Volume 9
2015

Medical Physics Alumni Newsletter

Medical Physics Graduate Program

Department Highlights

UTHealth
The University of Texas Health Science Center at Houston
THE UNIVERSITY OF TEXAS MD Anderson Cancer Center
Graduate School of Biomedical Sciences

In Memoriam

Dr. Robert Shalek
1922-2015

FROM THE PROGRAM DIRECTOR
RICHARD E. WENDT, III, PHD, PROFESSOR, DEPARTMENT OF IMAGING PHYSICS

The past year has been a good one for the Graduate Programs in Medical Physics of The University of Texas Graduate School of Biomedical Sciences at Houston. However, it drew to a close with the sad news of the death of Dr. Robert Shalek, whose numerous and profound contributions to the science and practice of medical physics and to the education of generations of medical physicists are memorialized elsewhere in this newsletter.

A year ago our students requested that the curriculum be reviewed and improved, and they made a number of great suggestions. A faculty committee under the leadership of Kyle Jones has been working since then to streamline our courses and to refocus them on the future directions of the field and the profession.

Our incoming class is quite strong, as the statistics elsewhere in this newsletter demonstrate. We had our customary high rate of acceptance of our offers and will have nine PhD students and three SMS students enter the program. Although the pool of applicants to the PhD program was as large as ever, we had fewer well-qualified applicants to the SMS program. This is probably a reflection of the growing competition for residency positions, which is perceived to favor PhD graduates.

We are making progress on the Doctor of Medical Physics Program. It will offer an alternative to the SMS program for students who desire a strongly clinical career by combining didactic education and clinical training. Its academic home will be the School of Health Professions of MD Anderson, although its courses would be cross-listed with the courses in the GSBS Medical Physics Program and jointly taught. We have the approvals of the Deans of the SHP and of the GSBS, and we are currently preparing our application to the Texas Higher Education Co-ordinating Board. We have received a grant from the MD Anderson Cancer Foundation to help with the expenses of starting up the program, such as developing the curriculum for the clinical phase. The DMP program's planned size is three students in each of the four years – two studying Radiation Physics and one studying Imaging Physics.

Alumni recommendations are a significant source of good applicants to our program. Please continue to encourage aspiring medical physicists to pursue our field and to obtain their educations in Houston.

The program is very proud of our students. Five of our students have earned the SMS degree and nine students have earned the PhD degree since our last newsletter. All of those who needed to obtain clinical training positions have done so. This newsletter also lists the numerous student presentations at this year's AAPM meeting and the many awards and honors that have recognized the extraordinary accomplishments of our students.

We are grateful for your generous support of the Shalek Fellowships. Although the funds given to education from short courses and vendor contributions have withered over the years, the loyal support of our alumni and friends has remained strong. In particular, the outpouring of gifts in Dr. Shalek's memory has come at a crucial time for the Fellowships. It has enabled us to continue supporting SMS students and giving short-term bridge funding to PhD students.

The support staff for our educational programs, Betsy Kindred, Tarcy Rosario, and Jordan Roos, are an indispensable factor in our success. They keep us on an even keel and make sure that everything is running smoothly. Lisa Hebert did a masterful job of editing this newsletter. The program is grateful for their work.

As always, I look forward to seeing many of you at the AAPM meeting, which this year is in Anaheim.

Bud Wendt

New Program Faculty & Associates

We are happy to report that the following faculty and program associate members have recently joined our program.

Michalis Aristophanous, PhD
Assistant Professor
Radiation Physics

Erik N. Cressman, PhD, MD
Assistant Professor
Interventional Radiology

Ho-Ling Anthony Liu, PhD
Professor
Imaging Physics

In Memory of Dr. Robert Shalek, by Dr. Geoffrey Ibbott

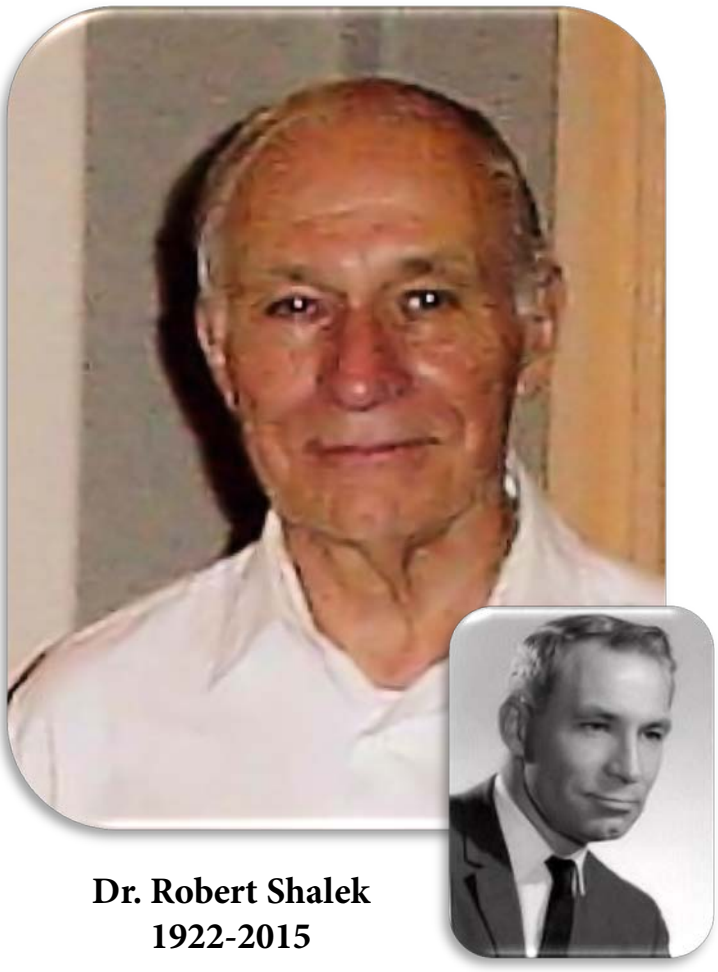
It is with deep personal regret and sadness that I inform you of the passing of Dr. Robert Shalek, 93, who died peacefully on April 20, 2015.

Among his many contributions to Medical Physics, he was:

- Chairman of the Department of Radiation Physics (1960 - 1984)
- First Director of Radiological Physics Center (1968-1985)
- A founding member, President (1966), and Fellow of the AAPM
- Recipient of both the AAPM's William D. Coolidge Award and the Marvin M.D. Williams Professional Achievement Award

Each of us not only grieves at the passing of a tremendous individual, scientist, mentor and friend, but also for the loss his family suffers.

His family has requested that in lieu of flowers and cards, it was his wish that individuals make a donation to the Robert J. Shalek Fellowship General Fund.



Dr. Robert Shalek
1922-2015

Shalek Fellowship Recipients

The Robert J. Shalek Fellowship Fund is used specifically for the support of the medical physics educational programs, and is used in conjunction with other funds to support current fellowships. Donations to this fund also support the long-term goal of providing continuous funding for the fellowships.

