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2024

ANNUAL REPORT

AMERICAN ASSOCIATION *of* PHYSICISTS IN MEDICINE

AAPM EDUCATION & RESEARCH FUND

2024 ANNUAL REPORT



To our Education & Research (E&R) Fund donors, thank you for being a vital part of profession's advancement. Your generous support fuels strategic research, educational programs, and awards. With support from members like you, AAPM has expanded its professional impact, funding approximately \$532,000 in research

seed grants, mentorship programs, travel grants, PhD student fellowships, distinguished lectureships, and travel and tuition awards in 2024. Your gift turns vision into action and ensures a bright future for our field.

The AAPM Development Committee invites you to review the award recipient testimonials included in the report.

These testimonials highlight the immense value donor support provides to recipients and are sure to inspire you. Additionally, the report details the current state of the E&R Fund, showcasing the contributions of individual donors.

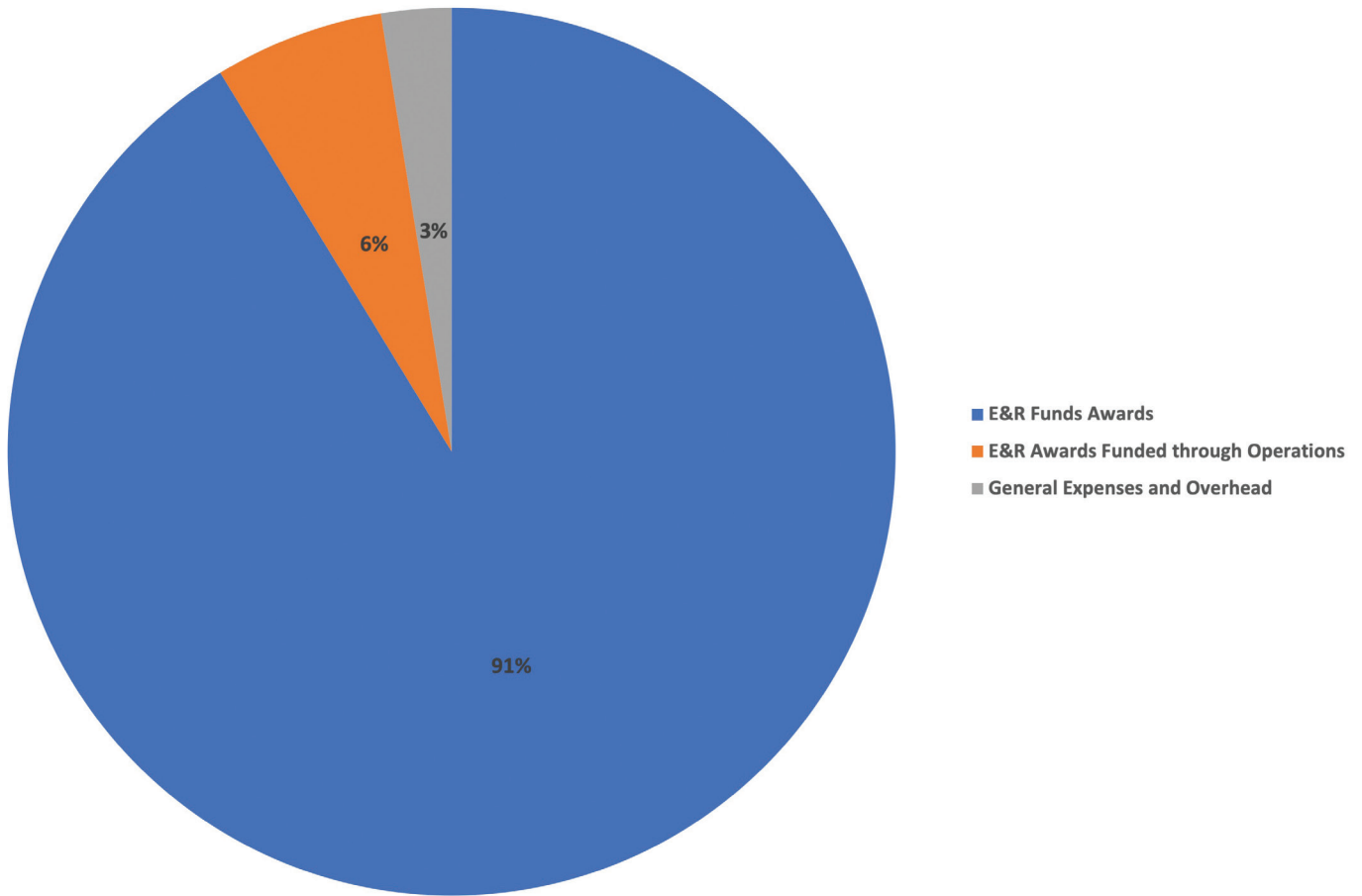
Since the E&R Fund was established in 1989, AAPM has awarded over \$5 million in grants, fellowships, and awards. Will you join us in sustaining this wonderful legacy? Donor levels and gift options are available here. We encourage every AAPM member to contribute. If you have any questions or would like to explore development opportunities, please don't hesitate to reach out. I'd love to hear from you.

