Medical Physics Alumni NEWSLETTER

THE UNIVERSITY OF TEXAS MD Anderson Cancer Center | UTHealth Houston
Graduate School of Biomedical Sciences

SUMMER 2024| VOLUME 18

2024 Student-led Research Retreat

Dr. Joseph Weygand was the invited speaker at the 2024 Annual Student Research Retreat. He is an alum of the University of Texas MD Anderson UT Health Medical Physics Graduate Program, having completed an SMS in 2017. Dr. Weygand went on to earn his PhD in Medical Physics at Heidelberg University in 2020 and is currently an Assistant Professor in the Department of Radiation Oncology at Dartmouth-Hitchcock Medical Center.

Photo credit (this page): Lian Duan, MS (1st-year PhD student)

Medical Physics Program Leadership

Rebecca M. Howell, PhD
Director

Radiation Physics Department
RHowell@mdanderson.org

A. Kyle Jones, PhD
Deputy Director

Imaging Physics Department
kyle.jones@mdanderson.org

Laurence E. Court, PhD
Director of Admissions

Radiation Physics Department
LECourt@mdanderson.org

Program Steering Committee

Faculty Member	Position/Until	Email
Rebecca Howell, PhD	Director/2025	rhowell@mdanderson.org
Kyle Jones, PhD	Deputy Director/2025	kyle.jones@mdanderson.org
Laurence Court, PhD	Admissions Director/2025	lecourt@mdanderson.org
Adam Melancon, PhD	#1, Radiation Physics/2024	amelanco@mdanderson.org
Rachel Barbee, PhD	#2, Nuclear Medicine/2026	rbarbee@mdanderson.org
Moiz Ahmad PhD	#3, Imaging Physics/2026	mahmad@mdanderson.org
Steven Millward, PhD	#4, External/2026	smillward@mdanderson.org
Ioannis Vlahos, MD	#5, Non-Medical Physics/2024	ivlahos@mdanderson.org
Kristy Brock, PhD	#6, Imaging Physics/2025	kkbrock@mdanderson.org
Tze Yee Lim, PhD	#7, Radiation Physics/2025	tlim@mdanderson.org
John Hazle, PhD	Ex officio	jhazle@mdanderson.org
Mary Martel, PhD	Ex officio	mmartel@mdanderson.org

Candidacy Examination Committee

Faculty Member	Position/Until	Email
Jingfei Ma, PhD	Imaging Physics/2026	jma@mdanderson.org
Kristy Brock, PhD	Radiation Physics/2027	kkbrock@mdanderson.org
Moiz Ahmad, PhD	Imaging Physics/2027	mahmad@mdanderson.org
Peter Balter, PhD	Radiation Physics/2026	pbalter@mdanderson.org

Inside This Edition

Program Director Report

Introduction

The 2023-2024 academic year has been as busy one, as always. A key milestone was the submission of our Commission on Accreditation of Medical Physics Education Programs (CAMPEP) reaccreditation report this past December, which is currently under review by the CAMPEP Graduate Education Program Review Committee (GEPRC). Having myself served on the CAMPEP-GEPRC for nearly two decades, I anticipated that the reaccreditation report would be a lot of work and it indeed was. However, it was not a solo effort, many people contributed including Lisa Echeverry, Bud Wendt, Kyle Jones, and GSBS staff. Our final report, including appendices, topped at over 500 pages! I learned so much during the preparation of the report, but the best part was the opportunity to follow-up with our program graduates from the past-five years. They are all doing exceptionally well at various stages of their career, from ABR examination, to residency, to their first positions at academic and community practice centers. I am also pleased to share that all graduates that sought residencies were admitted. Graduates that entered the match were matched at one of their top choices.

Our Students

Our students and alumni are the cornerstone of our program. Their successes both in graduate school and in the years and decades after graduation have shaped and will continue to define the field of medical physics. The current cohort is no exception to our legacy, and they are featured throughout the newsletter, including a listing of fellowships, honors, and awards bestowed on them. Of note, the American Association of Physicists in Medicine (AAPM) - Radiological Society of North America (RSNA) Graduate Fellowship has been awarded to one of our students every year during the past five years. Also noteworthy, Henry Meyer was awarded the prestigious Fulbright Fellowship and will be studying abroad in Heidelberg Germany for the next year. I'd like to congratulate all of our students on securing extramural funding and for the many honors and awards that they have received. Tianzhe Li, PhD received the 2023 Aaron M. Blanchard Research Award for best dissertation and most impactful research.

This academic year five PhD students and two SMS students graduate. Their dissertation and thesis abstracts as well as commencement photos (for those that attended) are included in this newsletter.

As you look through the newsletter, what you will find is a true sense of community among our students. They are building a network of future colleagues, collaborators, and life-long friends. It is my absolute honor and pleasure to work with such intelligent, innovative, hard-working, and genuinely kind and thoughtful young men and women. The future is bright.

Curriculum and Faculty

There have been no changes to the curriculum in the past year. However, The Curriculum Review Committee, led by Dr. Adam Melancon (our Radiation Physics Residency Program Director) initiated a thorough review of the curriculum. The committee includes Dr. Kyle Jones, all course directors and two student advocates, Hana Baroudi and Madison Grayson. The committee used the curriculum component of the CAMPEP report as a launching point. A key consideration of the committee is to ensure we are keeping-up with the ever- and rapidly evolving field of medical physics. We are also considering the curriculum in the context of AAPM Report 365, a Revision of Report 197 - Academic program recommendations for graduate degrees in medical physics.

Our courses continue to be primarily taught by outstanding faculty from our Imaging and Radiation Physics Departments. We also have strong faculty representation from the Departments of Cancer Systems Imaging, Biostatistics, Radiation Oncology, and Radiology. We have 86 faculty in our program with 53 full members and 33 associate members. New to the faculty this academic year are Rachel Barbee, PhD, Heiko Enderling, PhD, FSMB, Jung Kim, PhD, Yusung Kim, PhD, DABR, Jeffrey Siewerdsen, PhD, Alda Lui Tam , MD, and Paige Taylor, MS, PhD. An illustration of our organizational structure (page 7) highlights the departments and divisions represented by our faculty.

I would like to express my extreme gratitude to each and every faculty member for sharing their expertise and their time both teaching and mentoring our students both academically and in the clinic. Our curriculum and course directors are highlighted on page 7.

Program Director Report (Cont.)

Acknowledgements

Imaging and Radiation Physics Department Chairs

I would like to thank our Imaging Physics and Radiation Physics Department Chairs, Drs. John Hazle and Mary Martel for their high levels of support and engagement. One example of their support is their funding of two incoming PhD students each year (for the first 16 months in our program). This generous support allows our program to admit a total of seven fully funded PhD students each year (five funded by the GSBS and two funded by our chairs).

I would also like to thank Drs. Hazle and Martel for generously supporting the 2024 Alumni Event, which will be held on July 21 during the AAPM Annual Meeting. This annual gathering is an opportunity for our current students and faculty to network with our alumni. However, it is also a time to catch-up with friends and continue to further reinforce our sense of community.

Administrators

I am incredibly grateful to the Radiation Physics Department Administrators, Jason Thomas, Associate Administrator, Jose Alaniz, Operations Manager, Dana Garrison, and Program Manager, Melvina Kimble-Hackett for assisting us in so many times in so many ways throughout this year.

Student Council

Our student council was once again instrumental to improving our students' experience. Skylar Gay (Faculty Liaison), Brandon Reber (Education Chair), Collin Harlan (Networking Liaison), and Taylor Meyers (1st year Liaison) made significant contributions in their respective roles and have contributed reports for this newsletter (pages 9-11).

Program Coordinator Lisa Echeverry

Lisa continues to support our program and remains my right-hand woman. She handles essential and complicated administrative matters. I would like to express my deep appreciation to Lisa for her support of our program, faculty and students. She cares for our students academic progress and their wellbeing.

Unofficial Program Photographer

A special thank you to Lian Duan, MS, a first year doctorate student. Lian attends most of our events with his digital camera in hand. I've even started requesting his expertise at our events. He has a great eye for capturing the moment and has contributed many of the photos that are included throughout this newsletter.

Sincerely,

PLEASE CONSIDER A DONATION TO THE SHALEK FELLOWSHIP FUND

All gifts to the Robert J. Shalek Fellowship Fund are used to support of the Medical Physics Graduate Program and specifically to support incoming SMS students including tuition, fees, and when funding is sufficient, partial stipends. Please consider donating to this important source of student funding.

More details for making a donation are provided on page 47.

