of each ticket. As a newly organized alumni association, the executive board together decided it was time to be independent and take financial responsibility for sponsoring our own events. Unfortunately, this may have deterred some alumni from attending the event due to financial concerns or hardships. This may be especially difficult for recent graduates who are still in the early stages of their career and likely in a

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DUMPAA President | Irina Vergalasova

postdoctoral positions or residency programs. To address these concerns, one of our fellow alumni, Liwei Zhang, came up with a great idea to reach out to vendors for partial sponsorship of our future events. We are currently exploring this option and hope that this will resolve any issues attendees may have for being unable to attend the event due to financial reasons. As our alumni association continues to grow and spread across the country and world, the annual alumni dinner becomes more and more pivotal for connecting all of us together. Thus, it is always our goal to promote and facilitate maximum participation from all of our alumni in order to maintain a strong and supportive network for each other as we continue to progress in our careers.

Another avenue for building and growing an even stronger Duke Medical Physics network is by showing our support to the graduate program that enabled our careers and investing in current students and future alumni! Thus, another goal of the association is to set up scholarship funds for causes that would support the success of the student body. One example would be to financially help those students who have families to support, simultaneous to the rigors of graduate school so that they may be able to place more focus on their education. A second example could be a fund to award and recognize teaching assistants or peer mentors that ease the transition and/or hardships of graduate school. The idea would be to allow the donor to select the fund they would like to support when making their donation. If you are passionate about a specific cause or would like to recommend a type of fund that you may have benefited from during your graduate experience, please reach out to me or anyone on the executive board and let us know. I mentioned this at the alumni dinner, but for those of you who were unable to attend, we had a small difference of money left over between the cost of the ticket and what the restaurant ended up charging us for the event. I proposed that we donate the difference to start up the funds, which was well received by the attendees, so thank you again to all those alumni that bought tickets and attended the event! We now have a total of $1240 from this donation and hope it continues to grow. The next step is allocating how we would like that money to be awarded and based on what merits (expect a doodle poll from me in the near future if you attended the dinner in Denver!). I really do hope and encourage everyone to give back in whatever way they can and to please reach out with any suggestions you may have to help us succeed. I wish everyone a very happy and safe upcoming holiday season and look forward to seeing more of you at our future events!

Duke Alumni Dinner | Michael Trager

Michael Trager (MS '17) *is currently a medical physics resident in radiation oncology at Thomas Jefferson University Hospital, and continues to serve as a member of the Students and Trainees Subcommittee of the AAPM.*

The Duke annual alumni dinner took place at Marlowe's on Sunday, July 30 during the 2017 annual AAPM meeting in Denver. Over 70 alumni, current students and faculty reminisced and networked while enjoying a delicious three-course meal.

During dinner, Dr. Samei and Dr. Kapadia spoke about the continued success of our program. Dr. Samei discussed exciting new initiatives going on within the program such as new courses and opportunities. He also mentioned how proud he is of the growth and success of our program and reminded us that we are representatives of Duke Medical Physics even after we graduate. Dr. Kapadia stated that the field of medical physics as a whole is following our footsteps

Duke Alumni Dinner | Michael Trager

in setting standards for education and leadership, and that it is great to see many of the alumni taking leadership positions in clinics across the country.

Dr. Vergalasova informed everyone that the Alumni Association is striving to become its own entity in order to become financially independent from the program. This would allow the Alumni Association to be an independent group and to be able to start a fund for scholarships and other efforts to give back to the program.

Thank you to the Alumni Association for making this event possible and for giving your continued support to our alumni.

I look forward to seeing everyone at next year's annual AAPM meeting in Nashville, Tennessee!

Duke Abroad | Stewart Mein

Stewart "Mac" Mein (MS '16) is pursuing a PhD in Physics at the Heidelberg University through the German Cancer Research Center (DKFZ). For his Masters', he worked in Dr. Mark Oldham's 3D Dosimetry lab with his pals Devin Miles, Paul Yoon and Dr. Titania Juang, and got involved in Monte Carlo related projects with Dr. Gunasingha and Dr. Adamson. During his time at Duke, Leith Rankine (MS'13) helped bridge a dual-institution collaboration between Washington University in St. Louis and Duke (Oldham lab) to conduct a 3D dosimetric investigation of the latest commercially available MRgRT system (MRIdian's "ViewRay"). The fundamental research skills he gained during his thesis project have been invaluable on the path he is on today.

Medical Physics Abroad

My first medical physics experience abroad was in summer 2015, in between my first and second year at DUMP. I worked a 3-month research and clinical training internship at OncoRay, a proton therapy center in Dresden, Germany. This is where my interest in particle therapy took off and when I first considered a PhD abroad. I subsequently landed a position in Heidelberg the following summer—a beautiful European college town with well-preserved medieval architecture. A cool fact about Heidelberg is that the US military strategically left Heidelberg intact during WWII to set up a military base there.