A handwritten signature in black ink that reads "Michelle Wells".

Michelle Wells, FAAPM
Chair, AAPM Development Committee



2024 E&R Fund Expenses
Total = \$582,983





Meixu Chen

University of Texas Southwestern Medical Center
Department of Radiation Oncology

Interpretable multi-modal multi-task radiation therapy outcome prediction

Accurate survival prediction for Head and Neck Cancer (HNC) patients undergoing radiotherapy is critical for optimizing personalized treatment strategies.

However, prognosis modeling remains challenging due to heterogeneous disease presentations and limited patient data. While multimodal data fusion has shown promise, existing approaches predominantly rely on single-task learning, failing to capture interdependencies among clinical outcomes. Furthermore, the opacity of deep learning models hinders their clinical applicability, necessitating advancements in interpretability. This project aims to develop an interpretable multi-modal multi-task deep learning model for HNC treatment outcome prediction. A novel deep learning framework will be constructed to simultaneously predict multiple clinically relevant outcomes. Loss functions will be tailored to align with survival evaluation metrics, improving model optimization. Additionally, state-of-the-art interpretability techniques will be explored, including a customized Grad-CAM for imaging-based predictions and feature importance analysis for non-imaging data, ensuring clinical transparency. By advancing AI-driven prognostic modeling, this research has the potential to enhance individualized treatment planning, driving more effective, data-informed oncology care. With the support of the Seed Grant, this work will strengthen my expertise in oncology AI research and support my trajectory as an independent investigator in medical AI.



Zhuoran Jiang

Stanford University
Department of Radiation Oncology

Towards Real-time 3D In-vivo Dosimetry for FLASH Proton Therapy using Foundation Model-enhanced Protoacoustic/Ultrasound Dual-modality Imaging (PUDI)

Proton FLASH radiation therapy (RT), featuring ultra-high dose rates (>40Gy/s), promises a paradigm shift in cancer treatment. This technique has shown substantial

normal tissue sparing without compromising anti-tumor efficacy. However, real-time 3D in-vivo and in-depth dose verification for proton FLASH RT remains a major challenge due to the inadequacy of current dosimeters. To address this clinical need, our long-term goal is to establish a novel protoacoustic/ultrasound dual-modality imaging (PUDI) system as a robust and well-characterized 3D in-vivo dosimetry for proton FLASH RT verification. In this proposal, we aim to enhance PUDI's performance in two critical aspects: (1) developing a robust model for deformable image registration of prior and US images to provide precise real-time anatomy information; and (2) developing a knowledge-guided model for robust protoacoustic image reconstruction from limited-angle measurements of matrix transducers. This seed grant will deliver pivotal preliminary results to demonstrate the feasibility of PUDI, which paves the way for larger grant applications afterward. PUDI is a promising system as the first to provide real-time 3D in-vivo dose verification for proton FLASH, potentially heralding a new epoch of high-precision proton FLASH RT in cancer treatment.

The Research Seed Funding Grant

Four \$25,000 grants were awarded to provide funds to develop exciting investigator-initiated concepts, which will hopefully lead to successful longer term project funding from the NIH or equivalent funding sources. Funding for the 12-month grant period began July 2024. Research results are submitted for presentation at future AAPM meetings.