Program Organizational Structure

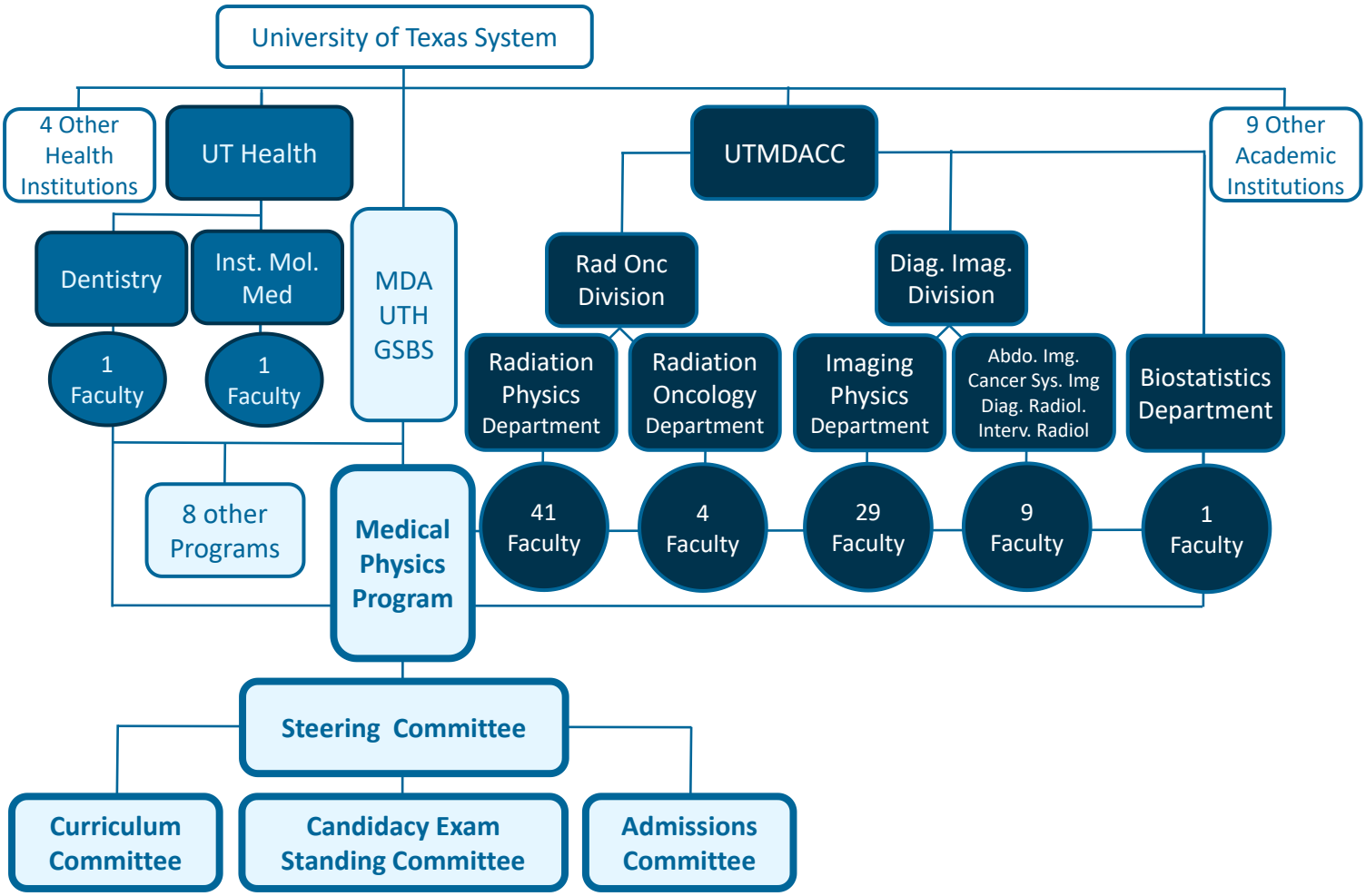


Illustration of the organizational structure of the Medical Physics Program within the MDAUTH GSBS and relationship to its two parent organizations the University of Texas MD Anderson Cancer Center (MDACC) and UT Health and their organization within the University of Texas Educational System. There are 86 faculty affiliated with the Medical Physics Program, among whom, 84 and 2 have primary appointments at MDACC and UTH, respectively. The Division of Radiation Oncology (RO) Faculty are from the Departments of Radiation Oncology and Radiation Physics. The Division of Diagnostic Imaging faculty are from the Departments of Imaging Physics, Abdominal Imaging, Cancer Systems Imaging, Diagnostic Radiology, and Interventional Radiology. The majority of Program faculty have their primary appointments in the Radiation Physics (41) and Imaging Physics Departments (29).

Program Courses & Course Directors

Core Courses	Course Director
Imaging Science	David Fuentes, PhD and Dragon Mirkovic, PhD
Introduction to Medical Physics I: Basic Interactions	Kent Gifford, PhD
Introduction to Medical Physics II: Medical Imaging	John Rong, PhD
Introduction to Medical Physics III: Therapy	Adam Melancon, PhD
Introduction to Medical Physics IV: Physics of Nuclear Medicine	Bud Wendt (until 2023) Rachel Barbee, PhD (2023)
Therapy Medical Physics II	Shane Kraft, PhD and Christopher Peeler, PhD
Diagnostic Medical Physics II	Jason Stafford, PhD
Radiation Detection, Instrumentation and Data Analysis	Stephem Kry (until 2023) Mallory Glenn, PhD (2024)
Introduction to Radiation Protection	Rajat Kudchaker, PhD
Fundamental Anatomy, Physiology and Biology for Medical Physics I	A. Kyle Jones, PhD (until 2023) B. David Flint, PhD (2024)
Fundamental Anatomy, Physiology and Biology f or Medical Physics II	A. Kyle Jones, PhD
Statistics for Medical Physicists	Sanjay Shete, PhD
Electronics for Medical Physicists	Xinming Liu, PhD
Medical Physics Seminar	Laurence Court, PhD
Medical Physics Seminar	Julie Pallard Larkin, PhD
The Ethical Dimensions of the Biomedical Sciences	Shane Cunha, PhD (Integrative Bio & Pharm)
Electives	**Course Director**
Supervised Clinical Experience in Radiation Therapy	Tze Yee Lim, PhD
Radiation Induced Late Effects and Survivorship Journal Club	Dragan Mirkovic, PhD
Special Project Course - Proton Therapy	Naryon Sahoo, PhD

Our courses directors are experts in their respective areas and are truly the cornerstone of the MDAUTH Medical Physics Graduate Program. Huge shout-out to them for doing the heavy lifting to teach our students the fundamental aspects of medical physics!

Meet the Student Council

2023- 2024 Student Council

Skylar Gay
Student Faculty Liaison

Brandon Reber
Education Liaison

Collin Harlan
Networking Liaison

Taylor Meyers
First Year Student Liaison

Skylar, Brandon, Collin, and **Taylor** were deeply committed to their roles on the council as well as to making improvements to the council that will benefit our students for years to come. A key accomplishment was the drafting of Student Council Bylaws, which are common within the GSBS, but that had not previously been established within our program. The bylaws will undergo review by the GSBS and then be voted upon by the student body. This initiative was the brainchild of Aashish Gupta (a 2022-2303 council member) and carried to the finish line by the current council. Additionally, this council sought to ensure representation from students from both Radiation and Imaging Physics. Specifically, the council expanded the role of Networking Liaison to two positions, one from Imaging and one from therapy. This will ensure that networking opportunities, e.g., special seminars, the student retreat, etc. are inclusive of the broad interdisciplinary interests of all students.

The program thanks them for their service.

Incoming 2024- 2025 Student Council

Hayden Scott
Student-Faculty Liaison

Rebecca Lim
Networking Liaison - Diagnostic

Angela Gearhardt
Networking Liaison - Therapy

Diana Carrasco
First Year Student Liaison

We welcome our new student council members.

We are looking forward to their innovative ideas for improving our students' experiences .

Madison Grayson
Education Liaison

Student-Faculty Liaison Report

The Student-Faculty Liaison is the primary administrative officer of the council and acting as a bridge between students and faculty members. This role encompasses various tasks, including facilitation of communications, representing students' interests to the program, and overseeing the student council.

Report from Skylar Gay

A very warm greeting to all readers of the 2023-2024 medical physics newsletter! This year I had the honor of leading the Student Council through another fun and educational year. We kicked off the year with a welcome session for our incoming students. All members of the Student Council (Taylor Meyers, Brandon Reber, Collin Harlan, and myself) presented tips, things to know, and fun activities around Houston!

We also co-hosted two Student Council/Director lunches, one in fall and one in spring. At the most recent lunch, I reported on a new initiative on bringing student representatives from institutions all across the US and Canada into close collaboration. We are currently seeking AAPM recognition to facilitate our networking and outreach! Many fun and educational events were led by Student Council this year and are separately reported by my fellow council members, but I would like to especially highlight two events: ten candidacy review sessions that were led by Brandon Reber (and which I personally found invaluable!), and an incredible Research Retreat with Dr. Joe Weygand that was organized by Collin Harlan and Taylor Meyers.

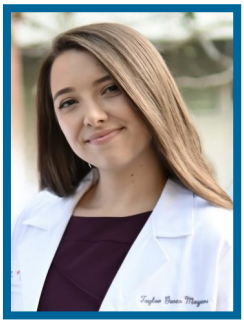
This was also a busy year administratively. We established official bylaws for the Student Council, an initiative requested by Dr. Howell at the beginning of this academic year. Special thanks go to Aashish Gupta for providing an initial draft which helped us lay a solid framework. Following the desire of our student body to be more involved in leadership and outreach, we also established an e-board to provide leadership opportunities and assist the Student Council – special thanks go to Natalie West for spearheading this.

Finally, I would like to thank our student body for their support and enthusiasm, Dr. Howell and Lisa Echeverry for providing wonderful leadership and guidance; as well as to offer warmest congratulations to our new Student Council members Hayden Scott, Angela Gearhardt, Rebecca Lim, Diana Carrasco Rojas, and Madison Grayson. I look forward to reading your reports in our next newsletter!

Skylar Gay

First-year Student Liaison Report

The First Year Liaison (FYL) The First-Year Liaison shall represent and support the first-year students to ensure a smooth transition to the program and Houston.



Report from Taylor Meyers

As First Year Liaison, my goal is to introduce the incoming first-year students to our program and ensure a smooth transition both academically and non-academically. To start off the year, we welcomed the new students to Houston by organizing a pool party + BBQ social their first weekend after joining our program, providing an opportunity for them to meet and socialize with current students in the program before classes started.

To provide additional support throughout their first year in the program, each first year student was matched with two current students through the Peer-Mentorship program. Through this initiative, each first year student was matched with a pre-candidacy and post-candidacy student mentor who can offer guidance in both academic and non-academic aspects of student life. To continue to foster teamwork and promote friendship within and outside the medical physics program, the Medical Physics softball team 'The Beam Hardeners' returned to participate in the TMC Softball league. A big thank you to FYL alumni Aashish Gupta and team captain Natalie West for spear-heading this team building extra-curricular activity!

In addition to helping the current first year students, the goal of the FYL is to be a point of contact between the program and future applicants as well. As FYL I assisted Dr. Howell during interview weekends for applicants of the 2024-2025 academic year, and provided further information to better prepare the next incoming first years for their transition via surveys providing information on housing, life in Houston, and potential research project opportunities they could pursue when joining the program.

New to the student council was the implementation of an electoral board, a group of volunteer student members to assist the student council. Proposed by current student Natalie West, it will provide an opportunity for students to be involved in student council discussions, take initiative in student council led activities, and be a voice for the current student body.

Taylor Meyers

Education Liaison Report

The Education Liaison are responsible for improving the professional development of students within and outside the program.

Report from Brandon Reber

This year as education liaison, I helped the student council host a variety of educational programming for students. We were able to organize information sessions for students on forming an advisory committee, registering for the candidacy with senior students who shared their previous experiences. Additionally, we held several medical physics subject review sessions covering areas such as imaging physics, therapeutic physics, radiation protection, and more. These reviews were designed to help students prepare for the off-topic portion of the candidacy exam and the ABR Part 1 exam. Finally, throughout the school year, we had midterm and final exam reviews that were led by student volunteers.

Brandon Reber

Networking Liaison Report

The Networking Liaison are responsible for improving the professional development of students within and outside the program.

Report from Collin Harlan

During my tenure as networking liaison of the Medical Physics student program for the 2023-2024 academic year, it was a pleasure to host two major social events, which are described below. Photographs from these events are shown on the Newsletter cover and pages 38 - 41.