Heidelberg Old-town

PhD Program

The German Cancer Research Center (DKFZ) is Germany's largest biomedical research institute. The PhD program is made up of roughly 600 students — 40% German and 60% international. The student body is well-rounded in cancer research, studying topics in biology, medicine, physics, biostatistics and translational research. It's a highly international workplace (the official language is English) and there are many professional and social events each month. It's a wonderful, tight-knit community for PhD students, especially in cancer research.

Heavy Ion Therapy

Although I'm funded by the DKFZ, my official workplace is the Heidelberg Ion-Beam Therapy Center (HIT), a one-of-a-kind particle therapy facility. HIT opened its doors in 2009, and since then has treated more than 2,000 patients. At the moment, two ion species are used clinically: protons and carbon. HIT also has the first and only rotating heavy-ion gantry (weighing over 500 tons). The US does not currently have a heavy-ion therapy program, but several US institutes work with us with the ambition to one day build a heavy-ion facility.

Duke Abroad | Stewart Mein

Japan, Qatar, Scotland

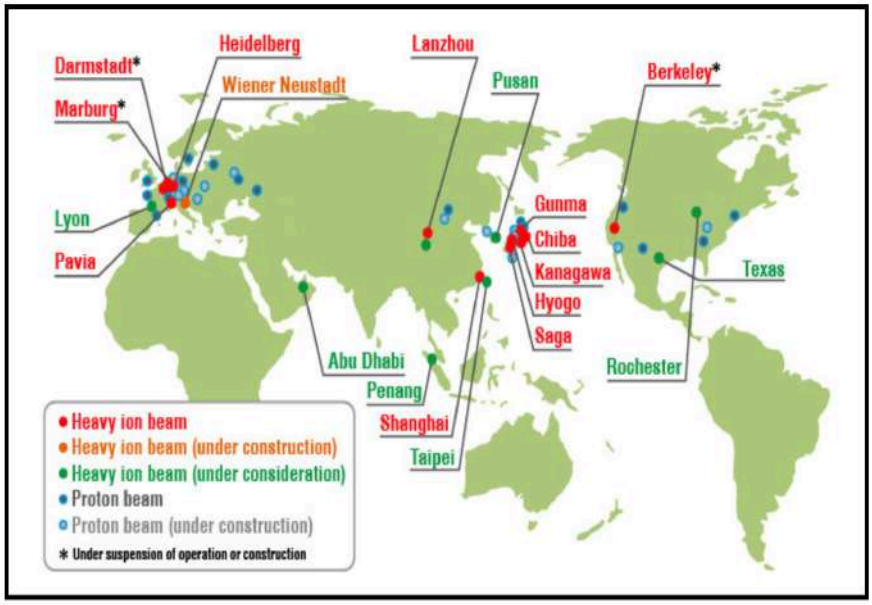
Travel

My geographical location has enabled many fun travel opportunities, both professional and recreational. I spent some time in Italy last Fall to take part in a hadron therapy school outside Milan, Italy. I also co-chaired an international particle therapy conference (PTCOG56, Tokyo, Japan) for the "RBE and Biological Effectiveness" scientific session, alongside Japanese professor Dr. Naruhiro Matsufuji. This was a great honor and a valuable experience as a 1st year PhD student. The most memorable recreational trip thus far was when I visited Qatar in February. I flew there only days after the travel ban was put in place, which was slightly unsettling. However, I did get to ride a camel through the desert, so it was definitely worth the risk!

PhD work

Helium! By 2019, Heidelberg will start up the first helium ion-beam therapy program since the clinical trials at Lawrence Berkeley Laboratory in the 70's. Physical and biological characteristics of helium ion beams constitute a clinical advantage over standard protons and carbon. Helium ions exhibit reduced lateral penumbra and greater biological enhancement at the Bragg peak (higher LET) in comparison to protons. Carbon beams yield the greatest biological enhancement (on the order of 2-4 times that of photons); however, fragmentation after the sharp Bragg peak produces a dose tail of 10-15% that extends centimeters beyond the target margins. Helium produces a less significant fragmentation tail of 2-4% target dose. Helium hovers somewhere in between protons and carbon in terms of physical and biological properties.