Benjamin Lopez

The University of Texas MD
Anderson Cancer Center
Department of Imaging Physics

**Lung Shunt and Dose Verification
Following 90Y-Microsphere
Radioembolization Treatments**

Radiation pneumonitis is a rare, but serious, complication following trans-arterial radioembolization (TARE) of liver tumors, arising when yttrium-90-microspheres (90Y-microspheres) bypass the liver parenchyma through arteriovenous shunts and become lodged in pulmonary capillaries. Current standard practice estimates the lung mean dose (LMD) from TARE using the administered 90Y-microsphere activity, the lung shunt fraction (LSF) calculated from planar imaging of technetium-99m-labelled macro-aggregated albumin (99mTc-MAA) administered in a separate procedure prior to TARE, and an assumed 1 kg lung mass. The objective of my project is to establish techniques to more precisely measure patient-specific lung masses, LSFs, and LMDs directly from post-TARE 90Y SPECT/CT and PET/CT imaging. My goal is to develop practical clinical tools to assess 90Y-microsphere lung doses and help identify cases with potentially concerning high 90Y-microsphere lung shunting. With the support of the AAPM Research Seed Funding Grant, I have been able design phantoms and perform experiments to achieve this goal. Furthermore, this award has been instrumental to my scientific and professional development as I transition this year from a medical physics resident to an early-career clinical medical physicist at an academic institution.



Poliana Camila Marinello

The University of Texas MD
Anderson Cancer Center
Department of Radiation Physics

**High-LET alpha particles
combined with PARP1 inhibition
to sensitize immunologically cold
cancers to immune checkpoint
blockade**

Immunologically cold breast cancers are aggressive and difficult to treat due to their lack of immune cell infiltration. One of the mechanisms that radiation stimulates antitumor immunity is by inducing cytoplasmic double-strand DNA (dsDNA) in cancer cells. High-LET alpha-particles induce more complex DNA damage that is harder to repair than low-LET radiation, resulting in more cytoplasmic dsDNA. DNA repair inhibitors, such as the Poly (ADP-ribose) polymerase (PARP) inhibitor, can block DNA repair from radiation-induced DNA damage and amplify even further cytoplasmic dsDNA, offering a promising strategy to stimulate antitumor immunity and enhance therapeutic efficacy. This project investigates the immunomodulatory potential of alpha-particles in combination with a selective PARP1 inhibitor (PARP1i) in breast cancer. Our data demonstrate that PARP1i combined with alpha-particles promotes greater radiosensitization of breast cancer cells than PARP1i combined with photons. Alpha-particles generated more DNA damage and induced the expression of immunomodulatory proteins more effectively than photons. Furthermore, PARP1i enhanced residual DNA damage and immunomodulatory effects induced by alpha-particles. The next phase of this research will explore how this combination synergizes with immune checkpoint blockade to improve treatment efficacy in vivo. Support from the AAPM Seed Grant has been crucial for developing the foundation of this research.



David Adam

Johns Hopkins University
Department of Radiation Oncology and Molecular
Radiation Sciences

Development of small-scale computational model and pre-clinical validation of patient-specific salivary gland toxicity predictions for beta emitting-radiopharmaceuticals

Radiopharmaceutical therapy (RPT) is a rapidly re-emerging treatment modality which holds promise to preferentially treat systemic disease. There is emerging evidence that EBRT normal tissue dose limits are inadequate to describe observed toxicities to RPT treatments. This is hypothesized to be due to the vastly different spatial and temporal dose distribution delivered by the RPT compounds compared to EBRT. The salivary glands have been identified as an organ at risk for ^{131}I and ^{177}Lu -PSMA-617 treatments. Because of the high dose non-uniformities in salivary glands, mean dose values do not correlate well with observed toxicities and new dosimetry methods will need to be devised. This work entails the development and validation of a macro-to-micro ($M2\mu$) salivary gland model. A model of the salivary glands will be created based on ex-vivo histology and GEANT4 Monte Carlo simulations will be conducted for ^{131}I and ^{177}Lu to compute small-scale S-values. Pre-clinical experiments will be conducted to then develop murine-model tissue apportionment factors to provide meaningful applications of the model. Patient cases will be used to demonstrate paradigms of translation and offer hypotheses of toxicities observed in human patients. The methods and framework will ultimately be applicable to other RPT paradigms. The work has enormous translational potential both in the pre-clinical and clinical space, will benefit patient care, and help Dr. Adam progress as an independent researcher.

Nolan Esplen

The University of Texas MD Anderson Cancer Center
Department of Medical Physics

ASTRO-AAPM Physics Resident/Post-Doctoral Fellow Seed Grant

Two \$25,000 grants were jointly awarded by AAPM and the American Society of Radiation Oncology (ASTRO) with the goal of advancing the field of radiation oncology in novel ways through the support of early-career scientists involved in radiation oncology physics-related research.