2015
- Brian Anderson
- Laura Bennett
- Benjamin Musall

2014
- Daniela Branco
- Harlee Harrison
- Joseph Weygand

2013
- Mattie McInnis
- Olivia Popnoe

2012
- Ming Jung Hsieh
- Jennifer Sierra Irwin
- Dana Lewis
- Justin Mikell

2011
- Shuaiping 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

2007
- Triston Dougall
- Georgi Georgiev
- Ryan Grant Lafratta
- Malcolm 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
- Kelly Kisling
- Jackeline Santiago
- David Zamora

2000
- Michael Beach

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

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
- Kay Jones

1991
- John Bayouth
- Robert Praeder
- Twyla Willoughby

1990
- Maria Graves
- John Wallace

1989
- Mike Gazda
- Scott Jones

From 1987 to 2015, 93 Shalek Fellowships have been awarded. In recent years, an average of two PhD students a year have received short-term bridge funding.

The selection of Shalek Fellows is the responsibility of the Medical Physics Program Steering Committee.

STUDENT HONORS & AWARDS

Daniela Branco
Mentor: David Followill, PhD
- Robert J. Shalek Fellowship

Lawrence Bronk
Mentor: David Grosshans, MD, PhD
- Rosalie B. Hite Fellowship (Renewal), GSBS

Katherine Dextraze
Mentor: Richard Bouchard, PhD
- Julia Jones Matthews Cancer Research Scholar, Cancer Prevention Research Institute of Texas, MD Anderson

Samuel Fahrenholtz
Mentor: Jason Stafford, PhD
- TL-1 Fellowship (Renewal), CCTS, GSBS
- SWAAPM Poster Contest
- Trainee Research Day, Poster Competition Finalist-Translational Research, MD Anderson

David Flint
Mentor: Gabriel Sawakuchi, PhD
- HHMI Med-into-Grad Summer Internship, Rice/MD Anderson

Shuaiping Ge
Mentor: Radhe Mohan, PhD
- Best in Physics Poster Discussion, 57th Annual AAPM Meeting

Rachel Ger
First Year Student
- HHMI Med-into-Grad Summer Internship, Rice/MD Anderson

Harlee Harrison
Mentor: James Bankson, PhD
- Robert J. Shalek Fellowship

Megan Jacobsen
Mentor: Dianna Cody, PhD
- TL-1 Fellowship, CCTS, GSBS

Shane Krafft
Mentor: Mary Martel, PhD
- Rosalie B. Hite Fellowship (Renewal), GSBS

Hannah Lee
Mentor: Geoffrey Ibbott, PhD
- SWAAPM Young Investigator's Symposium, Poster Award
- National Science Foundation, Graduate Research Fellowship Program (3 Years)
- Deans' Excellence Scholarship (4 Year Award)

Tze Lim
Mentor: Rajat Kudchadker, PhD
- Medical Physics Graduate Program Student Research Retreat, Grant Proposals Presentation,1st Runner Up
- SWAAPM Young Investigator's Symposium, 3rd Runner Up

Christopher MacLellan
Mentor: Jason Stafford, PhD
- TL-1 Fellowship (Renewal), CCTS, GSBS
- SWAAPM Young Investigator's Symposium, 2nd Place

Justin Mikell
Mentor: Cheenu Kappadath, PhD
- SWAAPM Spring Meeting, Poster Award
- ERF SNMMI Travel Award
- ERF SNMMI Arthur M. Weis Award in Radiation Dosimetry and Safety
- ERF SNMMI 3rd Place, Poster Competition

Trevor Mitcham
Mentor: Richard Bouchard, PhD
- HHMI Med-into-Grad Summer Internship, Rice/MD Anderson

Joshua Niedzielski
Mentor: Laurence Court, PhD
- Young Investigator's Oral Competition Finalist, 57th AAPM Meeting

***Justin Mikell** is presented with the "Arthur Weis Award in Radiation Dosimetry and Safety" at the SNMMI 2015 annual meeting. The award was presented by Satoshi Minoshima, MD, PhD, Chair of the AAPM Scientific Program Committee.*

STUDENT HONORS & AWARDS, CONTINUED

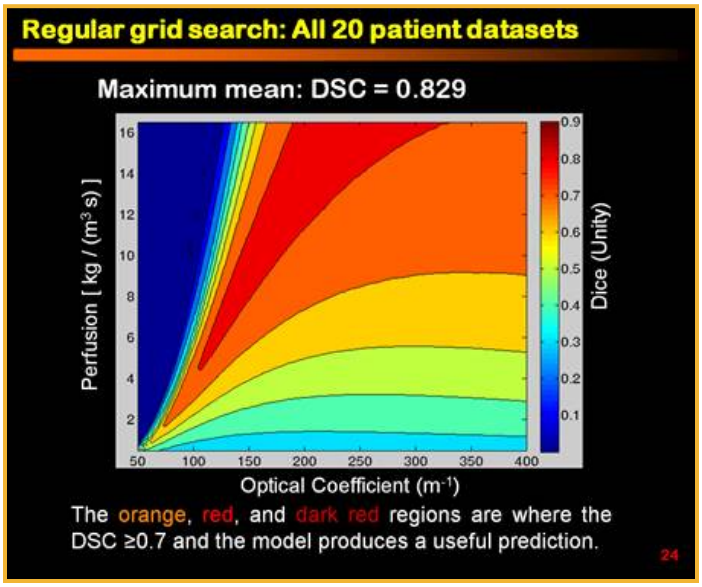
Travis Salzillo
First Year Student
- HHMI Med-into-Grad Summer Internship, Rice/MD Anderson

Christopher Walker
Mentor: James Bankson, PhD
- Julia Jones Matthews Cancer Research Scholar (Renewal), Cancer Prevention Research Institute of Texas, MD Anderson

Joseph Weygand
Mentor: Jihong Wang, PhD
- Helmuth and Mary Fuchs and James R. Waterston Scholarship

GSBS Student Travel Award Recipients

- Fahed Alsanea
- Carlos Cardenas
- Mitchell Carroll
- Katherine Dextraze
- Xenia Fave
- David Flint
- Shuaiping Ge
- Rachel Ger
- Scott Ingram
- Megan Jacobsen
- James Kerns
- Kelly Kisling
- Shane Krafft
- Hannah Lee
- Tze Lim
- Christopher MacLellan
- Rachael Martin
- Rachel McCarroll
- Justin Mikell
- Joshua Niedzielski
- Chris Peeler
- Olivia Popnoe
- Wendy Siman
- Daniel Smith
- Angela Steinmann
- Christopher Walker



From the Work of Samuel Fahrenholtz

In modeling laser ablation, blood perfusion rate and optical parameters are extremely important.

The figure is a retrospective optimization of both parameters in 20 clinical laser ablations in brain.

The orange and red colors indicate pairings of perfusion and optical parameters that provide successful predictions, on average, among the 20 patients.

Xenia Fave presents at the Summer Seminar Series. Throughout the summer, graduate students in the Medical Physics Graduate Program present 15 minute talks on their research, followed by 5-minute Q&A. Three students present each week with lunch provided by the Physics departments. All program faculty and trainees are invited to attend.