The greatest uncertainty in particle therapy is relative biological effectiveness (RBE), which is a function of LET, dose, particle species and tissue type. Carbon ion centers in Japan, Italy and Germany all practice biological treatment planning but by different means of biophysical modeling. Japanese centers implement a microdosimetric model (MKM), while European centers use an amorphous track structure model (LEM). Variations between these models can be as high as 15%. One could say that Japanese and European patients receive different effective doses, despite applying identical target prescriptions and OAR constraints. These uncertainties arise even with proton biological planning, where a constant RBE of 1.1 is applied in clinics world-wide, despite evidence of variable RBE, ranging



source: http://www.hirt-japan.info/en/what/japan.html

Duke Abroad | Ashley Manzoor

between 1.0 and 1.7.

Our efforts to best prepare for the upcoming helium program involve reducing these uncertainties by tweaking and validating potential biological models for the clinic, as well as building an in-house TPS for biological treatment planning with helium ions.

Duke Abroad | James Bowsher

Dr. James Bowsher is the Director of Graduate Studies of the Duke Kunshan University (DKU) Medical Physics Graduate Program. He is an Associate Professor of Medical Physics at DKU, Faculty in the Medical Physics Program and Adjunct Associate Professor in the Department of Radiation Oncology at Duke University.

His research interests include functional and molecular imaging, imaging onboard radiation therapy machines, robotics and imaging, region-of-interest methods for high-resolution high-sensitivity imaging, methods for integrating multiple imaging modalities into the generation of medical images, and quality assurance methods for imaging and radiation therapy systems.

Class of 2019

The DKU Medical Physics program enrolled 15 students this fall semester, 2017. This is more than double the average of 6 students per year in the first 3 classes. These 15 students are from China (mainland, Hong Kong and Taiwan), Singapore, Brazil, Nigeria and Ghana. Many are shown in the photographs below, taken following the fall semester convocation ceremony and, more recently, during a visit to Suzhou Municipal Hospital to gain experience with gamma cameras.

Also joining the first-year students at DKU this fall is Lei Zhang, who is a doctoral student in the medical physics program at Duke University. Mr. Zhang is working with the DKU students, orienting them to research and other aspects of year-2 studies at Duke.

Duke Abroad | James Bowsher

Class of 2018

The Class of 2018 DKU students (shown in the photograph below) have been at Duke University this summer and fall, where they are working on MS thesis projects and taking classes along with the Duke students. In the spring, they will return to DKU for the final semester of the program.

DKU Medical Physics Alumni

The DKU program has now graduated 2 classes of students. Their various employment includes a top hospital in China – two are at Peking University Cancer Hospital. Two others work in Singapore, one at KK Women's and Children's Hospital, and another in the proton therapy division of IBA. Three students are employed with companies in the Shanghai area – one with Elekta, and two with start-up companies. Three DKU graduates are furthering their studies as PhD candidates in the U.S. (University of Minnesota, and University of Arizona) and Canada (University of British Columbia)..

Recently Class-of-2016 graduate Wang Hongyuan organized a career information session for the current students. Also participating in the session were Class-of-2016 graduate Edcer Laguda, Class-of-2017 graduate Du Yixiao, and Duke University PhD candidate Lei Zhang.

Duke Abroad | James Bowsher

DKU Medical Physics Summer School

The DKU Medical Physics Summer Program 2017 was held from August 13 to 18 on the Duke Kunshan campus. Twenty-three outstanding undergraduate students were selected from 18 well-known universities across the world, such as University of Bristol (the UK), University of Hong Kong, Fudan University, and Nanjing University to experience the full flavor of Duke Kunshan University's Medical Physics Graduate Program. The summer school program included classes by Professors James Bowsher and David Huang at DKU, Jing Cai from Hong Kong Polytechnic University, and Qin Lin from Shammen University. Also included in the program was an art class, shown in the photograph.

DKU Colloquium by Professor Yin

Dr. Fang-Fang Yin, Director of Medical Physics Graduate Program at Duke Kunshan, delivered a colloquium "Medical Physicists in Era of Precision Radiation Therapy" to the general public at Duke Kunshan University on September 13. Dr. Yin talked about critical roles that medical physicists play in all aspects of radiation therapy and in developing new technologies and techniques to improve the accuracy and precision.

Alumni Spotlight | David Erickson

David Erickson graduated from the Masters program at Duke University in 2015. He is a Medical Physicist and Captain in the United States Air Force. He is currently stationed at Duke University as a Diagnostic Imaging Physics Resident with the Clinical Imaging Physics Group.

I am an active duty Air Force officer, one of many born from the Duke medical physics program. This was made possible through a direct commission program known as the Health Professions Scholarship Program (HPSP–it's worth a google search). My decision to join the Air Force was not straightforward, though it should have been considering the amount of student debt I avoided. The process of applying was long and took endurance but it was well worth the effort. So, what does a medical physicist do in the Air Force? Before I attempt to answer that question, I should lay out some framework.