AAPM/RSNA Imaging Physics Residency Grants

The AAPM Board of Directors approved \$420,000 in support over six years (\$70,000/year starting in 2020) to co-fund six positions in existing or new imaging physics residency programs, and in support, the Radiological Society of North America (RSNA) Board of Directors approved \$210,000 for an additional three positions. The intent of these funds is that after the period of the award is over, the awardee institution(s) will continue to fully support these imaging physics residency positions. With this funding, the awardee's institution will receive \$35,000 per year for two years as matching support (50/50) for one imaging physics resident. This provides matching funds for nine imaging physics residents over the next six years.

Awarded 2024 | 1st Year Funding 2025 | 2nd Year Funding 2026



Janet Ching-Mei Feng, PhD

The University of Texas Health Sciences Center at Houston/McGovern Medical School
Department of Diagnostic and Interventional Imaging



John Holmes, DMP

University of Pittsburgh/UPMC
Department of Radiology and Radiation Safety

Awarded 2023 | 1st Year Funding 2024 | 2nd Year Funding 2025



E. Russell Ritenour, PhD

Medical University of South Carolina
Department of Diagnostic Radiology



Christopher C. Smitherman

Petrone Associates, LLC
Department of Diagnostic Medical Physics

Awarded 2022 | 1st Year Funding 2023 | 2nd Year Funding 2024



Kalpana Kanal, PhD

University of Washington
Department of Radiology



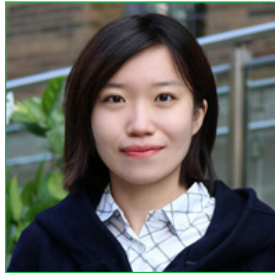
Jie Zhang, PhD

University of Kentucky
Department of Radiology

Doctoral Recipients



Hunter Mehrens
Second Year or Higher
The University of Texas
MD Anderson Cancer
Center



Ruiyan Ni
Second Year or Higher
University of Toronto



Odette Rios-Ibacache
First Year
McGill University

Qingying Wang
First Year
University of Texas
Southwestern Medical
Center

Masters Recipients



Nathan Clements
University of Victoria



Adia Holtman
University of Kentucky



Bolin Li
University of
Pennsylvania

The AAPM/RSNA Doctoral and Masters Graduate Fellowships are comprised of four Doctoral awards (PhD or DMP) and three Masters awards each in the amount of \$10,000. Additionally, one each of the Masters and Doctoral awards is reserved for under-represented applicants. Awardees are outstanding students based on their academic record, recommendations, curriculum vitae, and self statement of how an award would benefit their graduate studies.

The Summer Undergraduate Fellowship Program (SUFF)

is a 10-week (40 hours per week) summer program designed to provide opportunities for undergraduate university students to gain experience in medical physics by performing research in a medical physics laboratory or assisting with clinical service at a clinical facility. The mentor and fellow determine the exact 10-week schedule (May-September). In this program, AAPM matches exceptional students with exceptional medical physicists, many whom are faculty at leading research centers. Students participating in the program are placed into summer positions that are consistent with their interest. Selected for the program on a competitive basis, summer fellows receive a \$6,000 stipend from AAPM. Additional funding provided by the AAPM Northwest Chapter.



Aydin Aghaie

University of Maryland, College Park
Senior, Physics

Mentor: Edward Graves, PhD
Stanford University

Department of Radiation Oncology - Radiation Physics

Monte Carlo Simulations of Ionizing Radiation Transport through Matter: EGSnrc

During my AAPM Medical Physics Fellowship at Stanford University, I gained a comprehensive understanding of medical physics, focusing on Monte Carlo simulations, radiotherapy, and in vitro testing. A significant part of my work involved independently modeling Stanford's XRAD SmART+ system using the EGSnrc toolkit. I conducted Monte Carlo simulations to analyze ionizing radiation transport through matter, where I generated eight unique EGSnrc input files, processed phase space files, and used DOSXYZnrc for dose deposition in solid water among other materials. I performed quality assurance testing with Gafchromic EBT-XD films and analyzed the results using VICTORIA software, comparing computer-generated and experimental results to validate the accuracy of the simulations. In addition to my primary research, I participated in a range of collaborative projects, including in vitro testing of anti-CD47 antibodies to inhibit cancer growth and radiotherapy studies combining anti-CD47 with PMX205 to induce macrophage-mediated abscopal effects. I also gained hands-on experience in clinical settings, conducting daily QA, treatment planning, and dose verification under expert mentors. Through these projects, I developed a deeper understanding of radiation biology, imaging, and treatment planning. The fellowship sharpened my technical skills, reinforced the importance of collaboration, and provided valuable insights into the clinical application of medical physics in cancer treatment.