The first event was a spring social at the Houston Livestock Show and Rodeo. RodeoHouston is the largest livestock exhibition and rodeo in the world and is considered to be Houston's signature event. As a local Houstonian, I felt that the rodeo would be a memorable location for our spring social, especially for the many students that are from out of the state/country and have never been before. With the generous help of Emily Thompson, a current Imaging Physics resident and annual rodeo volunteer, we were able to secure 20+ grounds passes for our group, which meant that all students were able to enter for free! Additionally, our group attended a behind the scenes tour where we learned about different kinds of livestock, general agriculture practice in Texas, and the many ways in which RodeoHouston serves as an important resource to support high school and college students interested in a future in agriculture. Despite a storm that left many of us soaking wet, the rodeo was an exciting location for the students to socialize in a unique setting, take part in Texan culture, learn about a different field of study, listen to live music, and of course eat unhealthy treats!

The second event was the annual Medical Physics student retreat. This year, our invited speaker was Dr. Joe Weygand, Assistant Professor and Medical Physicist from Dartmouth College. Dr. Weygand gave a wonderful presentation on career development in Medical Physics. He spoke in depth on his extensive international experience performing medical physics work both independently and with RAD-AID, an organization which focuses on improving access to radiology healthcare services in medically underserved regions worldwide. His presentation was multifaceted; not only did he discuss the medical physics tasks he performed at the various hospitals he visited, but he also provided photographs and information about the geography, culture, and history of the cities and countries he traveled to for his work (Sudan, Nigeria, Mongolia, etc.) and the many unique people he met and worked with along the way. His presentation showed that Medical Physics can be applied to and merged with ones interests, in this case international travel and improving global health. Afterwards, we went as a group to the Houston Zoo and spent the afternoon socializing and enjoying the animals. Despite the heat, I greatly enjoyed the opportunity to share my love of the Houston Zoo and play tour guide to the 20+ students and their significant others who participated. Animal favorites for the day included Marv, the one year old Northern White-Cheeked Gibbon, who was actively playing with his mother and father, Ting and Max, and slightly shyer Tino, the adorable new baby Masai giraffe. Thanks again to Joe for his time and mentorship, and to Taylor Meyers and Lisa Echeverry for their help with organizing the retreat.

Finally, a big thank you to all of the students who participated in these events; your participation is what made them so fun, special, and memorable! Not to mention the awesome pictures we took along the way!!! It has been an honor to serve the hardworking students of this program over the course of the past year. I hope that the memories made during both of these events will travel with you, wherever you go after your time at MD Anderson, and serve as a loving reminder of stormy weather and soggy clothes, Marv and Tino, the city of Houston, the amazing state of Texas, and your time as a student in the Medical Physics program at the best cancer hospital in the world.

Best,

Collin Harlan

Student Grants and Fellowships

AMERICAN ASSOCIATION OF PHYSICISTS IN MEDICINE (AAPM), RADIOLOGICAL SOCIETY OF NORTH AMERICA (RSNA) GRADUATE FELLOWSHIP
Skylar Gay | 2021-2023 | Advisor: L. Court, PhD
Kevin Liu | 2022-2024 | Advisor: E. Schueler, PhD
Lucas McCullum | 2022-2023 | Advisor: C.D. Fuller, PhD
Lian Duan | 2023-2024| Advisor: TBD (1st year student)
Hunter Mehrens | 2024 2025 | Advisor: Stephen F. Kry

AMERICAN LEGION AUXILIARY FELLOWSHIP
Hunter Mehrens | 2022-2023| Advisor: S. Kry, PhD
Kevin Liu | 2022-2023 | Advisor: E. Schueler, PhD
Barbara Marquez | 2022-2023 | Advisor: L. Court, PhD
Hana Baroudi | 2024-2025 | Advisor: L. Court, PhD
Zaphanlene Kaffey | 2024-2026 | Advisor: D. Fuller, MD, PhD

CANCER PREVENTION RESEARCH INSTITUTE OF TEXAS (CPRIT) GRADUATE SCHOLAR TRAINING AWARD
Hunter Mehrens | 2024-2025 | Advisor: Stephen F. Kry

CPRIT INNOVATION IN CANCER PREVENTION RESEARCH FELLOWSHIP
Joseph DeCunha | 2022-Present| Advisor: R. Mohan, PhD
Kevin Liu | 2022-Present| Advisor: E. Schueler, PhD
Barbara Marquez | 2023-Present | Advisor: L. Court, PhD

JOHN J. KOPCHICK FELLOWSHIP
Skylar Gay | 2024-2025 | Advisor: L. Court, PhD
Kevin Liu | 2024-2025| Advisor: E. Schueler, PhD
Hana Baroudi | 2023-2024 | Advisor: L. Court, PhD

FULBRIGHT OPEN STUDY/RESEARCH SCHOLARSHIP (GERMANY)
Henry Meyers | 2024-2025| Advisor: R. Mohan, PhD

LARRY DEAVEN PH.D. FELLOWSHIP IN BIOMEDICAL SCIENCES
Skylar Gay | 2024-2025 | Advisor: L. Court, PhD

NATIONAL IINSTITUTES OF HEALTH (NIH)
THE ACADEMY INITIATIVE FOR MAXIMIZING STUDENT DEVELOPMENT T32 TRAINING GRANT
Angela Gearhardt | 2024 2025 | Advisor: Stephen F. Kry

NIH F31 DIVERSITY SUPPLEMENT
Lucas McCullum | 2022-2023 | Advisor: D. Fuller, MD, PhD

NIH/NCI RUTH L. KIRSCHSTEIN NRSA INSTITUTIONAL RESEARCH TRAINING GRANT T32 PREDOCTORAL FELLOWSHIP IN CANCER NANOTECHNOLOGY
Collin Harlan |2 023-2025 | Advisor: J. Bankson, PhD

NATIONAL SCIENCE FOUNDATION (NSF) GRADUATE RESEARCH FELLOWSHIP
Daniel El Basha| 2020-Present | Advisor: L. Court, PhD

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC) POSTGRADUATE SCHOLARSHIP, DOCTORAL
Joseph DeCunha | 2022-Present | Advisor: R. Mohan, PhD

PAULINE ALTMAN-GOLDSTEIN FOUNDATION DISCOVERY FELLOWSHIP
Aashish Gupta |2022-2023 | Advisor: K. Brock, PhD

ROSALIE B. HITE GRADUATE FELLOWSHIP IN CANCER RESEARCH
Xinru Chen | 2024-2025 | Advisor: Jinzhong Yang

ROBERT J. SHALEK GRADUATE FELLOWSHIP IN MEDICAL PHYSICS
Allen Lopez Hernandez | 2022-2023 | Advisor: E. Schueler, PhD
Hayden Scott | 2022-2023 | Advisor: S. Kry, PhD
Diana Carrasco | Summer 2023 | Advisor: P. Taylor
Derek Garcia | 2023-2024 | Advisor: K. Brock
Michael Yang | 2023-2024| Advisor M. Glenn

UNIVERSITY OF TEXAS MD ANDERSON UT HEALTH GRADUATE SCHOOL OF BIOMEDICAL SCIENCES (GSBS) ENDOWMENT FELLOWSHIP
Brandon Reber | 2022-2023| Advisor: K. Brock PhD

UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT HOUSTON (UTHEALTH HOUSTON) - CENTER FOR CLINICAL AND TRANSLATIONAL SCIENCES (CCTS)
TL1 TRAINING FELLOWSHIP
Sam Mulder | 2024| Advisor C.D. Fuller, MD, PhD

Student Awards and Honors

AAPM BEST MEDICAL AWARD
Rebecca Lim | 2024 | Advisor: K. Brock

AAPM EARLY CAREER INVESTIGATOR SYMPOSIUM
Rebecca Lim | 2024 (finalist) | Advisor: K. Brock

AAPM EXPANDING HORIZONS TRAVEL GRANT
Kevin Liu | 2023 | Advisor: E. Schueler, PhD

AAPM IMAGING PHYSICS BLUE RIBBON POSTER AWARD IN MRI AND NUCLEAR MEDICINE
Collin Harlan | 2023 | Advisor: J. Bankson, PhD

Student Awards and Honors

AAPM SEXUAL AND GENDER MINORITY SUBCOMMITTEE TRAVEL AWARD
Henry Meyer | 2024-2025 | Advisor: R. Mohan, PhD

AAPM PETER ALMOND AWARD OF EXCELLENCE FOR AN OUTSTANDING RADIATION MEASUREMENTS ARTICLE
Kevin Liu | 2024 | Advisor: E. Schueler, PhD

ANDREW SOWELL-WADE HUGGINS SCHOLARSHIP IN CANCER RESEARCH
Lucas McCullum | 2022-2023 | Advisor: C.D. Fuller, PhD

CHILDHOOD CANCER SURVIVOR STUDY TRAINEE CAREER DEVELOPMENT AWARD
Taylor Meyers | 2023-2024 | Advisor: R. Howell PhD

EDWARD JACKSON SCHOLARSHIP
Aashish Gupta | 2018 | Advisor: R. Howell, PhD
Derek Garcia | 2023 | Advisor: |K. Brock, PhD
Michael Yang | 2023 | Advisor: M.C. Glenn

EMERGING LEADERS OF ACADEMIC MEDICAL PHYSICS SYMPOSIUM AT THE UNIVERSITY OF WISCONSIN - INVITED PARTTICIPANT
Hunter Mehrens | 2024| Advisor: Stephen F. Kry

HPS TEXAS CHAPTER, BEST STUDENT PRESENTATION AWARD
Taylor Meyers | 2023 | Advisor: R. Howell, PhD

INTERNATIONAL CONGRESS OF RADIATION RESEARCH TRAVEL AWARD
Kevin Liu | 2023 | Advisor: E. Schueler, PhD

INTERNATIONAL CONFERENCE ON THE USE OF COMPUTERS IN RADIATION THERAPY (ICCR) RISING STARS COMPETITION
Rebecca Lim | 2024 (3rd place) | Advisor: K. Brock

ICCR TRAVEL AWARD
Kevin Liu | 2024-2025| Advisor: E. Schueler, PhD

INTERNATIONAL SOCIETY FOR MAGNETIC RESONANCE IN MEDICINE (ISMRM) 2023 EDUCATIONAL STIPEND AWARD
Collin Harlan | 2023, 2024 | Advisor: J. Bankson, PhD
Jian Ming Teo | 2023, 2024 | Advisor: H.L. Liu, PhD

JAMES E. TEMPESTA, M.D., ENDOWED SCHOLARSHIP
Xinru Chen | 2023 | Advisor: Jinzhong Yang

JANET ELAINE PIERCE FRYE SCHOLARSHIP FOR CANCER RESEARCH
Henry Meyer | 2023-2024| Advisor: R. Mohan, PhD

JOURNAL OF APPLIED MEDICAL PHYSICS, TOP CITED ARTICLE
Hunter Mehrens | 2022 | Advisor: S. Kry, PhD