I graduated from the medical physics program in May of 2015 with a focus in diagnostic imaging physics. I did not discover that medical physics was even a career option until my senior year at North Carolina State University, when I learned from a family friend that the clinic she worked in had a physicist come in every day to test their treatment machines. My interest was piqued. I did more research on the career field and soon found myself adding a physics minor to my biomedical engineering degree. Physics, medicine, technology, and problem-solving – it seemed like a perfect fit. And need I mention the salary?

As I continued to investigate more about the medical physics career field, I found myself interested in both radiation therapy (RT) and the diagnostic imaging (DI) sides of the field. For a moment, it was a toss-up between the two but I was continually drawn toward DI because of my engineering background. After further investigating, it seemed as though RT jobs were popping up right and left, and DI jobs were few and far between. But I do love a good challenge, and I knew the DI world of constant innovation, modality diversity, and intellectual challenge would keep things interesting. Thus, DI won me over.

Along with the fear of landing a future job, it is always hard to picture yourself in a new place or position because of fear/curiosity of the unknown. I felt the same way upon acceptance of the HPSP scholarship. I quickly found out how much I did not know. Upon graduation from Duke, I was required to attend Commissioned Officer Training (COT), which starts with learning how to wear the uniform properly (not kidding). After learning how to dress ourselves to standard, we were taught customs and courtesies, told to run, told to jump, told to stand still in silence, and of course, yelled at until we could march with proper technique. COT was swift but quickly gave me a glimpse into the making of the Air Force and how it operates. It prepared me to integrate into a new culture and along with my new ability to march in sync with a squadron of men and women, I was confident to step into my role at my first assignment at Travis Air Force Base in California.

For those of you who have not visited California—GO! It is one of the most beautiful places with boundless hiking and for those of you with interest, wine. But as far my time at Travis, I was thrown into an active role as a medical physicist, which gave me swift kick in the rear. I was very grateful for the necessary tools and scientific training

Erickson Family Christmas 2016

that Duke effectively prepared me for. I found myself referring back to old class notes and slide decks to revisit concepts. For example, one of the first things I was responsible for was completing the annual physics testing for the nuclear medicine department (1 PET/CT, 1 SPECT/CT, 2 SPECT, 1 mobile gamma camera). I arrived on station, new and tentative around radiation sources, and was expected to complete the testing on my own. While my final report was properly reviewed by a board-certified physicist, I felt that the working-world learning curve was steeper than I was led to believe. In those early successes, I credit my strong foundation in nuclear medicine from my time at Duke (the class and practicum with Dr. Turkington – Thanks Dr. T!). The other thing that cannot go unstated is the value of networking with physicists from Duke. I was not the only Duke graduate stationed at Travis. In fact, my co-worker who was responsible for giving me on-the-job training is also a Duke graduate!

I am in my third year as an Air Force officer and can confidently say, it is never boring! On top of my medical physics duties, I am also required to fill the boots (no pun intended) of the many tasks required of an Officer. For example, the Travis hospital leadership needed two officers to spearhead a CBRNE (chemical, biological, radiological and nuclear defense) emergency response readiness team. You guessed it! I was assigned to help restructure and lead this team. The work required attending special training sessions, developing response procedures, documenting training compliance, and participating in meetings and hospital-wide exercises. The experience gave me a deeper appreciation for the various kinds of work that go into making the Air Force function and provided me an invaluable opportunity.

So, what does a medical physicist do in the Air Force? The short answer: physics stuff. The real answer: physics stuff plus Air Force stuff. The Air Force provided me a phenomenal education at Duke and here I am again, currently assigned as an imaging physics resident with the Clinical Imaging Physics Group at Duke University Medical Center. I am honored to be at Duke for my residency and know I will be well-equipped to continue my service as a medical physicist in the United States Air Force.

Alumni Spotlight | Dvone Jackson

Dvone Jackson, MD, MS ('09) graduated from the Masters program at Duke University in 2009, and received his medical degree from John Hopkins University School of Medicine in 2013. He is currently a 1st year Internal Medicine Resident at the Hospital of University of Pennsylvania.

My first contact with medical physics occurred in the summer between my junior and senior years of college. I was working on a semi-automatic lung tumor detection algorithm and dabbling in physical thoracic phantom design. At that point, I was sold on medical physics; it had the right combination of theory, hands-on experimental techniques and direct application for me. So, I came to Duke and completed my MS degree in 2009 under the direction of Dr. Martin Tornai, with a research focus in radiation dosimetry for the combined CT/SPECT imager in the MMIL.