The Aaron 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 Aaron's family and is sustained by their generosity and by other donations to the GSBS. It recognizes a Medical Physics graduate (MS or PhD) for completion of an outstanding thesis or dissertation, which is judged to make a significant contribution to cancer therapy or diagnosis. The recipient of the award is selected by a sub-committee reporting to the Medical Physics Graduate Program's Steering Committee. The award consists of a certificate and cash. Additionally, the graduate's name is engraved on the Aaron Blanchard Research Award in Medical Physics plaque that is on display in the classroom, and a book plate is placed on the front page of the graduate's thesis in recognition of the award.

2015 **John G. Eley, PhD** - Scanned Ion Beam Therapy for Thoracic Tumors

2015 **Luke Hunter, MS** - Radiomics of NSCLC: Quantitative CT Image Feature Characterization and Tumor Shrinkage Prediction

2013 **Kevin Casey, MS** - Development and Implementation of a Remote Audit Tool for High Dose Rate (HDR) ^{192} Ir Brachytherapy Using Optical Stimulated Luminescence Dosimetry

2012 **Richard Castillo, PhD** - Evaluation of Deformable Image Registration for Improved 4D CT-Derived Ventilation for Image-Guided Radiotherapy

2011 **Brian Taylor, PhD** - Dynamic Chemical Shift Imaging for Usage-Guided Thermal Therapy

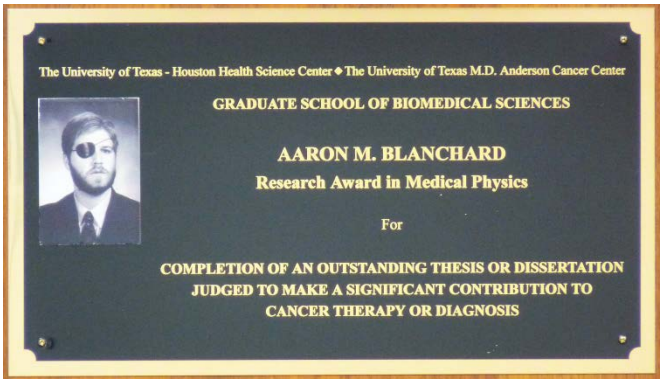
2010 **Malcolm P. Heard, PhD** - Identification and Characterization of an Optimal Three-Dimensional Dosimetry System for Remote Auditing by the RPC

2009 **Jonas D. Fontenot, PhD** - Proton Therapy versus Intensity Modulated X-ray Therapy in the Treatment of Prostate Cancer: Estimating Secondary Cancer Risks

2008 **Stephen F. Kry, PhD** - The Development and Validation of a Monte Carlo Model for Calculating the Out-of-Field Dose from Radiotherapy Treatments

2007 **Jennifer C. O'Daniel, PhD** - Image-Guided Adaptive Radiotherapy for Prostate and Head-and-Neck Cancers

2006 **Jason Shoales, MS** - Development of an Independent Audit Device for Remote Verification of 4D Radiotherapy



2005 **Kent A. Gifford, PhD** - A 3-D CT Assisted Monte Carlo Evaluation of Intracavitary Implants

2004 **Stephen Kry, MS** - Secondary Dose Equivalent from IMRT Treatments

2003 **Jennifer C. O'Daniel, MS** - The Delivery of IMRT with a Single Physical Modulator for Multiple Fields: A Feasibility Study for Prostate and Paranasal Sinus Cancers

2002 **R. Jason Stafford, PhD** - Fast Magnetic Resonance Temperature Imaging for Focused Ultrasound Thermal Therapy

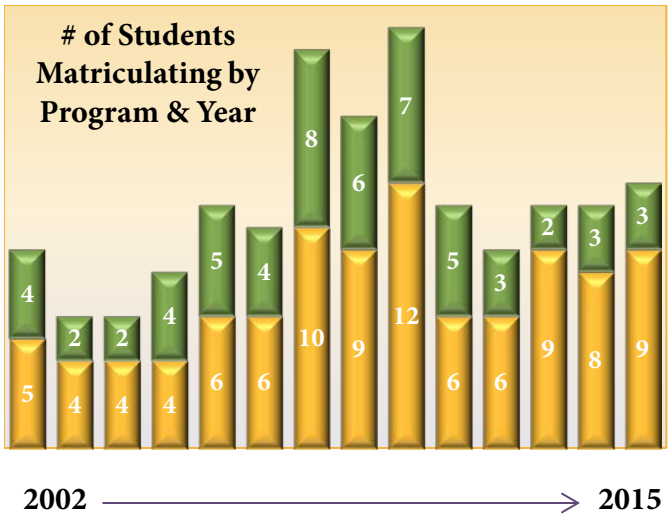
2001 **Brent C. Parker, MS** - Quantification of Uncertainties for PTV Margin Determination in Conformal Stereotactic Radiotherapy of Intracranial Lesions

2000 **Steven P. McCullough, PhD** - A Novel Treatment Planning Methodology for High Dose ^{166}Ho-DOTMP Marrow Ablation Therapy in Patients with Multiple Myeloma

1999 **Teresa A. Fischer, MS** - Retrospective Analysis of Lung Fibrosis following Radiation and Chemotherapy for Lung Cancer

ACADEMIC YEAR 2015-16 ADMISSIONS DATA

Applicant Data	PhD	SMS
Total Number of Applications	63	11
Number of Offers	12	4
Number of Admitted Students	9	3
Average Scores Matriculating Students	**PhD**	**SMS**
Undergraduate GPA	3.54	3.67
Graduate GPA	3.71	-
Verbal GRE	159	161
Quantitative GRE	161	161
Analytical GRE	4.4	4.5
Verbal + Quantitative GRE	320	322



SMS Incoming Class	Undergraduate Institution
Laura Bennett	BS - University of Science and Arts of Oklahoma
Brian Anderson	BS - Georgia Institute of Technology
Benjamin Musall	BS - Georgia Institute of Technology

PhD Incoming Class	Undergraduate / Graduate Institution
Mallory Carson	BS - Texas A&M University
Kristine Ferrone	BS - Carnegie Mellon University MBA - University of Florida MS - United States Sports Academy MS - University of Houston
Donnie Kim	BS- Rice University
Benjamin Lopez	BS - Rice University
Keith Michel	BS - Rice University
Mark Newpower	BS - Embry-Riddle Aeronautical University MS - University of Oklahoma Health Sciences Center
Constance Owens	BS - Houston Baptist University
Saleh Ramezani	BS - Louisiana Tech University MS - Louisiana Tech University
Cayla Wood	BS - Colorado School of Mines MS - Colorado School of Mines

CONGRATULATIONS 2015 GRADUATES!