LINDA M. WELLS GSBS OUTREACH AWARD
Hana Baroudi | 2024 | Advisor: L. Court, PhD

MD ANDERSON CANCER CENTER, DIVISION OF IMAGING PHYSICS TRAINEE RESEARCH DAY ORAL PRESENTATION AWARD
Collin Harlan | 2023 (1st Place) | Advisor: J. Bankson, PhD
Rebecca Lim | 2024 (1st place) | Advisor: K. Brock

MD ANDERSON CANCER CENTER, DEPARTMENT OF IMAGING PHYSICS PERFORMANCE AWARD
Collin Harlan | 2021 | Advisor: J. Bankson, PhD

MD ANDERSON UT HEALTH GSBS CANCER ANSWERS FOUNDATION SCHOLARSHIP
Rebecca Lim | 2024| Advisor: K. Brock

MD ANDERSON UT HEALTH GSBS GRADUATE RESEARCH DAY ELEVATOR SPEECH AWARD
Barbara Marquez | 2022 (1st place) | Advisor: L. Court, PhD
Hunter Mehrens | 2022 (finalist) | Advisor: S. Kry, PhD
Hayden Scott | 2023 (2nd place) | Advisor: S. Kry, PhD
Zaphanlene Kaffey | 2024 2nd place | Advisor: D. Fuller MD

MD ANDERSON UT HEALTH GSBS GRADUATE RESEARCH DAY ORAL PRESENTATION SKILLS AWARD
Hunter Mehrens | 2022 (1st place)| Advisor: S. Kry, PhD

MD ANDERSON UT HEALTH GSBS GRADUATE RESEARCH DAY PEOPLE'S CHOICE AWARD
Aashish Gupta | 2023 | Advisor: K. Brock, PhD
Barbara Marquez | 2021 (2nd place) | Advisor: L. Court, PhD

MD ANDERSON UT HEALTH GSBS STUDENT TRAVEL AWARD
Aashish Gupta | 2019 | Advisor: R. Howell, PhD
Aashish Gupta | 2019 | Advisor: K. Brock PhD
Barbara Marquez | 2021 | Advisor: L. Court, PhD
Benjamin Insley |2021, 2022, 2023|Advisor: M. Salepour, PhD
Hana Baroudi | 2022, 2023, 2024 | Advisor: L. Court, PhD
Collin Harlan | 2022, 2023, 2024 | Advisor: J. Bankson, PhD
Xinru Chen | 2023 | Advisor: J. Yang, PhD
Kevin Liu | 2023 | Advisor: E. Schueler, PhD
Allen Lopez Hernandez | 2023 | Advisor: E. Schueler, PhD
Lucas McCullum | 2023 | Advisor: C.D. Fuller, PhD
Henry Meyer | 2023 | Advisor: R. Mohan, PhD
Hayden Scott | 2023 | Advisor: S. Kry, PhD
Jian Ming Teo | 2023, 2024 | Advisor: H.L. Liu, PhD
Natalie West | 2023, 2024 | Advisor: C.D. Fuller, MD, PhD
Rebecca Lim | 2023, 2024 | Advisor: K. Brock

Student Awards and Honors

MD ANDERSON UT HEALTH GSBS TRAINEE ENHANCEMENT AWARD
Lucas McCullum | 2023 | Advisor: C.D. Fuller, PhD
Kevin Liu | 2023 | Advisor: E. Schueler, PhD

MD ANDERSON UT HEALTH GSBS VIRTUAL CONFERENCE AWARD
Aashish Gupta | 2021| Advisor: K. Brock, PhD
Benjamin Insley | 2021| Advisor: M. Salepour, PhD

NATIONAL SCIENCE FOUNDATION (NSF) LIFE SCIENCE I-CORPS REGIONAL PROGRAM AWARD
Collin Harlan | 2019 | Advisor: J. Bankson, PhD

PHYSICS IN MEDICINE AND BIOLOGY, OUTSTANDING REVIEWER
Joseph DeCunha | 2022, 2023 | Advisor: R. Mohan, PhD

RADIATION RESEARCH SOCIETY SCHOLAR-IN-TRAINING TRAVEL AWARD
Kevin Liu | 2022, 2024 | Advisor: E. Schueler, PhD

RAY MEYN SCHOLARSHIP
Kevin Liu | 2021 | Advisor: E. Schueler, PhD

HENRY W. STROBEL, PHD ENDOWED SCHOLARSHIP

SOUTHWEST AAPM EARLY CAREER INVESTIGATOR BEST ORAL PRESENTATION AWARD
Fre'Etta Brooks | 2023 | Advisor: S. Kry, PhD

SOUTHWEST AAPM EARLY CAREER INVESTIGATOR BEST POSTER AWARD
Aashish Gupta | 2024 (1st place) | Advisor: K. Brock, PhD
Aashish Gupta | 2020 (1st place) | Advisor: R. Howell PhD
Xinru Chen | 2023 | Advisor: J. Yang, PhD
Skylar Gay | 2023| Advisor: L. Court, PhD
Aashish Gupta | 2024 (1st place) | Advisor: K. Brock, PhD
Zaphanlene Kaffey | 2024 (2nd place) | Advisor: D. Fuller PhD

SOUTHWEST AAPM MEDPHYS SLAM
Zaphanlene Kaffey | 2024 (1st place) | Advisor: D. Fuller PhD

WINTER INSTITUTE OF MEDICAL PHYSICS EARLY C REER SCHOLARSHIP AWARD
Rebecca Lim | 2023, 2024 | Advisor: K. Brock

Congratulations to our students and their advisors on their outstanding performance in securing funding and receiving awards in recognition of their research!

2024 Fulbright Award Recipient Henry Meyer

Fulbright Germany's study and research program facilitates research and studies for two academic semesters at a German university or relevant non-university institution.

During the Fulbright award period I will be working on an investigation of how radiation therapy can be used to stimulate the immune system to attack and eliminate cancer throughout the body. It has been documented since as early as the 1960s that, on rare occasion, radiation therapy to a single tumor on a patient with multiple tumors can result in the elimination of cancer throughout the body. Our current understanding is that this effect is due to an immune response that is stimulated by the radiation therapy. However, we do not fully understand the conditions necessary to elicit this response in a consistent manner, so this project seeks to characterize the differences in immune responses across different types of radiation.

As there are no operational radiation therapy centers in the US capable of treating with ions heavier than protons, we will be collaborating with the DKFZ and the Heidelberg Ion Therapy center (HIT) to characterize immune responses across the entire spectrum of clinically relevant particle therapies.

I would like to give special thanks to Dr. Radhe Mohan, Dr. Albert Koong, and all the members of their respective labs for the immense support they have provided to be able to make this project a reality. This project and the Fulbright scholarship are immense privileges that I have been afforded because of their continued support, and for that I am incredibly grateful. More details in the GSBS News Story.

Henry Meyer

Aaron M. Blanchard Research Award

The Aaron Blanchard Research Award was established as a memorial to Aaron Blanchard, a graduate student in the Medical Physics Program, who succumbed to cancer before earning his degree.

The award was created by Blanchard's family and is sustained by their generosity and by other donations to the GSBS. It recognizes a medical physics graduate (SMS or PhD) for completion of an outstanding thesis or dissertation that is judged to make a significant contribution to cancer therapy or diagnosis. The recipient of the award is selected by a subcommittee reporting to the Medical Physics Graduate Program's Steering Committee. The award consists of a certificate and monetary award. Additionally, the graduate's name is engraved on the Aaron Blanchard Research Award in Medical Physics plaque that is displayed in the classroom.

2002 - 2022 Award Recipients

2022 David B. Flint
2021 Travis Salzillo, PhD
2020 Drew Mitchell, PhD
2019 Megan Jacobsen, PhD
2018 Xenia Fave, PhD
2017 Justin Mikell, PhD
2016 Daniel Robertson, PhD
2015 John Eley, PhD
2015 Luke Hunter, SMS
2014 Christopher Peeler, PhD
2013 Kevin Casey, SMS
2012 Richard Castillo, PhD
2011 Brian Taylor, PhD
2010 Malcolm Heard, PhD
2009 Jonas Fontenot, PhD
2008 Stephen Kry, PhD
2007 Jennifer O'Daniel, PhD
2006 Jason Shoales, SMS
2005 Kent Gifford, PhD
2004 Stephen Kry, SMS
2003 Jennifer O'Daniel, SMS
2002 R. Jason Stafford, PhD

2023 Recipient Tianzhe Li, PhD

Dr. Li received this award in recognition of his PhD Dissertation research

"Interrogations of the Tumor Microenvironment using Magnetic Resonance Imaging"

Advisory committee Members:
Marty Pagel, PhD
Jingfei Ma, PhD
Jason Stafford, PhD
Ken-Pin Hwang, PhD
Steven Millward, PhD

Dr. Li explored multiple MRI-based methods for studying acidosis and hypoxia in the tumor microenvironment, using the proton exchange reaction as a sensitive, non-invasive pH probe. His research was built on a rigorous theoretical framework, supported by extensive high-quality experimental work, and the cherry on top was a machine learning algorithm trained to predict the pH of iopamidol, a common contrast agent used in clinical radiology modified for CEST MRI experiments.

Dr. Li improved the Bloch fitting method for analysis of acidoCEST MRI, demonstrating increasing the number of fixed fitting parameter values obtained through additional parametric MR imaging did not improve the accuracy or precision of pH determination but did decrease computation time. He also demonstrated the applicability of his methods to -in vivo data in a mouse model. Finally, he used pulsed electron paramagnetic resonance imaging (EPRI) oximetry and the OX071 trityl compound to explore the partial pressure of oxygen (pO2) as a biomarker for evaluating early responses of tumors to radiotherapy. He found that while neither pO2 while breathing medical air nor pO2 while breathing 100% O2 were suitable biomarkers, the change in pO2 (ΔpO2) when switching from medical air to 100% O2 was a consistent and significant biomarker for response to radiotherapy.

Dr. Li's bench work and data analysis represent an original and significant contribution to our knowledge of MRI for precisely and accurately quantifying acidosis and hypoxia in the tumor microenvironment. It is clear from his work that Dr. Li understands these methods deeply, and he was able to critically evaluate and justify the methods he used to develop his cohesive conceptual and theoretical framework throughout his dissertation. His work has been cited in key journals in the field, evidence of the contribution of his work to the fields of magnetic resonance imaging, radiation biology, and medical physics.