Towards the end of my tenure as a Duke student, sadly my mom had a recurrence of her lung cancer. It was a rough time for me; one which led me to reconsider becoming a physician to get even more patient interaction, than would otherwise be possible as a medical physicist. Additionally, I felt that I would be able to develop a better understanding of both cancer and radiation biology after being introduced to the subjects by Dr. David Kirsch in the elective course. After completing my degree, I moved back to my hometown in Maryland to care for my mother, who would unfortunately succumb to her disease months after my relocation.

With my interests now firmly directed more towards medicine, and away from physics, I took the necessary steps to complete the pre-requisites to gain admission to medical school. I entered Johns Hopkins University School of Medicine in the fall of 2013, and developed a range of research interests along the way, including interactions between cancer and the immune system, healthcare disparities related to cancer care and cancer prevention. I am currently in my first year of internal medicine residency at the Hospital of the University of Pennsylvania.

I still have some time to finalize my choice of sub-specialty, but at this juncture my leading option is Hematology and Medical Oncology.

Image from pennmedicine.com

In retrospect, I can unequivocally say that the Duke University Medical Physics Program helped me a great deal despite my decision not to pursue a traditional path. My basic understanding of anatomy started from day one in Dr. Reiman's course and the biostatics course allowed me develop a proficiency to perform my own statistical calculations for projects in medical school. Moreover, when I interviewed for medical school and residency, all of my interviewers found my background and research in medical physics to be quite intriguing. I am thankful for the support of the program administration and especially indebted to Dr. Martin Tornai who went out of his way for me as a research and life mentor. Though it may feel like a huge gamble for the few who may decide not to follow the typical medical physics career path, I am confident that the Duke University Medical Physics Program will equip you with valuable skills that will allow you to be successful in whatever endeavors you choose to pursue.

Research Spotlight | Wendy Harris

Wendy Harris is a PhD candidate in the medical physics graduate program. Her advisors are Dr. Lei Ren and Dr. Fang-Fang Yin. She is planning to graduate this upcoming May and wishes to pursue a radiation oncology residency position upon graduation.

My research focus is on generating volumetric cine (or real-time) imaging for on-board target localization in radiation therapy. Stereotactic body radiation therapy (SBRT) is an effective treatment paradigm to treat early stage liver and non-small cell lung cancer patients. Currently, however, no imaging technique is capable of localizing the 3D target volume in real-time to ensure precise delivery of SBRT, which poses a challenge to further improve local control and reduce toxicities.

I work under the supervision of Dr. Lei Ren and Dr. Fang-Fang Yin to develop novel techniques to generate volumetric cine imaging for liver and lung SBRT target localization. The two main aims of my research are to 1) develop a technique to generate quasi-cine CBCT for on-board target localization for lung radiotherapy and 2) develop a novel technique to estimate real-time volumetric cine MRI (VC-MRI) for inter- and intra-fraction liver and lung radiotherapy. My work also aims to improve the temporal resolution and spatial accuracy of VC-MRI through novel sparse acquisition, deformation models and image reconstruction methods. Additionally, we have recently been developing a novel method to generate synthetic on-board 4D MRI using prior 4D MRI and limited kV projections from a conventional LINAC for liver SBRT localization.

Figure 1 shows a comparison of prior CT volume, ground-truth CBCT volume, estimated CBCT volume from previous estimation technique using global motion modeling and free-form deformation (GMM-FD) (Zhang et al. 2013), and estimated CBCT volume from new estimation technique using structural motion modeling and weighted free-form deformation (SMM-WFD) (Harris e.t al. 2017). Our new method is able to more accurately estimate on-board 4D CBCT using only orthogonal-view 15° scan angle, compared to the previous estimation technique, which can estimate accurate on-board 4D CBCT using orthogonal-view 30° scan angle.

Figure 2 shows a comparison of prior MRI volume, 2D Cine MRI, and estimated volumetric cine MRI (VC-MRI), along with corresponding profile curves for a liver patient (Harris et. al. 2016). Our method generates real-time VC-MRI using a prior 4D MRI, a single on-board 2D cine MRI and motion modeling. Generation of VC-MRI can potentially become a valuable tool for both inter- and intra-fraction target localization in lung and liver SBRT treatments.