SMS Program

Mindy Hsieh, MS
Sierra Irwin, MS
Dana Lewis, MS
Mattie McInnis, MS
Olivia Popnoe, MS

PhD Program

Hua (Asher) Ai, PhD
Austin Faught, PhD
Jessie Huang-Vredevoogd, PhD
Jessica Nute, PhD
Daniel Robertson, PhD
Daniel Smith, PhD
Jacqueline Tonigan Faught, PhD
Landon Wootton, PhD
Joshua Yung, PhD

# of Matriculated Students Since 2002

SMS = 58 PhD = 95

Trainees Presenting at AAPM

Sunday, July 12, 2015

Education General Poster Discussion
3:00 PM - 6:00 PM Exhibit Hall

SU-E-E-4 **Chris Peeler,** Assessment of Medical Physics Students and Trainees Interest and Awareness of Non-Clinical Careers

Imaging for Therapy Guidance
1:00 PM - 1:55 PM Ballroom A

SU-C-BRA-3 **Samuel Fahrenholtz, Reza Madankan,** Prediction of Laser Induced Thermal Therapy: Results of Model Training and Cross Validation

Imaging General Poster Discussion
3:00 PM - 6:00 PM Exhibit Hall

SU-E-I-22 **Steven Bache,** A Comprehensive Investigation of Noise Variations Between the GE Discovery CT750 HD and GE LightSpeed VC

Joint Imaging - Therapy General Poster Discussion
3:00 PM - 6:00 PM Exhibit Hall

SU-E-J-135 **Jingqian Wang,** Feasibility of Using Quantitative Cone Beam CT for Proton Adaptive Planning

SU-E-J-203 **Hannah Lee, Ashley Rubinstein,** Investigation of 1.5T Magnetic Field Dose Effects On Organs of Different Density

SU-E-J-210 **Angela Steinmann,** Characterizing Tissue Equivalent Materials for the Development of a Dual MRI-CT Heterogeneous Anthropomorphic Phantom Designed Specifically for MRI Guided Radiotherapy Systems

SU-E-J-214 **Tze Yee Lim,** MR Protocol Development to Visualize Sirius MRI Markers in Prostate Brachytherapy Patients for MR-Based Post-Implant Dosimetry

SU-E-J-220 **Joseph Weygand, Yao Ding,** Assessment of MRI Geometric Distortion in Head and Neck Cancer Patients Scanned in Immobilized Radiation Treatment Position

SU-E-J-242 **Xenia Fave, David Fried,** Volume-Dependence of Quantitative Imaging Features From CT and CE-CT Images of NSCLC

SU-E-J-261 **David Fried, Xenia Fave,** The Importance of Appropriate Image Preprocessing to Augment the Information of Radiomics Image Features

Sunday, July 12, 2015, Continued

Joint Imaging – Therapy SNAP Oral Image Features for Therapy Guidance
2:05 PM - 3:00 PM Ballroom A

SU-D-BRA-5 **Xenia Fave, David Fried,** Toward Understanding the Robustness of Radiomics Features in CT

SU-D-BRA-7 **Xenia Fave, David Fried,** A Phantom Study to Assess the Variability in Radiomics Features Extracted From Cone-Beam CT Images

Professional General Poster Discussion
3:00 PM - 6:00 PM Exhibit Hall

SU-E-P-23 **Landon Wootton, Francois Therriault-Proulx,** What Can the Medical Physics Field Learn From the Open Source Hardware Community?

Proton Therapy Treatment Planning
4:00 PM - 6:00 PM Ballroom D

SU-F-BRD-3 **Jingqian Wang** Evaluation of Head-Neck IMPT Plans Quality Using a Knowledge Based Model

SU-F-BRD-16 **Christopher Peeler, Reza Taleei, Fada Guan, Lawrence Bronk,** Relative Biological Effectiveness of Double-Strand Break Induction for Modeling Cell Survival in Pristine Proton Beams of Different Dose-Averaged Linear Energy Transfers

Mammography, Radiography and Fluoroscopy
2:05 PM - 3:00 PM Room 204

SU-D-204-7 **Guang Li,** Comparison of AAPM TG150 Draft Image Receptor Tests with Vendor Automated QC Tests for Five Mobile DR Units

Nuclear Medicine, SPECT
1:00 PM - 1:55 PM Room 201

SU-C-201-7 **Justin Mikell, Wendy Siman** Validation of a GATE Gamma Camera Model for the Siemens Symbia

Therapy General Poster Discussion
3:00 PM - 6:00 PM Exhibit Hall

SU-E-T-26 **Dana Lewis,** A Dosimetric Comparison of Two Treatment Setups for Lung Stereotactic Body Radiation Therapy (SBRT) Patients

SU-E-T-46 **David Flint,** A Monte Carlo Investigation of Radiation Interactions with Gold Nanoparticles in Water for 6 MV, 85 KeV and 40 KeV Photon Beams

Trainees Presenting at AAPM

Sunday, July 12, 2015, Continued

SU-E-T-105 **Jacqueline Faught,** An FMEA Survey of Intensity Modulated Radiation Therapy (IMRT) Step and Shoot Dose Delivery Failure Modes

SU-E-T-171 **Angela Steinmann,** Characterization of the New Xoft Axxent Electronic Brachytherapy Source Using PRESAGE Dosimeters

SU-E-T-179 **Jacqueline Faught,** Clinical Impact of IMRT Failure Modes at Or Near TG-142 Tolerance Criteria Levels

SU-E-T-516 **Hannah Lee,** Investigation of a Novel Radiochromic Radiation Reporting System Utilizing the Reduction of Ferric Ion

SU-E-T-274 **Mamdooh Alqathami,** Does Atmospheric Oxygen Affect the PRESAGE Dosimeter?

SU-E-T-276 **Kelly Kisling,** Dose Calculation Accuracy with a Standard Beam Model for Extended SSD Treatments

SU-E-T-329 **Jessie Huang-Vredevoogd,** Dosimetric Impact of Implementing Metal Artifact Reduction Methods and Metal Energy Deposition Kernels for Photon Dose Calculations

SU-E-T-359 **Francisco Reynoso,** Emulation of Yb-169 Gamma-Ray Spectrum Using Metal-Filtered 250 KVp X-Rays for Pre-Clinical Studies of Gold Nanoparticle-Aided Radiation Therapy

SU-E-T-486 **Fahed Alsanea, Landon Wootton,** In Vivo Skin Dosimetry Using the Exradin W1 Plastic Scintillation Detector for Passively Scattered Proton Beam Therapy

SU-E-T-557 **Francisco Reynoso,** Monte Carlo Modeling of Philips RT-250 Orthovoltage Unit for Beam Spectrum Modulation

SU-E-T-515 **Mitchell Carroll,** Investigating the Linear Energy Transfer Dependency of Different PRESAGE Formulations in a Proton Beam

SU-E-T-547 **Reza Taleei, Christopher Peeler, Fada Guan,** Modeling Biological Response to Proton Irradiation and Evaluating Its Potential Clinical Consequences

Sunday, July 12, 2015, Continued

SU-E-T-592 **David Flint,** OSL Response of Al_2O_3:C Detectors Exposed to Therapeutic Proton Beams