Meet the Incoming Class of 2024

Admissions By the Numbers

121 Applications Received	**91** PhD	**30** SMS
13 Interviews Conducted	**12** PhD	**1** SMS
9 Offers Extended	**9** PhD	**0** SMS
6 Matriculating Fall 2023	**6** PhD	**0** SMS

PhD Students Matriculating in 2024

Diya Choudhary, BS
Physics
Univ. of Florida

Ziyu (Ben) Fu, BS
Interdisciplinary Eng.
Minor in Physics Equiv.
Univ. of Tsukuba Japan

Ashley Harrington, BS
Physics
Univ. Northern Iowa

No photo on file

Moghadaseh Khaleghibizaki , BS, MS
Medical Physics MS)
Iran Univ. Medical Sciences
Physics (BS)
Univ. of Mazandaran

Alexandra Leone, BS, MS
Biomedical Sciences (MS)
Nova Southeastern University
Physics (BS)
Univ. Alabama

Anna Marks, BS
Mathematics
Physics and Chemistry Minors
Wake Forest Univ.

This year, we had limited funding to extend offers to SMS students. We are working toward further building the Shalek fund this year with the aim of funding SMS students in 2025.

Please consider making a donation (donation details on page 49).

Meet the New Certificate Students

The certificate program is an important component of our graduate program and serves as an alternative pathway into the field of medical physics.

Requirements for admission to this program are a PhD either in physics or in a related discipline plus at least a minor in physics. Additionally, we require medical physics research experience at MD Anderson or UTHealth. Most of our certificate students are current or former post-doctoral fellows working with Medical Physics Program faculty.

This year we had four qualified applicants, three began the program in the Spring 2024 semester and another will join us this fall.

Certificate Students Matriculating in 2024

Elliot Abbott, PhD
PhD in Oncology from Univ. of Oxford
MS in Radiation Biology from Univ. of Oxford
BS in Physics at Univ. Florida

Mojtaba Hoseini-Ghahfarokhi, PhD
PhD in Medical Physics from Ahvaz Univ. of Medical Sciences
MSc in Medical Physics from Isfahan Univ. of Medical Sciences,
BSc in Physics Shahrekord Univ.

María José Peláez Soní, PhD
PhD in Applied Physics at Rice University
BS in Engineering Physics from Instituto Tecnológico y de Estudios Superiores de Monterrey (TEC de Monterrey)

Sogand Sadeghi, PhD
PhD in Physics from Mazandaran Univ.
MSc in Particle Physics from Central Tehran Branch of Azad Univ.
BSc in Physics from Hakim Sabzevari Univ.

Academic Year 2024 Graduates

Graduate	Dissertation Title	Advisor	Post-Grad. Position
Fall 2023 Graduates			
Paige Taylor, PhD	Development of a Remote Dosimetric Audit Framework for Carbon Therapy	Stephen F. Kry, PhD	Assistant Professor (previously, a Senior Medical Physicist) MD Anderson Cancer Ctr.
Spring 2024 Graduates			
Daniel El Basha, SMS	Evaluation of an End-to-End Radiotherapy Treatment Planning Pipeline for Prostate Cancer	Laurence court, PhD	Research Assistant MD Anderson Cancer Ctr.
Rachel Glenn, SMS (w/prior PhD in Physics)	Quantum Computing Based Image Segmentation for Treatment Planning Applications	David Fuentes, PhD	Industry
Benjamin Insley, PhD	Proof-of-Concept for Converging Beam Small Animal Irradiator	Mohammad Salepour, PhD David Jaffray, PhD	Applied Research Scientist at Empyrean Medical Systems
Brandon Reber, PhD	Methods for the Prediction of Osteoradionecrosis Resulting from Head and Neck Cancer Radiation Therapy	Kristy K. Brock, PhD	Therapy Residency The Mayo Clinic Rochester
Spring 2024 Graduates			
Fre'Etta Brooks, PhD	The Consistency of Advanced Radiation Therapy QA Methods and Global Auditing Systems	Stephen F. Kry, PhD	Therapy Residency MD Anderson Cancer Ctr.
Hunter Mehrens, PhD	Influential Factors and Predicting Dose Delivery Accuracy for the Imaging and Radiation Oncology Core's Phantom Program Using Machine Learning	Stephen F. Kry, PhD	Therapy Residency MD Anderson Cancer Ctr.

We look forward seeing our list of future alumni continue to grow!

Full dissertations and thesis are available online (unless under embargo):
https://digitalcommons.library.tmc.edu/utgsbs_dissertations/

2024 Commencement

Medical Physics Graduates that participated in the 2024 commencement ceremony (left to right): Saleh Ramezani, PhD (Summer 2023 graduate), Paige Taylor, SMS, PhD, DABR (Fall 2023 graduate), Shannon Hartzell, PhD (Summer 2023 graduate), Brandon Reber, PhD (Spring 2024 graduate) and Rachel Glenn SMS, PhD (Spring 2024 graduate - not pictured here).

Brandon Reber, PhD

2024 COMMENCEMENT

Saleh Ramezani, PhD

2024 COMMENCEMENT

Paige Taylor, SMS, PhD, DABR

2024 COMMENCEMENT

Shannon Hartzell, PhD

2024 COMMENCEMENT

Rachel Glenn, SMS, PhD

2024 COMMENCEMENT

Thesis Abstract

Rachel Glenn, SMS, PhD

Quantum Computing Based Image Segmentation for Treatment Planning Applications

The exponential advancement of quantum computing has led to its increasing integration into medical radiology. Quantum-inspired algorithms have helped accelerate magnetic resonance fingerprinting for possible applications in clinic settings. Numerous global initiatives are currently integrating quantum computing into medical radiology and health care applications. Given the potential of quantum computing to enhance clinical care and medical research, we have developed this primer to introduce medical physicists to the realm of quantum computing. In this primer, we explore the application of currently available quantum computing-based auto-contouring methods to image segmentation. These implementations serve as prototypes of existing quantum algorithms tailored for specific quantum hardware, specifically focusing on the auto-contouring of medical imaging. We evaluated these algorithms using a small MRI abdominal dataset comprising 102 patient scans. Our findings suggest that quantum computing for auto-contouring is still in its infancy, with artificial intelligence-based algorithms remaining the preferred choice for auto-contouring in treatment planning.

Advisory Committee:

David Fuentes, PhD
Jim Bankson, PhD
Tucker Netherton, PhD
Jason Stafford, PhD
Richard Wendt, PhD

Dr. Glenn holds a PhD in Physics and had a successful career in that field before joining the MDAUTH Medical Physics Program as a SMS student. She is presently working in industry and plans to apply for residency in the coming year.

Thesis Abstract

Daniel El Basha

Evaluation of an End-to-End Radiotherapy Treatment Planning Pipeline for Prostate Cancer

Radiation treatment planning is a crucial and time intensive process in radiation therapy. This planning involves the careful design of a treatment regimen tailored to a patient's specific condition which includes type, location, and size of the tumor with reference to surrounding healthy tissues. For prostate cancer, this tumor may be either local, locally advanced with extracapsular involvement or extent into the pelvic lymph node chain. Automation of essential parts of this process would not only allow for rapid development of effective treatment plans but the framework to allow for better plan optimization to enhance tumor control for better outcomes.
The first objective for this work's goal of automation of the treatment planning process was automatic segmentation of key structures. Delineation of both target and normal tissue structures was important as it sets the foundation for identifying where radiation must be delivered and what was be spared from excess radiation.

To accomplish this objective, deep learning segmentation models were developed from retrospective CT simulation imaging data and clinical contours to delineate both intact, postoperative, and nodal treatment structures for prostate cancer. Quality contours were extracted in accordance to established contouring guidelines in literature. Model refinement on a holdout fine tune dataset was used to verify model contours before quantitative and qualitative evaluation on holdout test set. Predicted contours resulted in contours comparable in quantitative Dice-Similarity-Coefficient (DSC) and 95% Hausdorff Distance (HD95) to proposed models in literature and clinically usable contours with no more than minor edits upon physician review.
The second objective is the automation of Volumetric modulated arc therapy (VMAT) planning for a breadth of prostate treatment scenarios. Development of VMAT plans for both intact, postoperative, and nodal involvement treatment cases necessary for both the sequence in daily treatment delivery but also the prospective distribution of radiation dose to target and normal tissues.

To accomplish this objective, knowledge-based planning models were separately developed to estimate patient specific DVH's to guide plan optimization for delivery of radiation. These two models were then used in this work for end-to-end testing of cases with and without lymph node involvement which includes if the prostate target is intact or postoperative with or without the presence of treatment devices such as hydrogel spacers and rectal balloons. A sequence of iterative optimization runs was created to ensure hotspot reduction and target conformality.
The findings demonstrated that plans developed from automatically generated contours were clinically usable with minor edits for intact and postoperative treatments without lymph node involvement. For treatments with lymph node involvement, dose constraints were met for a select set of cases without excessive rectum curvature or excessive bladder descension into the postoperative treatment bed. When comparing auto-segmented to clinical contours, clinical contours experienced similar pass rates as those achieved by auto-segmented contours.

Advisory Committee:
Laurence Court, PhD
Carlos E. Cardenas, PhD
Julianne M. Pollard-Larkin, PhD
Steven J. Frank, MD
David T. Fuentes, PhD
Falk Poenisch, PhD
Henry Yu, PhD

Mr. El Basha is currently working at University of Texas MD Anderson Cancer Center in the Court lab as a Research Assistant and will be applying the medical physics residency programs in the coming year.

Dissertation Abstract

Fre'Etta Brooks, PhD

The Consistency of Advanced Radiation Therapy QA Methods and Global Auditing Systems

Auditing systems provide a means to verify the implementation and operation of all equipment and radiation parameters used by an institution providing radiation therapy treatments. The systems are important tools that are used to determine if an institution can accurately deliver radiation therapy that requires complex planning in the form of IMRT or VMAT and credential radiotherapy treatment institutions for specific clinical trial protocols; to assure the quality of treatment to all patients. Auditing techniques vary by region thus resulting in inconsistencies in error detection between systems. Currently a global standard for auditing techniques has not been established and the differences in institutional pass/fail results between global auditing bodies is unknown.

The purpose of this work was to establish a practical framework for creating a set of validated reference plans and a workflow for developing plans that could be used to test and compare the differentiability of various audit methodologies in a manner that has not been previously explored. The workflow is relevant for PSQA systems as they are used for both individual QA and as audit systems for various agencies. This work aims to provide both a procedural foundation for audit methodology and PSQA evaluation in addition to insight into the magnitude of perturbation associated with beam modeling, calibration, and delivery errors that are currently common in clinical practice. Further, a workflow that facilitates agreement amongst the pass/fail results for audit quality assurance centers is proposed.