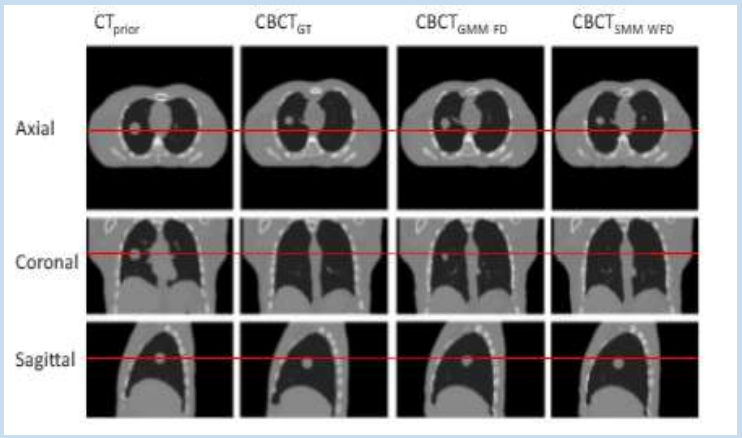


Figure 1

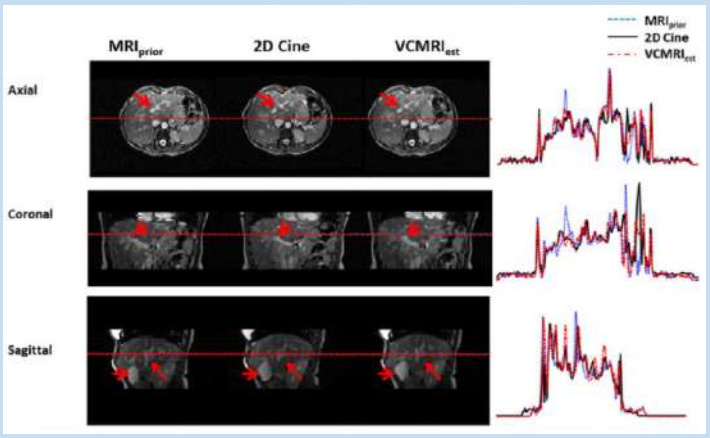


Figure 2

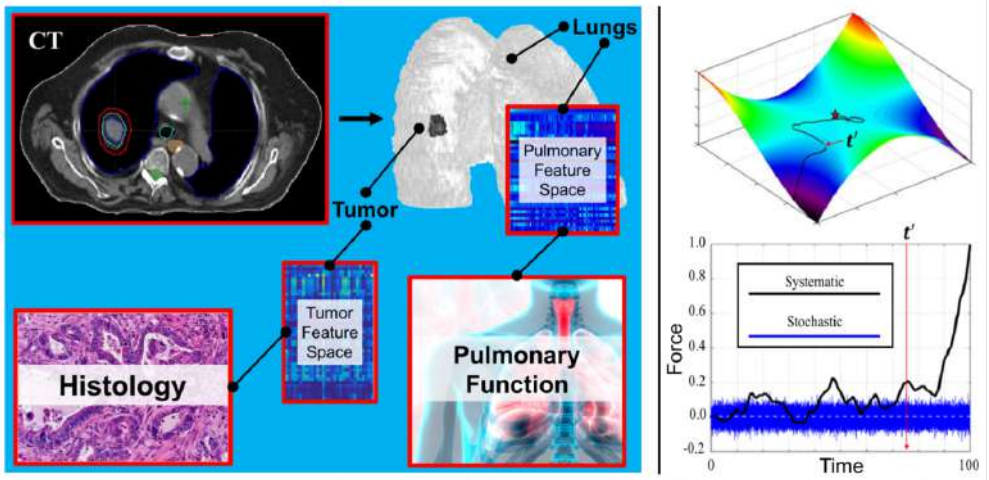
Research Spotlight | Kyle Lafata

Kyle Lafata is a 5th year PhD student under the supervision of Dr. Fang-Fang Yin. Kyle's research focuses on applying fundamental concepts borrowed from quantum mechanics and statistical mechanics to imaging radiomics problems.

Radiomics is a rapidly emerging field that aims to transform standard-of-care medical images into mineable data, from which computational biomarkers can be developed. These biomarkers – so called *radiomic signatures* – may be able to non-invasively detect tumor phenotypes such as histology, genetic mutation status, and therapeutic responsiveness. By measuring voxel-level interactions and gray-level texture patterns, various radiomic features are extracted that collectively capture aspects of a particular image, including morphology, density, and heterogeneity. Cluster analysis – i.e., the grouping of similar data objects together based on their intrinsic properties – is a common approach to understanding this otherwise non-trivial radiomics data. However, although data clustering is a hallmark of many fields, it is, in general, an ill-defined practice that may benefit from physics intuition.

In collaboration with the Departments of Physics and Mathematics at Duke, our group has developed a novel approach to data clustering based on ideas borrowed from quantum mechanics and Langevin dynamics. By interpreting radiomics data as a quantum system in equilibrium with a heat bath, data points are stochastically propagated on the surface of a potential function uniquely defined by the data. Data points which ultimately end up at similar potential minima are considered to be in the same cluster. The stochastic nature of such a dynamic approach allows data points to thermally jump local potential barriers and escape saddle points into locations of the potential surface otherwise forbidden. Practically, this tunneling phenomenon allows the radiomics data to be explored at a particularly high resolution, while still maintaining a reasonably narrow impulse response.