SU-E-T-641 **Daniel Robertson, Fahed Alsanea,** Proton Range Measurements Using a Geometrically Calibrated Liquid Scintillator Detector

SU-E-T-716 **Yvonne Roed,** Suitability Study of a Unique 3D Dosimeter for Commissioning Radiation Treatment Machines

SU-E-T-792 **James Kerns,** Validation of a Secondary TPS for IROC-H Recalculation of Anthropomorphic Phantoms

Annual Alumni Event
Sunday, 8:30 – 10:00 PM
Location: Anaheim Marriott Marquis North

Monday, July 13, 2015

John R. Cameron Young Investigator Symposium
7:30 AM - 9:30 AM Ballroom A

MO-AB-BRA-1 **Joshua Niedzielski,** A Novel Method to Objectively Quantify Normal Tissue Toxicity in the Esophagus

MO-AB-BRA-4 **Jessica Nute, Megan Jacobsen,** Correct Identification of Low-Attenuation Intracranial Hemorrhage and Calcification Using Dual-Energy Computed Tomography in a Phantom System

MDCT- Reconstruction
4:30 PM - 6:00 PM Room 204

MO-FG-204-4 **Guang Li,** How Iterative Reconstruction Algorithms Affect the NPS of CT Images

Nanoparticle Applications
4:30 PM - 6:00 PM Ballroom

MO-FG-BRA-9 **Christopher MacLellan,** Quantification of Nanoparticle Heating and Concentration for MR-Guided Laser Interstitial Thermal Therapy

Therapy Mash Up: Novel Innovations for Radiotherapy
4:30 PM - 6:00 PM Room 303

MO-FG-303-8 **Jongmin Cho,** PET-Detectable Bimetallic (Zn@Au) Nanoparticles for Radiotherapy and Molecular Imaging Applications

Trainees Presenting at AAPM

Tuesday, July 14, 2015

Imaging for RT Treatment Planning
5:30 PM - 6:00 PM Exhibit Hall

TU-F-CAMPUS-J-3 **Rachael Martin,** Evaluation of a New GE Device-Less Cine 4D-CT

Proton Therapy Planning and Bioeffects
1:45 PM - 3:45 PM Room 304

TU-EF-304-1 **Shuaiping Ge,** Best in Physics (Therapy): Plan Robustness and Optimality Improvement with 4-Dimensional Robust Optimization for Lung Cancer Patients

MDCT-Novel Imaging Systems and Image Quality
1:45 PM - 3:45 PM Room 204

TU-EF-204-6 **Jessica Nute, Megan Jacobsen,** Waveform Measurements On a Fast-kV Switching CT System

MRI
5:30 PM - 6:00 PM Exhibit Hall

TU-F-CAMPUS-I-1 **Yao Ding,** Head and Neck Squamous Cell Carcinoma: Short-Term Repeatability of Apparent Diffusion Coefficient and Intravoxel Incoherent Motion Parameters at 3.0T

Out–of-field Does, Risk Assessment and Shielding
4:30 PM - 5:00 PM Exhibit Hall

TU-F-CAMPUS-T-4 **Carlos Cardenas,** An Evaluation of Out-Of-Field Doses for Electron Beams From Modern Varian and Elekta Linear Accelerators

Science Council Session: Radiomics & Imaging Genomics
10:15 AM - 12:15 PM Ballroom B

TU-CD-BRB-1 **Shane Krafft,** Normal Lung CT Texture Features Improve Predictive Models for Radiation Pneumonitis

Wednesday, July 15, 2015

Devices for Beam Measurement
7:30 AM - 9:30 AM Ballroom B

WE-AB-BRB-6 **Francois Therriault-Proulx,** A Temperature Independent Plastic Scintillation Detector Capable of Simultaneous Dose and Temperature Measurement

Wednesday, July 15, 2015, Continued

Nuclear Medicine, SPECT, PET
7:30 AM - 9:30 AM Room 204

WE-AB-204-1 **Wendy Siman,** Performance Characterization of Regularized-Reconstruction Algorithm for 90Y PET/CT Images

Image Registration and Segmentation
7:30 AM - 9:30 AM Ballroom A

WE-AB-BRA-12 **Scott Ingram,** Virtual Endoscope Tracking for Endoscopy-CT Image Registration

Patient Specific QA
11:00 AM - 12:15 PM Ballroom A

WE-D-BRA-5 **Rachel Ger, Daniel F Craft,** Pseudo In Vivo Patient Dosimetry Using a 3D-Printed Patient-Specific Phantom

Imaging for Particle Therapy
1:45 PM - 3:45 PM Room 303

WE-EF-303-6 **Kai Lou,** Feasibility of PET Image-Based On-Line Proton Beam-Range Verification with Simulated Uniform Phantom and Human Brain Studies

Preclinical Radiobiology Studies and Technology
1:45 PM - 3:45 PM Ballroom A

WE-EF-BRA-5 **Fada Guan, Lawrence Bronk, Reza Taleei, Christopher Peeler,** Experimental Design for High-Throughput In-Vitro RBE Measurements Using Protons, Helium and Carbon Ions

WE-EF-BRA-10 **Daniel Smith,** Prophylactic Cranial Irradiation Reduces the Incidence of Brain Metastasis in a Mouse Model of Metastatic Breast Cancer

Thursday, July 16, 2015

Brachytherapy and Radiopharmaceuticals
7:30 AM - 9:30 AM Ballroom A

TH-AB-BRA-3 **Francois Therriault-Proulx,** Development of a Scintillation Dosimetry System Capable of Real-Time Dosimetry During LDR Brachytherapy Seed Implant

TH-AB-BRA-10 **Justin Mikell,** Clinical Implementation of a Grid-Based Boltzmann Solver with Adaptive Meshing for Nuclear Medicine Dosimetry

Trainees Presenting at AAPM

Thursday, July 16, 2015, Continued
Proton Therapy Delivery, Verification and QA **10:00 AM - 12:00 PM Ballroom A**
TH-CD-BRA-9 Daniel Robertson, Quality Assurance of Scanned Proton Beams with a Volumetric Liquid Scintillator Detector

2014-2015 Student Update

By Scott Ingram

The 2014 Student Research Retreat was held on August 14th, 2014. This was later in the summer than usual, which allowed students matriculating in the fall of 2014 to attend as well. Our guest speaker, Dr. Ross Berbeco of Brigham and Women's Hospital, led an engaging discussion on the theme of the retreat, Emerging Fields in Medical Physics Research.

This year we held three presentation competitions: 15-minute talks on an emerging research field, 5-minute "mini grant proposals" based on our own research, and 1-minute elevator speeches describing our own research. Winners for each competition, determined by evaluations from the students in attendance, are as follows:

Emerging Fields Presentation

1st place: David Fried
2nd place: Xenia Fave
3rd place: Scott Ingram

Mini Grant Proposal

1st place: Daniel Robertson
2nd place: Tze Lim

Elevator Speech

1st place: Sam Fahrenholtz
2nd place: Daniel Robertson

The medical physics student body has continued to help maintain the future of the program by providing the presence and perspective of current students at recruitment events, as well as providing feedback on interviewing students to Dr. Wendt.