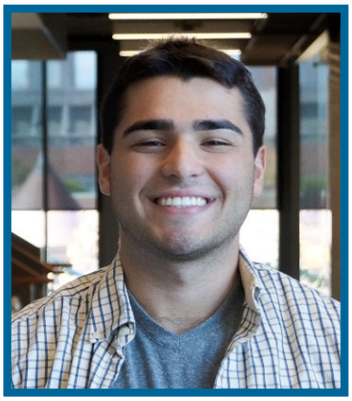
Advisory Committee:

Stephen F. Kry, PhD – Advisory Professor
Rebecca M. Howell, PhD
Julianne M. Pollard-Larkin, PhD
Christopher L. Nelson, PhD
Christine B. Peterson, PhD
Catharine H. Clark, PhD

Dr. Brooks is currently a Medical Physics Resident (therapy) at the University of Washington

Dissertation Abstract

Benjamin Insley, PhD



Proof-of-Concept for
Converging Beam Small Animal Irradiator

The Monte Carlo particle simulator TOPAS, the multiphysics solver COMSOL®, and several analytical radiation transport methods were employed to perform an in-depth proof-of-concept for a high dose rate, high precision converging beam small animal irradiation platform. In the first aim of this work, a novel carbon nanotube-based compact X-ray tube optimized for high output and high directionality was designed and characterized. In the second aim, an optimization algorithm was developed to customize a collimator geometry for this unique Xray source to simultaneously maximize the irradiator's intensity and precision. Then, a full converging beam irradiator apparatus was fit with a multitude of these X-ray tubes in a spherical array and designed to deliver converged dose spots to any location within a small animal model. This aim also included dose leakage calculations for estimation of appropriate external shielding. The result of this research will be the blueprints for a full preclinical radiation platform that pushes the boundaries of dose localization in small animal trials

Advisory Committee:
Mohammad Salehpour, PhD
David Jaffray, PhD
Peter A. Balter, PhD
Khandan Keyomarsi, BA, PhD
Dirk Bartkoski, BS, PhD
Surendra Prajapati, PhD

Pending Patents:

Systems and Methods for Forward Directed X-ray Emission and Biological Systems Irradiation. Bartkoski D, Insley B, Salehpour M, Jaffray D. US Patent Appl. No. 63/434,956, Filing Date: December 23, 2022

Numerical Optimization of collimator Geometry for Photon Irradiation. Insley B, Bartkoski D, Salehpour M, Jaffray D. US Patent Appl. No. 63/568,101; Filing Date: March 21, 2024

Systems and Methods for Differentially Activatable Assemblies. Insley B, Bartkoski D, Salehpour M, Jaffray D. US Patent Appl. No. 63/578,436;

Dr. Insley is currently an Applied Research Scientist at Empyrean Medical Systems.

Dissertation Abstract

Hunter Mehrens, PhD

Influential Factors and Predicting Dose Delivery Accuracy for Imaging and Radiation Oncology Core's Phantom Program Using Machine Learning

IROC's mission is to help ensure consistent and comparable, high-quality radiotherapy across clinics that participate in national clinical trials. To obtain this mission, IROC's phantom program provides a third-party end-to-end check of the clinical workflow of a patient receiving radiotherapy. The goal of the phantom audit is to compare the dose delivered to the dose planned by the treatment system ensuring dose delivery accuracy. While IROC's phantoms are better equipped to catch dose delivery errors compared to a clinic's QA process, the end-to-end process and reporting of results is time-consuming creating a bottleneck for clinical trial participation. Furthermore, IROC's passing criteria must remain loose to allow for sufficient powering of clinical trials in a timely manner and even if a clinic fails the phantom, meaningful and productive feedback is difficult to provide lowering the quality of radiotherapy allow within clinical trials affecting the overall results.

This aims of this work seek to remedy these two issues of IROC's phantom program through machine learning, which, in turn, will improve clinical trials. This will be accomplished by 1) identifying and understanding the important factors that drive phantom failures across multiple treatment modalities through machine learning, and 2) development of a virtual phantom model for predicting dose delivery accuracy. Three of IROC's phantoms: head and neck, stereotactic head, and thoracic, were retrospectively analyzed with random forest algorithm to predict phantom performance metrics that determine dose delivery accuracy. These three phantoms were chosen because they are the majority of those required by clinical trials for participation. For each phantom study, properties of the treatment were collected about the treatment system and calculated from the treatment plan. Furthermore, important factors for random forest algorithm were captured to highlight the underlying differences between passing and failing phantoms. With the head and neck phantom, a virtual phantom model was developed which expanded the metrics calculated from the treatment plan, compared different machine learning algorithms and feature selection schemes, and used interpretability algorithms to further understand the contributing factors between passing and failing a phantom.

This study will provide an avenue to shorten the time clinics can receive results from a phantom audit ensuring faster enrollment for patients to clinical trials and furthermore, feedback will be provided to clinics to raise the quality of their radiotherapy and improve their clinical workflow. Clinical trials will be positively impacted by reducing the overall time to accumulate sufficient power for meaningful results and due to the improvement of quality in radiotherapy, the noise and variation within the clinical trial will be reduced quickening even further the time it takes to complete clinical trials. This work has even further reach by improving current clinical workflows which will inevitably lead to increase patient safety and outcome.

Advisory Committee:
Stephen F. Kry, PhD
Rebecca M. Howell, PhD
David Jaffray, PhD
Julianne Pollard-Larkin, PhD
Christine Peterson, PhD
Laurence Court, PhD

Dr. Mehrens will begin a medical physics residency (therapy) at MD Anderson Cancer Center this fall.

Dissertation Abstract

Brandon Reber, PhD

Methods for the Prediction of Osteoradionecrosis Resulting from Head and Neck Cancer Radiation Therapy

A head and neck cancer (HNC) is the sixth most diagnosed cancer worldwide with over 600,000 patients diagnosed every year. One of the primary methods to treat HNC is through radiation therapy (RT). While RT is effective at treating HNC, late toxicities resulting from treatment can occur months to years post-treatment and can cause debilitating quality of life changes for HNC survivors. One of these late toxicities is osteoradionecrosis (ORN), which is the death of bone due to radiation. For HNC, the mandible is commonly affected and can cause challenges chewing, swallowing, and physical appearance changes. Several factors indicate the pressing need to reduce ORN such as improving HNC survival rates and a lower age of HNC diagnosis due to the increase of HPV-associated cases. One potential method to achieve this goal is by evaluating imaging biomarkers associated with ORN development. With appropriate imaging biomarkers, HNC treatment can be optimized to reduce the prevalence of ORN and allow for earlier ORN detection.

In this dissertation, several imaging biomarkers were evaluated for their potential use in monitoring ORN development. The imaging biomarkers studied were radiation treatment dose, post-treatment dynamic contrast enhanced magnetic resonance imaging (DCE-MRI), and the change in pre- and post-RT DCE-MRI. In the first project, several machine learning and deep learning methods were compared to predict binary ORN status based on treatment dose. This project found that the machine learning algorithms studied performed similarly to each other and outperformed the deep learning algorithms used. The final model test set area under the receiver operating characteristic curve was 0.70. The next project analyzed high radiation therapy dose (> 60 Gy) in the mandible in post-treatment DCE-MRI. The Wilcoxon signed-rank test in this study determined that there was a statistically significance difference in the DCE-MRI quantitative parameter ve between high dose (> 60 Gy) and low dose (≤ 60 Gy) regions of the mandible (W=214, Z=3.85 p=0.00013, n=48). Finally, in the last study, a pipeline was built as part of an ongoing clinical trial to determine the association between the changes in pre- and post-RT DCE-MRI quantitative parameters and ORN development. This pipeline will be used as part of an ongoing clinical trial to determine if there is a statistically significant difference in the mandibular K trans and ve between ORN negative and ORN positive subjects.

This group of studies shows the possibility in using different imaging biomarkers for the early identification of ORN and as a potential tool to aid in ORN intervention. The first project's work can serve as a guide for future studies on the use of machine learning and deep learning for late toxicity prediction. From the second project, the association between posttreatment DCE-MRI and high delivered radiation dose could be used to motivate further studies to understand the relationship between DCE-MRI and dose during treatment. Finally, the results from the final project could inspire future work that analyzes the changes in DCEMRI during radiation treatment and methods to adapt treatment plans to minimize ORN development.

Advisory Committee:
Kristy Brock, PhD
David Fuentes, PhD
Clifton Fuller, MD, PhD
Stephen Lai, MD, PhD
James Long, PhD

Dr. Reber is currently a Medical Physics Resident (therapy) at the Mayo Clinic Rochester.

Dissertation Abstract

Paige Taylor, SMS, PhD

Development of a Remote Dosimetric Audit Framework for Carbon Therapy

Carbon ion therapy is available at over a dozen institutions around the world and is being employed for treatment of cancer. The increased biological effect of carbon compared to conventional photon-based radiotherapy holds promise for the therapeutic benefit in historically radioresistant tumors. While ion chamber dosimetry has been used for day-to-day clinical measurements of absorbed dose, there are few options for remote dosimetry. The availability of such tools would support the development of a robust remote audit program for carbon therapy.

The Imaging and Radiation Oncology Core (IROC) conducts remote audits of photon and proton therapy. These audits are used to ensure comparability and consistency among radiotherapy clinics and are an important peer-review tool to ensure accurate dose delivery. The most common detectors used for these audits are thermoluminescent dosimeters (TLD) and optically-stimulated luminescent dosimeters (OSLD) and GafChromic film.

The aim of this work will be to characterize dosimeters and materials for use in carbon radiotherapy and combine these tools to create an end-to-end anthropomorphic phantom audit. The absorbed dose corrections factors for TLD and OSLD will be characterized in a therapeutic carbon beam, as will a variety of plastics typically used in phantom dose measurements. An anthropomorphic phantom, mimicking pancreatic cancer, will be designed, and field-tested at a clinical carbon facility. A realistic carbon treatment plan will be created for the pancreas phantom and delivered using a therapeutic carbon beam at the Centro Nazionale di Adroterapia Oncologica (CNAO) in Pavia, Italy. The phantom dosimetry will be measured using film and one of the luminescent dosimeters characterized by this project.

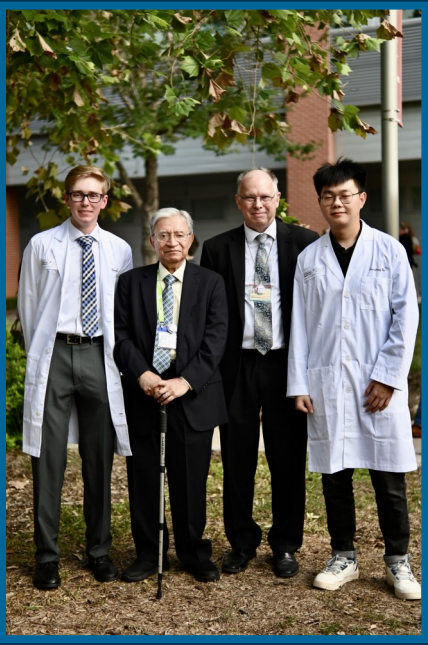
This work will lay the foundation for remote audits of carbon therapy centers. This will be an important step in developing a framework for clinical trial credentialing for carbon therapy randomized trials. These tools will help ensure that carbon therapy treatment around the world is accurate and consistent.