Key applications have primarily focused on phenotyping Non-Small Cell Lung Cancer based on radiomics features derived from x-ray CT images. Classification of tumor histology has been shown to be driven by radiomic features that capture asymmetries within a tumor's gray-level histogram, measures of image linearity, measures of local tumor heterogeneity, and similarity metrics comparing tumors to spheres. Further, an interesting relationship has been observed between pulmonary function and radiomic features extracted from the lungs. We have demonstrated that patients with a large lung volume of skewed gray-level content, and heterogeneous, low density lung tissue, are often associated with worse pulmonary function.



LEFT: Radiomic features are extracted from both the CT-segmented tumor and lungs to create two unique feature spaces. The encoded quantitative information is used to map relationships to tumor histology and pulmonary function, respectively. **RIGHT**: A data point with zero initial momentum escaping the saddle-point (indicated by the red star) of a hyperbolic paraboloid potential. Systematic and stochastic influence are comparable while the data point is located near the saddle point, however, the potential gradient is the dominating effect at times $t > t'$, allowing the data point to escape the local minima. This dynamic stochastic phenomenon contributes to robust clustering of radiomics data.

Duke MP Annual Retreat| James Spencer

James Spencer (MS '17) is a new Duke Medical Physics alumnus. He concentrated in the Diagnostic Imaging track, where his research interest area involved coherent scattering for breast cancer assessment. He will continue to stay at Duke as one of the Clinical Imaging Physics Group (CIPG) DI residents for the next 2+ years.

2nd Annual Duke Medical Physics Graduate Program Retreat

Continuing off the success of last year's inaugural program-wide retreat, the 2nd annual Duke Medical Physics Graduate Program Retreat was held September 8-10 at Haw River State Park. To continue not only shaping the future leaders of our field in the program's students but also strengthen the current innovators of our field in our alumni and faculty, this year's retreat focused on Achieving Excellence in Education, Communication, and Community.

The weekend's fun started with student-only activities on Friday. First year students were acclimated to the program, learning about life in Durham and what to expect in the program throughout their time here.

Duke MP Annual Retreat| James Spencer

Faculty and alumni arrived Saturday to join the students for the main sessions, which included learning about the dynamic SCALE-UP classroom model, how to communicate like a Toastmaster, and hearing storytelling techniques taught by the founder of the Monti to improve scientific presentations. The weather was absolutely perfect and created some great outdoor activity experiences: park rangers taught folks how to properly build and start a fire as well as create different types of structures to survive in the wilderness. The sessions culminated Sunday with a meaningful and important discussion about building community and how our program can create an even deeper sense of belonging for all members of its community.

No matter how far along the career path you might be, this retreat offered something for everyone. Seeing the Duke Medical Physics community all gathered together over the weekend truly brought a sense of accomplishment and reminded me of the benefits of our Medical Physics "motherland". The retreat is a great opportunity to center yourself back in your origins and learn and progress skills beyond those found in the core of Medical Physics. These retreats reinforce the type of skills expected in the MedPhys 3.0 model – in the future of our field – and I think it allows us as alumni to remember what makes Duke Medical Physics so special and then bring that to our current places of work. I had such a blast attending this year's retreat, and I want to thank all the faculty, staff, and students who helped plan and contribute to its success. I look forward to meeting and seeing you alumni at future program-wide retreats!

Student Update | Jeff Fenoli

Jeff Fenoli is a second-year MS student, originally from Seattle, WA. He was a member of the planning committee for the 2016 spring open house and the 2017 annual retreat, and a member of several Duke medical physics sports teams. He is currently doing his Master's thesis research with Dr. Anuj Kapadia and working on additional research with Dr. David Fried at University of North Carolina, Chapel Hill.

Everyone told me that my time at Duke would fly by, but I am still amazed by how quickly my first year came and went. I have truly enjoyed my time here, and it is exciting to see where the program is headed. This is especially important in the dynamic field in which we find ourselves. The future is always changing and we must constantly be adapting, if we are going to keep up. Whether you look at our research, didactic content, student involvement, or extra-curricular activities, we have a unique community here and one that keeps getting stronger with each passing year.