In the past year the Student Council and the Student Curriculum Committee have also been active in working with Dr. Kyle Jones and other faculty members to improve the curriculum of our program and maintain its competitiveness.

The medical physics student body has also maintained an active presence in UTHealth intramural sports, fielding teams for the soccer, football, volleyball, and ultimate Frisbee leagues. We have not won a championship yet, but our performance improves every year, and I am happy to report that unlike previous years, we did not have a single major injury on any team! Medical physics students performed very well in the Graduate Student Association Olympics held in March, taking first and second place.

Voting to determine the members of the 2015-2016 Student Council was held at the end of the spring semester. It was also decided by popular vote to eliminate two of the positions on the Student Council, leaving three newly-elected members:

- Mitchell Carroll, Student-Faculty Liaison
- Carlos Cardenas, Education Representative
- Rachel Ger, Social Representative

It has been a very fulfilling experience for me to serve as the Student-Faculty Liaison and I would like to thank my fellow Student Council members for working with me over the past year. I look forward to seeing what next year's officers will accomplish.

I would also like to thank Betsy Kindred and Tarcy Rosario for their constant assistance to the student body, and Dr. Wendt for his mentorship and support of our student-led initiatives.

Sincerely, Scott Ingram

Department of Radiation Physics
www.mdanderson.org/radiation-physics

Department of Imaging Physics
www.mdanderson.org/imaging-physics

Medical Physics Graduate Program
www.mdanderson.org/medical-physics-graduate-program

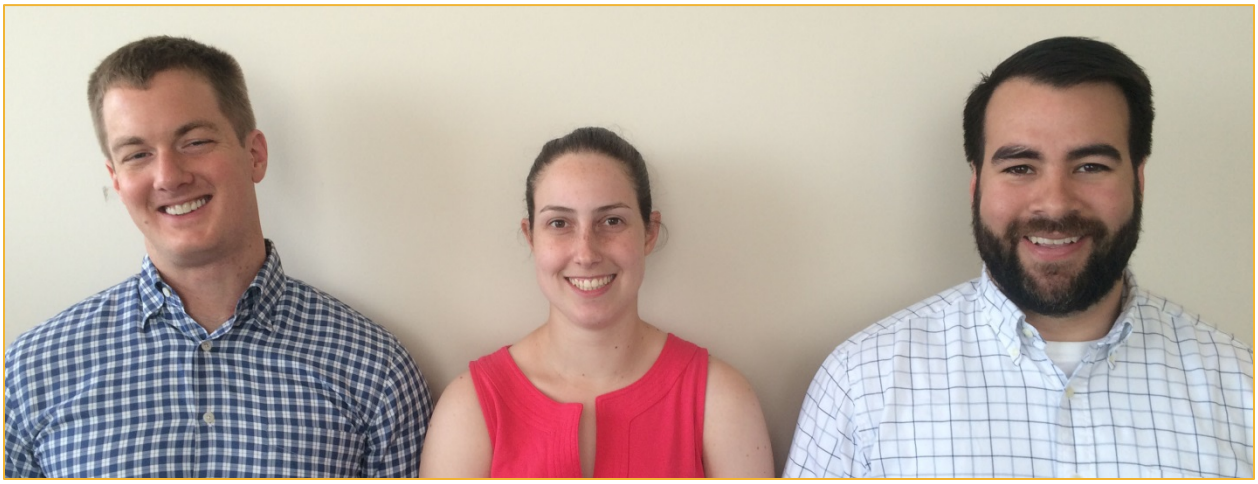
Imaging Physics Residency Program
www.mdanderson.org/imaging-physics-residency-program

THANK YOU OUTGOING 2014-2015 STUDENT COUNCIL!

From left:

- **Sara Loupot:** First-Year Representative
- **Xenia Fave:** Social Representative
- **Scott Ingram:** Student-Faculty Liaison
- **Ashley Rubinstein:** Education Representative
- **Katherine Dextraze:** Assistant Student-Faculty Liaison

WELCOME INCOMING 2015-2016 STUDENT COUNCIL!



From left:

- **Mitchell Carroll:** Student-Faculty Liaison
- **Rachel Ger:** Social Representative
- **Carlos Cardenas:** Education Representative

Annual Alumni Event

Date: Sunday, July 12, 2015
Time: 8:30 – 10:00 PM
Location: Anaheim Marriott Hotel, Marquis North

Department of Imaging Physics Highlights

Faculty Honors, Awards & Recognition

Richard Bouchard, PhD & Emelianov Stanislav, PhD
Journal Cover Art: Dana N, Di Biase L, Natale A, Emelianov SY, Bouchard RR. In-vitro Photoacoustic Visualization of Myocardial Ablation Lesions, *Heart Rhythm*, 11(1): 150-157, 2014. Jan. 2014

Cheenu Kappadath, PhD
- Arthur Weis Award in Radiation Dosimetry and Safety. Society of Nuclear Medicine and Molecular Imaging (SNMMI), 2015

Jingfei Ma, PhD
- New Patent: Methods of Efficient and Improved Phase-Sensitive MRI. US patent application number 12/668,872
- Elevated to the grade of Senior Member, Institute of Electrical and Electronic Engineers (IEEE)
- Received GSBS Commendation for "service to graduate education in both the magnitude and quality of contributions"

Konstanin Sokolov, PhD
- Appointed Fellow Optical Society of America (OSA)

Osama Mawlawi, PhD
- Elected AAPM Chair-Elect: Awards Selection Sub-Committee
- Elected AAPM Vice-Chair: Middle East Affairs Subcommittee
- Elected AAPM Chair: Chair Task Group No. 126 PET/CT Acceptance Testing and Quality Assurance

Faculty & Staff - Hired & Promotions

Lan Chen: Research Assistant II
Brandan Darensbourg, MBA/HCM: *Promoted,* Supervisor Physics Technologist
Tameka Fraser: Administrative Assistant
Mitchell Hawkins: Sr. Machinist and Fab Tech
Baohuong Hoang, MBA: Research Program Director
Thaddeus Howard: Physics Technologist
Mu-Lan Jen: Research Assistant I
Kyle Jones, PhD: *Promoted*, Associate Professor
Ho-Ling Anthony Liu, PhD: Professor
Xinming Liu, PhD: *Promoted*, Associate Professor
Jacqueline Nguyen: Sr. Secretary
Abraham Padua: CW Collaborator – Patient Access
Frances Quintana: *Promoted*, Program Coordinator
Ashley Reyes: Administrative Assistant
Jordan Roos: *Promoted*, Sr. Secretary
Tarcy Rosario: Sr. Administrative Assistant
Hao Song, PhD: Instructor
Wolfgang Stefan: *Promoted*, Sr. Research Programmer
Vivien Tran: Imaging Research Tech
Joshua Yung, PhD: Instructor

Featuring Outstanding Science

Jingfei Ma, PhD:
Two Facilities, One Goal - Direct Investigator Access to MR Image Reconstruction Environment Opens New Research Doors