Advisory Committee:
Stephen F. Kry, PhD
Rebecca M. Howell, PhD
Eugene Koay, MD, PhD
Christopher Peeler, PhD
Christine Peterson, PhD
Alfredo Mirandola, MS

Dr. Taylor is an Assistant Professor at the University of Texas MD Anderson Cancer Center (UTMDACC) Imaging and Radiation Oncology Core (IROC) - Houston Radiation Oncology Department. She is also a Full Member of the MDAUTH Medical Physics Program Faculty.

2023 White Coat Ceremony

Second year white coat recipients (left to right): Zaphanlene Kaffey, Zongsheng Hu, Henry Meyer, Taylor Meyers, Rebecca Lim, Natalie West, and Lucas McCullum

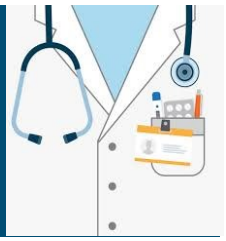


Henry Meyer & Zongsheng Hu with Drs. Mohan and Titt

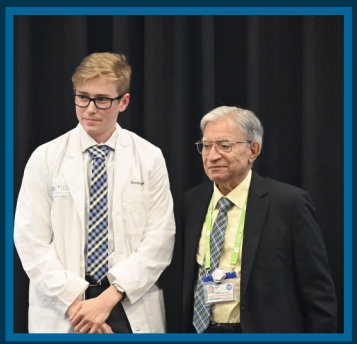
Taylor Meyers with Dr. Howell

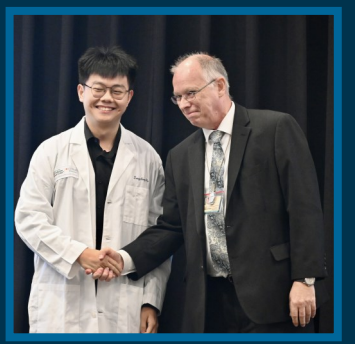
Taylor, Zaphanlene, Natalie, & Rebecca

2023 White Coat Ceremony



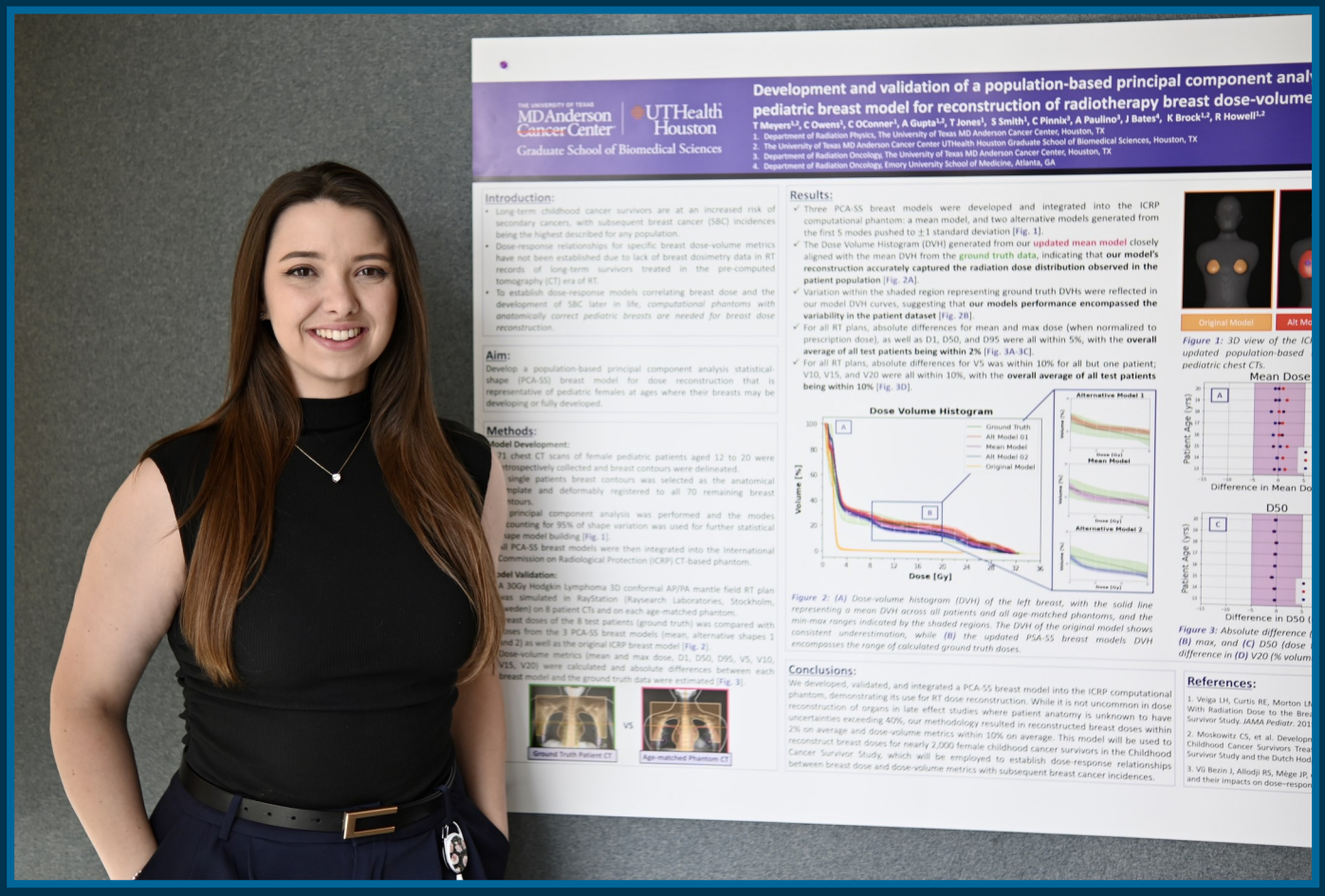
Second year white coat recipients with Drs. Brock and Howell



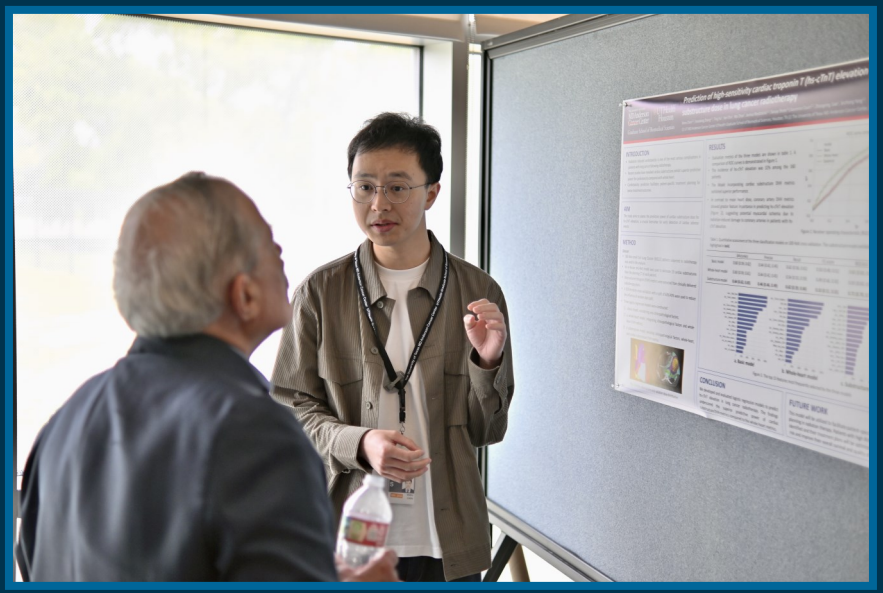


This right of passage signifies the official beginning of the mentor-mentee relationship and publicly reveals the students' mentors and labs.

GSBS Graduate Student Research Day



Poster Competition



GSBS Graduate Student Research Day

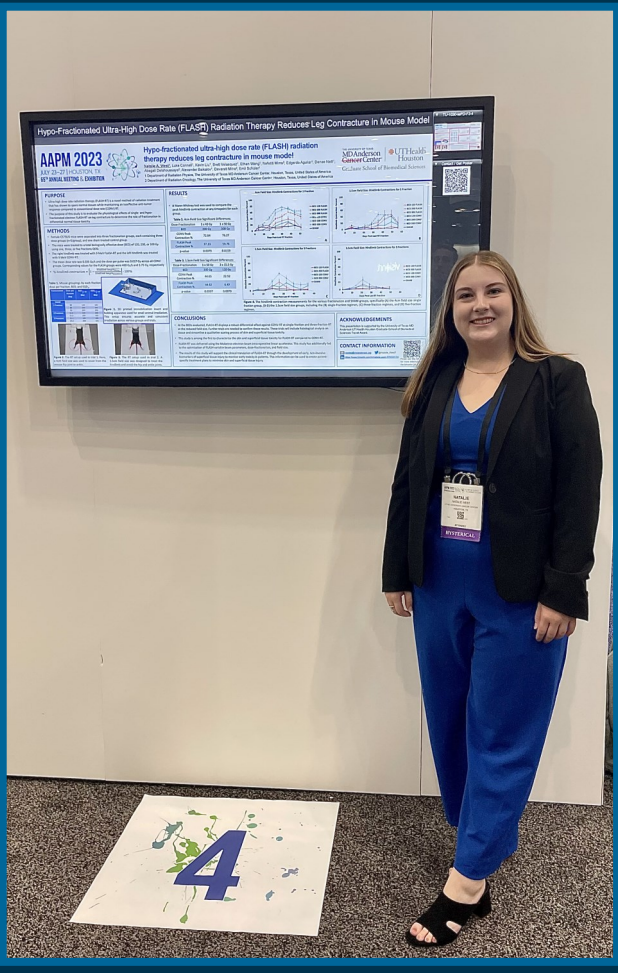
Graduate Student Research Retreat

First, the "science", then....

Graduate Student Research Retreat

… "fun" at the Houston Zoo!