Duke MP Students enjoying the annual basketball Campout

Research at Duke

At the annual AAPM meeting, Duke had another strong presence: over 70 first author presentations and posters, two awards for Best in Physics, and many more presentations from alumni. Some of this research came from a new collaboration with UNC Chapel Hill, where two students are doing the work for their Masters' Theses. Duke is also playing a strong role in the future of medical physicists: Dr. Ehsan Samei presented his work on the MedPhys 3.0 initiative and Dr. Joshua Wilson shared his experience teaching professionalism. With many presentations and posters at conferences such as ISMRM, SPEI, and ASTRO, Duke continues to be a leader in the field of medical physics.

Course Evolution

This year, for the first time, the student orientation included a 27-hour math workshop. Dr. Dean Darnell taught nine three-hour sessions where he worked through the basic math concepts needed in medical physics. He covered everything from probability to linear algebra to Fourier transforms. While this was an intense and stressful start for the new students, they will certainly be better equipped for their future, here at Duke and beyond. The advanced coursework continues to evolve as well, with more shadowing opportunities and improved shadowing classes. We are now offering shadowing courses for almost every facet of medical physics, and even some through a partnership with UNC Chapel Hill.

Sports

Life at Duke would not be complete without sports. Jacob Kodra, our intramural sports coordinator, organized a football team and Dr. Justus Adamson organized a volleyball team with students, faculty, and even radiation oncology staff. We may not have the best teams around, but we play hard and have a great time. In the spring, we hope to have teams for basketball, softball, kickball, and soccer, even though many of us will be quite busy with interviews and thesis defense preparations. Some of us also like to watch our Duke basketball team, but tickets are hard to come by. Every year, students have the chance to camp out in a parking lot for three days, running to "check-in" at any time in the day or night for the chance to purchase discounted tickets to the Duke basketball games. Several students participated in this sweaty, sleep-deprived weekend and two students even managed to win tickets!

Duke MP intramural basketball (top) and volleyball (bottom) teams

Medical Physics Retreat

At the start of this semester, we took a weekend to travel into the woods for our second annual medical physics retreat. This year's retreat was hosted in the beautiful Haw River State Park, September 8th-10th. This retreat was focused on achieving excellence through communication, education, and community. Incoming students had opportunities to learn about life in Durham, research at Duke, and to meet current students and faculty, while upper students got to share their experiences and welcome the new students. We also had the pleasure of being visited by alumni for a Q&A panel - many thanks go out to Titania Juang, Steven Bache, Michael Trager, and James Spencer for sharing their words of wisdom. The retreat also included talks from Dr. Robert Biechner on the flipped classroom, Dr. ZJ Kabala on communication, Dr. Jeff Polish on improving presentations in science, and Paul James on intercultural awareness. If this was not enough, we had two outdoor teambuilding activities, a talent show, and many fantastic meals. Many parts of this retreat were student planned and organized, and I want to give a huge shout-out to those involved with the planning of this retreat.

Alumni News

Chris and Sisi Zatwarnicki

Daniel Lee at graduation from Officer Training (Right) and white coat ceremony (above)

Joshua Wilson (PhD '11) joined the Duke Medical Physics Graduate Program as the Assistant Director for Administration, effective January 2017.

Jeremiah Sanders (MS '16) recently completed a deep learning internship at the Maui Optical and Supercomputing Site in Maui, HI. He is starting his second year in the Medical Physics PhD program at MD Anderson Cancer Center.

Daniel Lee (MS '15) started medical school at Midwestern University and is currently on his second year. He is under the Health Profession Scholarship Program with US Air Force. Over the past summer he finished my Commissioned Officer Training for US Air Force and has been commissioned as 2nd LT! He is currently in the Reserves, but will be active duty once medical school is finished.

Christopher Zatwarnicki (MS '08) recently married in September with family and friends in attendance.

Adam Cohen (MS '09) lives in Milwaukee, WI working on CT product development at GE Healthcare. I had a kid! Holy Moly! His name is Arthur Liu Cohen. And he's awesome.

Adam and Arthur Cohen

Alumni News

Katie Albanese (MS '16) accepted a Summer Associate Position in the Patent Litigation Department of Greenberg Traurig, LLP in New York City for next summer

Matthew Goss (MS '07) was recently married in September. He and his wife are spending their honeymoon in Vienna, studying German, and traveling through central and Eastern Europe.

Sherry Andrew (MS '09) is living in Raleigh, NC and working as a Medical Physicist at UNC Rex Healthcare. We have a son who is a year and a half with another boy due in January, and recently moved into our new house in the woods.

Irene Zawisza (MS '13) accepted a position at Tower Health in Reading, PA.

Maryann Ayoade (MS '09) and her husband had their first child, Joshua born on April 14th, 2017.

Sherry Andrew and family

Matt Goss and his wife Emily

Maryann Ayoade and family