Konstanin Sokolov, PhD & Emelianov Stanislav, PhD:
Imaging Technique Identifies Early Metastasis in Lymph Nodes - Highly Sensitive Ultrasound-Guided Technique Could Eliminate Need for Lymph Node Biopsies

NEWLY FUNDED GRANTS IN IMAGING PHYSICS

Medtronic, **(PI: David Fuentes)** 4/10/2015 - 10/9/2017, total cost $130,000, Patient-Specific Treatment Planning System for MR-Guided Thermal Therapy in Brain

MDACC/GE Healthcare **(PI: Kyle Jones)** 5/1/2014 - 6/30/2015, total cost $102,353, Feasibility of Using Dual Energy CT (DECT) for Measuring Contrast Enhancement in Single Phase CT Exams

MDACC/GE Healthcare **(PI: Cheenu Kappadath)** 9/1/2015 - 8/31/2017, total cost $178,602, PET/MR Hepatic Imaging of 90-Y Microsphere Radioembolization

Siemens, **(PI: Jingfei Ma)** 5/28/2014 - 5/27/2017, total cost $166,666, Siemens MDA Research Collaboration

RITA Foundation, **(PI: Osama Mawlawi)** 1/22/2015 - 1/21/2017, total cost $100,429, Dosimetry for Lu-177 DOTATE for Peptide Receptor Radionuclide Therapy (PRRT) for Progressive Metastatic Neuroendocrine Cancer

NIH, **(PI: Yiping Shao)** 9/12/2014 - 8/30/2016, total cost $382,800, Road to PET Image-Based On-line Proton Beam Range Measurement

NIH, **(PI: Konstantin Sokolov)** 4/1/2015 - 3/31/2016, total cost $ 501,855, iThera Medical Multispectral Optoacoustic Tomography System for Full Body Molecular and Functional Small Animal Imaging

MDACC/IRG (**PI: Konstantin Sokolov**) 9/1/2015 – 8/31/2016, total cost $75,000, Internal Multimodal Nanoparticles for Adoptive Immunotherapy Monitoring

IMAGING PHYSICS RESIDENCY PROGRAM

The CAMPEP-accredited Imaging Physics Residency Program has trained a total of 22 clinical medical physicists, 21 of whom have achieved national board certification.

Current Residents

Steven Bache, MS from Duke University joined the program in August 2014 and has completed his 1st year of training.

R. Benton Pahlka, PhD (our first Medical Physics Fellow) from The University of Texas at Austin came here from the Fermi National Accelerator Laboratory and began a hybrid research and clinical training program with us in March 2014; he has completed his 1st year of clinical training.

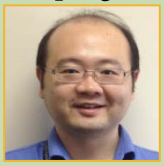
Charles E. Willis, PhD
Associate Professor &
Program Director
Imaging Physics
Residency Program

Future Residents

- Diana Carver, MS from Vanderbilt University will begin the program in late July.
- Hua "Asher" Ai, PhD from The University of Texas Graduate School of Biomedical Sciences at Houston will begin the program in late July.
- We are in the process of recruiting one resident to enter the program in 2016.

Recent Resident Graduates

- Guang Li, PhD will complete the program in July 2015.



Resident Alumni

Congratulations to our resident alumni who completed their ABR certification in Diagnostic Medical Physics this year: Cristina Dodge, MS, Ching-Yi Hsieh, MS, Leland Page, PhD.

Department of Radiation Physics Highlights

Honors, Awards & Recognition

Sam Beddar, PhD
- Highest commendation for service to graduate education, The University of Texas GSBS at Houston

Rebecca Howell, PhD
- Recognized as a Fellow of the American Association of Physicists

Radhe Mohan, PhD
- Invited to be a member of Germany's Scientific Advisory Board of their National Center for Tumor Diseases

Completed ABR Board Certification
- Paola Alvarez, MS
- Kevin Casey, MS
- Dennis Mackin, PhD
- Peter Park, PhD
- Paige Taylor, MS
- Jinzhong Yang, PhD

Faculty & Staff – Newly Hired

Faculty
- Eun Young Han, PhD – Assistant Professor
- Jinzhong Yang, PhD – Assistant Professor
- Oleg Vassiliev, PhD – Associate Professor

Staff
- David Fair - Physics Assistant
- Omar Garcia, Jr. - Radiological Physics Tech I
- Archana Gautam – Senior Medical Physicist
- Brittney Goff - Administrative Assistant
- Anthony Harvey Jr. - Storekeeper
- Courtney Maloy - Program Coordinator
- Shelly Matejka - Administrative Assistant
- Catrice Nelson – Administrative Assistant
- Paige Nitch – Senior Medical Physicist
- Walter Thomas - Accountant I
- Grecia Torres - Radiological Physics Tech I

Radiation Physics Feature Articles

Fada Guan, PhD
Nature Scientific Reports
Spatial mapping of the biologic effectiveness of scanned particle beams: towards biologically optimized particle therapy. Guan F, Bronk L, Titt U, Lin S, Mirkovic D, Kerr M, Zhu XR, Dinh J, Sobieski M, Stephan C, Peeler C, Taleei R, Mohan R, Grosshans D, Sci Rep [Internet]. 2015 May 18;5. http://dx.doi.org/10.1038/srep09850

Sam Beddar, PhD
Journal of Medical Physics: Editor's Choice
Variation of kQclin,Qmsr (fclin,fmsr) for the small-field dosimetric parameters percentage depth dose, tissue-maximum ratio, and off-axis ratio, Francescon P, Beddar S, Satariano N, Das IJ, Med Phys 41(10):101708, 10/2014, 2014

Major Achievements in Radiation Physics Research

Sam Beddar, PhD
- $919,247, Real-time volumetric scintillation dosimetry for proton therapy

Laurence Court, PhD
- $90,849, A preclinical study investigating the impact of a magnetic field on radiation-induced toxicity

Radhe Mohan, PhD
- $5,567,865, Improving the clinical effectiveness and understanding of the biophysical basis of proton therapy

Gabriel Sawakuchi, PhD
- $33,600, Use of ICs in the presence of a B-field
- $30,000, The role of reactive oxygen species in gold nanoparticle radiosensitization in clinical MV beams

Jihong Wang, PhD
- $54,265, Evaluation of MR image distortion on dose distribution in the presence of magnetic field

Zhifei Wen, PhD
- $36,100, Further evaluation of dose response of radiation dosimeters in the presence of a strong magnetic field

Radiation Physics Trainee Updates

Residency Program
Three residents will be completing the program during Summer 2015:
- Sandeep Dhanesar, PhD
- Athena Heredia, PhD
- James Neihart, PhD

Three new residents will be joining the program September 1, 2015:
- Surendra Prajapati, PhD (University of Wisconsin)
- Kevin Kauweloa, PhD (University of Texas HSC San Antonio)
- Yue Yan, PhD (University of Wisconsin)

Postdoctoral Fellows
Since the last report, three Postdoctoral Fellows joined the program:
- Ane Appelt, PhD
- Felisberto Ferreira, PhD
- Daniel O'Brien, PhD

Advanced Radiation Physics Proton Therapy Fellows
Since the last report two Proton Therapy Physics Fellows joined the program:
- Rajesh Pidikiti, PhD: Left the program April 2015 to join Willis-Knighton Cancer Center as a medical physicist
- Juan Jen Yu, PhD: Left the program in July 2015 to join University of Maryland School of Medicine as a medical physicist

Recruitment for two new fellows is in progress.