2023 AAPM Annual Meeting



2023 AAPM Annual Meeting

Houston Rodeo 2024

Houston Rodeo 2024

Halloween 2023

Halloween 2024

2023 Holiday Celebrations

Holiday Party at Dr. Howell's Home

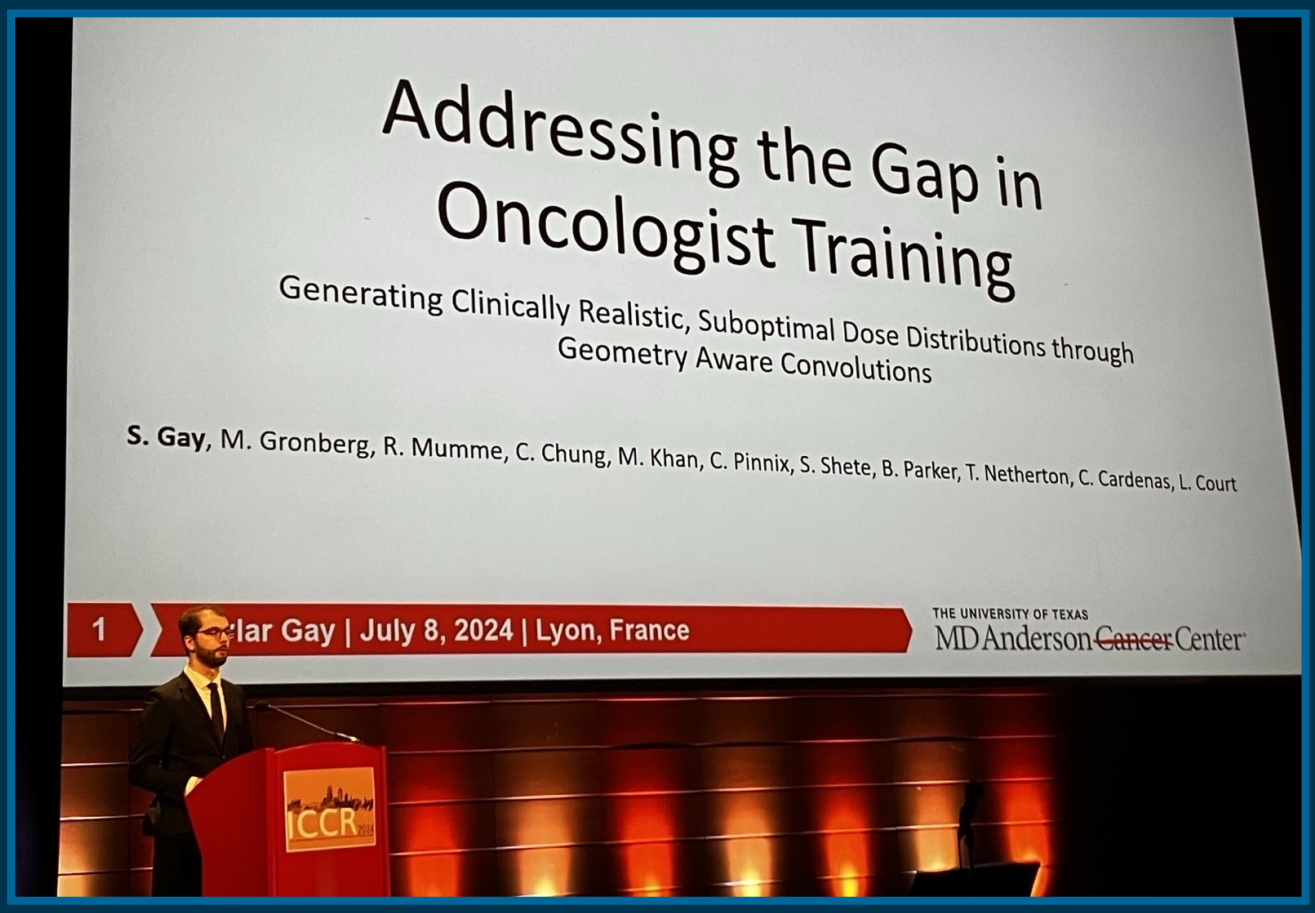
Radiation Oncology Division Holiday Party at Lone Star Flight Museum

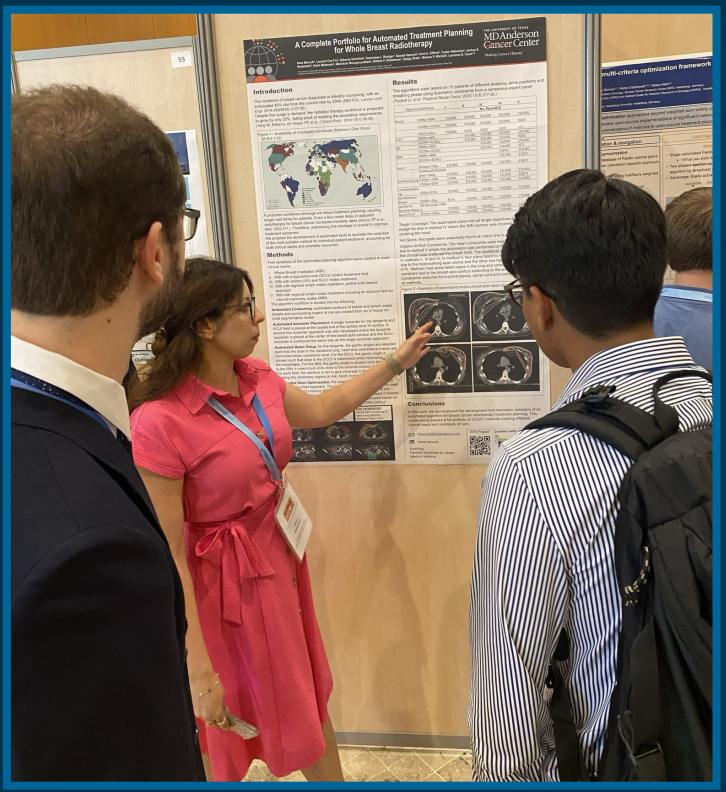
2023 Holiday Celebrations

The Fuller Lab Holiday Party

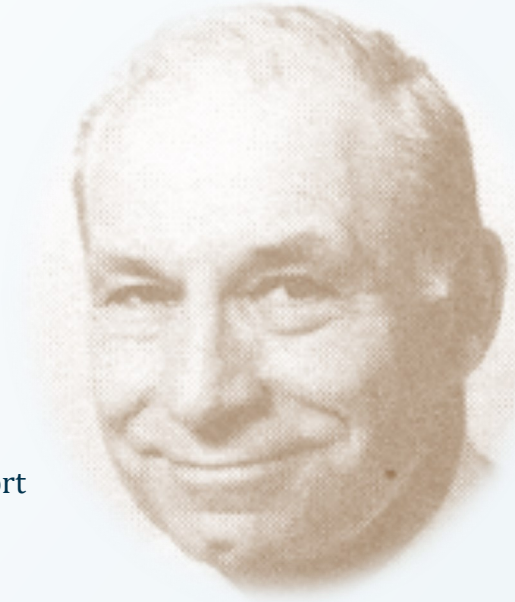
2024 ICCR Annual Meeting

2024 ICCR Annual Meeting





Robert J. Shalek
Fellowship Fund



The Robert J. Shalek Fellowship is used specifically for the support of the Medical Physics Educational Programs. Donations to the fund also support the long-term goal of providing continuous funding for fellowships.

2023
Dianna Carrasco-Rojas
Derek Garcia
Michael Yang

2022
Alen E. Lopez Hernandez

2021
Rachel Glenn

2020
Hayden Scott

2019
Rebecca DiTusa

2017
Shannon Hartzell
Brandon Luckett

2016
Mary Peters Gronberg

2015
Brian Anderson
Laura Bennett
Benjamin Musall

2014
Daniela Branco
Harlee Harrison
Joseph Weygand

2013
Matte McInnis
Olivia Popnoe

2012
Ming Jung Hsieh
Jennifer Sierra Irwin
Dana Lewis
Justin Mikell

2011
Shuaping Ge
Annelise Giebeler
Olivia Huang
Elizabeth McKenzie
James Neihart
Matthew Wait

2010
Jennelle Bergene
Kevin Casey
Jared Ohrt
Kevin Vredevoogd

2009
Sarah Joy
Emily Neubauer
Paige Summers
Jackie Tonigan Faught

2008
Joseph Dick
James Kerns
Kelly Kisling
David Zamora

2007
Triston Dougall
Georgi Georgiev
Ryan G. Lafratta
Malcom Heard
Katie West

2006
Maria Bellon
Jimmy Jones
Nathan Pung
Yevgeney Vinogradskiy

2005
Renee Dickinson
Susannah Lazar
Alanna McDermott
Paige Nitsch

2004
Michael Bligh
Ryan Hecox
Hilary Voss

2003
Blake Cannon
Scott Davidson

2002
Earl Gates
Kenneth Homann
Hilary Voss
Claire Nerbun

2001
Melinda Chi
Gary Fisher
Jackeline Santiago

2000
Michael Beach

1999
Laura Butler
Amanda Davis
Nicholas Koch
Jennifer O' Daniel
Nicholas Zacharopoulos
Matthew Vossler

1998
Shannon Bragg-Sitton
Christopher Cherry
Dee-Ann Radford

1997
Christopher Baird
Aaron Blanchard
Michael Lemacks
Luke McLemore

1996
Michael Bieda
Tamara Duckworth
Gwendolyn Myron

1995
Jonathan Dugan
Teresa Fischer
Russell Tarver

1994
Victor Howard
Usman Qazi
Donna Reeve
Steve Thompson
Matthew Vossler

1993
Kyle Antes
Sarah Danielson
Dena McCowan
Donna Reeve
Matthew Vossler

1992
Peter Balter
Katy Jones

1991
John Bayouth
Robert Praeder
Twyla Willoughby

1990
Maria Graves
John Wallace

1989
Mike Gazda
Scott Jones

Donation Pledge Form

Robert J. Shalek Fellowships in Medical Physics

Name _____ Title _____

Address _____

Email _____

Total Donation/Pledge: (all contributions are fully tax deductible)

☐ $100	☐ $200	☐ $500	☐ $1,000	☐ Other: $_____

☐ Payment Enclosed: $_____ or ☐ Amount Pledged: $_____ by _____

Does your (or your spouse's) institution have a matching gift program?

☐ Yes ☐ No

Would you consider making a legacy donation as part of your estate planning?

☐ Yes ☐ No

If yes, may we contact you to discuss?

☐ Yes ☐ No

TO PLEDGE OR DONATE BY CHECK:

Checks should be payable to: MD Anderson Cancer Center
Mail all donations and pledges:

Shalek Fellowships
Department of Radiation Physics
Attn: Lisa Echeverry, Program Coordinator
1515 Holcombe Blvd., Unit 602
Houston, TX, 77008

TO DONATE ONLINE:

Go to: gifts.mdanderson.org
Fill in online donation form
From the drop-down menu
Check the box ☐ : "I would like to choose where my donation will go."
Choose "**other**" and enter "**Robert J. Shalek Fellowship**" (this annotation is essential to ensuring that your gift is directed as intended)

Please send an Email message or forward a copy of your Email donation receipt to Lisa Echeverry at lecheverry@mdanderson.org to inform us of your gift so that we can promptly thank you.

See you next year!

Follow us on Academic Twitter **@MedPhys_MDAUTH**

We regularly post about #medphys program activities, especially awards and honors!