Mohammad R. Salehpour, PhD
Professor & Director
Radiation Physics Education and the Radiation Physics Residency Program

Narayan Sahoo, PhD
Professor & Director
Advanced Radiation Physics Fellowship Program in Proton Therapy

Imaging & Radiation Oncology Core (IROC) Houston QA Center Highlights

Section of Outreach Physics

The Imaging and Radiation Oncology Core (IROC) Houston QA Center has just completed its first year as a part of the NCI's National Clinical Trial Network (NCTN) Program. The IROC Houston QA Center is part of a cooperative of six QA centers that support the use of both radiation therapy and diagnostic imaging in NCI-supported clinical trials. The six QA centers with their new names and former names are shown below.

Current IROC Name	Former QA Center Name
IROC Houston QA Center	Radiological Physics Center (RPC)
IROC Philadelphia (RT) QA Center	RTOG QA Office
IROC Rhode Island QA Center	Quality Assurance Review Center (QARC)
IROC Ohio QA Center	CALGB Core Imaging QA Center
IROC Philadelphia (DI) QA Center	ACRIN Core Lab
IROC St Louis QA Center	Image Guided Therapy Center (ITC)

Imaging & Radiation Oncology Core (IROC) Houston QA Center Highlights

IROC By the Numbers

During the past year, the IROC Houston QA Center has remained very active in providing QA services to clinical trial participants and the radiotherapy (RT) community. In 2014 we performed the following:

Beams checked w/ TLD/OSLDs: **16,397**
On site dosimetry review visits: **20**
Patient records reviewed: **1253**
Phantoms shipped (15 countries): **691**
Clinical active proton centers approved: **14 of 16**

Over **2000** RT facilities have received services from our QA Center, these facilities are mainly in North America, but also in **55** other countries.

In addition to the federal funding sources listed here, IROC Houston personnel are supported by several other efforts through the MD Anderson Dosimetry Laboratory. These efforts include for-fee QA audits from single beam output verifications up to end-to-end QA phantoms through requests and contracts with Varian Associates, US Oncology, EORTC participants and single radiotherapy facilities.

Imaging and Radiation Oncology Core (IROC Group) - IROC Houston QA Center, 1 U24 CA180803, American College of Radiology, 3/1/2014-2/28/2019, ($1,163,698/year).

Community Clinical Oncology Program-Studies 0631-1203 Supplement, Radiation Therapy Oncology Group/American College of Radiology, 6/1/2014-5/31/2018, $352,372 ($88,093/year).

Imaging and Radiation Oncology Core (IROC) Group - NRG 1314 Supplement, American College of Radiology, 3/1/2014-2/28/2015, $41,248.

Clinical Trial Quality Assurance for the P01 IMRT vs. IMPT Phase II Trials Supplement, American College of Radiology, 3/1/2014-2/28/2015, $146,164.

National Medical Physics Peer-Review of Radiation Therapy Quality Assurance Operations, Veterans Administration, 9/27/2010-9/26/2014, $821,118 ($205,280/year). This contract is anticipated to be renewed for another 3 year period.

The AIDS Malignancy Clinical Trials Consortium (AMC) Protocol #081: Pilot Study of Safety, Toxicity, and Compliance of Concomitant Chemoradiotherapy for HIV-Associated Locally-Advanced Cervical Cancer, CA121947, The EMMES Corporation, 7/1/2012-8/31/2015, $43,657 ($14,552/year).

The TACO Trial: A Randomized Phase III Clinical Trial of Weekly Versus Tri-Weekly Cisplatin Based Chemoradiation in Locally Advanced Cervical Cancer, KIRAMS 50906, 7/1/2013-6/30/2017, $33,216 ($8304/year).

The Development of Standard Operating Procedures for Dosimetry Validation and Accreditation of Proton Therapy Centers, $741,775 ($247,258/year).

IROC Highlights, Continued

IROC staff and students are presenting their work on the following 23 topics at this AAPM meeting. Most projects are collaborations with staff or faculty in the Departments of Radiation Physics, Imaging Physics, and other IROC QA centers.

1. Quality Assurances for Proton Therapy Delivery Equipment
2. Results From Multi-Institutional Measurements with An Anthropomorphic Spine Phantom
3. The Imaging and Radiation Oncology Core Houston (IROC Houston) QA Center International Activities Outside North America
4. An Analysis of TG-51 Electron Beam Calibration Correction Factor Uncertainty
5. A Comparison of CT Number to Relative Linear Stopping Power Conversion Curves Used by Proton Therapy Centers Jack Fowler Junior Investigator
6. An Evaluation of Multiple Irradiations of the IROC Houston QA Center Anthropomorphic Liver Phantom
7. A Phantom Study to Assess the Variability in Radiomics Features Extracted From Cone-Beam CT Images
8. Benchmarks and Pre-Treatment Reviews: A Study of Quality Assurance Effectiveness
9. Volume-Dependence of Quantitative Imaging Features From CT and CE-CT Images of NSCLC
10. Validation of a Secondary TPS for IROC-H Recalculation of Anthropomorphic Phantoms
11. Dosimetric Impact of Implementing Metal Artifact Reduction Methods and Metal Energy Deposition Kernels for Photon Dose Calculations: John R. Cameron Young Investigator Symposium
12. Characterizing Tissue Equivalent Materials for the Development of a Dual MRI-CT Heterogeneous Anthropomorphic Phantom Designed Specifically for MRI Guided Radiotherapy Systems
13. Implementing SBRT Protocols
14. Uncertainties in Treatment Planning for IROC-Houston Proton Phantom QA Program Due to Variable CT Technique and Proton Energy
15. Characterization of the New Xoft Axxent Electronic Brachytherapy Source Using PRESAGE Dosimeters
16. Clinical Impact of IMRT Failure Modes at Or Near TG-142 Tolerance Criteria Levels John R. Cameron Young Investigator Symposium
17. An FMEA Survey of Intensity Modulated Radiation Therapy (IMRT) Step and Shoot Dose Delivery Failure Modes
18. IROC Houston QA Center's Anthropomorphic Proton Phantom Program
19. Common Errors and Deficiencies in Radiation Oncology Practice
20. IROC Houston On-Site Audits and Parameters That Affect Performance
21. AAPM Task Group 263 Tackling Standardization of Nomenclature for Radiation Therapy
22. A Round Robin Dosimetry Intercomparison of Gamma Stereotactic Radiosurgery Calibration Protocols
23. Feasibility Study On Using Small Plastic Phantoms for Auditing Radiation Output of MR-Linac Systems

NOTES