Brett Bocian

University of Miami
Senior, Biomedical Engineering

Mentor: Patrick J. Jensen, PhD

The University of Texas MD Anderson Cancer Center
Department of Radiation Physics

Computational Prototype Single-Channel Vaginal Cylinder with Integrated Filter to Address Dose Uniformity in High-Dose-Rate Brachytherapy for Endometrial Cancer

At MDACC, I worked on developing a computationally designed filter to improve dose uniformity in single-channel vaginal cylinder HDR brachytherapy for endometrial cancer. Using Monte Carlo simulations in TOPAS, I analyzed dose distributions and iteratively refined the filter design to achieve improved uniformity. The final design reduced dose variation at the prescription depth, particularly near the applicator tip. Dr. Patrick J. Jensen and Dr. Luis Perles

provided valuable guidance on optimizing the simulation setup for accurate analysis and improving its runtime. While the initially assigned project idea was an AI-based DRR registration study, we pivoted due to time constraints and unexpected changes. This experience taught me the importance of adaptability and leveraging my existing skills to complete a project within a deadline. I also completed a second project on dose perturbation measurements in intraoperative radiation therapy. Both projects have since been submitted for review for the AAPM Annual Meeting 2025. Beyond research, exposure to key medical physics concepts and clinical shadowing provided valuable insight into real-world applications. Observing treatments firsthand reinforced the significance of precise dose delivery and strengthened my understanding of how computational techniques translate into patient care. These ten weeks in the SUFP solidified my resolve to pursue residency after graduate school and apply my skills toward improving patient care.



Alex Culver

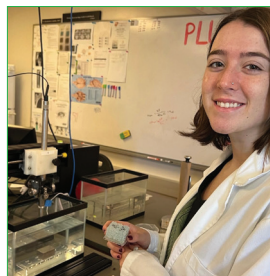
Loyola University, Chicago
Senior, Biophysics

Mentor: Carlos Huesa-Berral, PhD
Massachusetts General Hospital
Department of Radiation
Oncology

Differential Effects of Alpha and Beta Particles on Tumor Vasculature in Transarterial Radioembolization (TARE)

During my AAPM Summer Undergraduate Fellowship at Massachusetts General Hospital, I worked on simulating how different types of radiation, specifically Yttrium 90 and Actinium 225, affect liver tumors. Using TOPAS, a Monte Carlo simulation tool, I modeled how radiation interacts with tumor cells and spreads through tissue. The goal was to compare how these isotopes deliver treatment, helping refine targeted radiation therapies that could better attack tumors while sparing healthy cells. To do this, I built computer models that tracked how radiation particles moved and deposited energy in tumors. In the end, I developed a framework that helps compare the effectiveness of these therapies. Beyond the lab, I had the chance to attend the AAPM Annual Meeting in Los Angeles, where I met medical physicists from all over and saw firsthand how research translates into real world treatments. Sitting in on talks about radiation therapy and imaging technology gave me a bigger picture view of where the field is headed. The conference reinforced my excitement about medical physics and how I can play a role in advancing cancer treatment. This fellowship showed me how physics and medicine come together to solve real

problems, and it strengthened my desire to work in this field. I gained hands on experience in computational modeling, learned from experts, and saw how collaboration drives innovation. More than anything, this summer confirmed that medical physics is the path I want to follow.



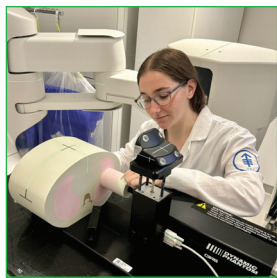
Katherine Hazelwood

Rhodes College
Junior, Physics, Biochemistry and
Molecular Biology

Mentor: Damodar Pokhrel, PhD
University of Kentucky
Department of Radiation
Oncology

An Investigation into the Feasibility and Efficacy of Small Lesion Stereotactic Radiosurgery on the Ring-Mounted Halcyon LINAC

The goal of this project was to investigate the feasibility of using a Ring-Mounted Halcyon LINAC for small (<1 cm) brain lesions. If this system could be used for Stereotactic Radiosurgery of such brain lesions, this could increase the accessibility of care, as some cancer centers are Halcyon-only. This can also be used for patients who require an immediate SRS treatment when other C-arm LINACs are not available. This study was performed by retrospectively replanning 15 SRS patients who were previously treated on TrueBeam and investigating conformity index, gradient index, gradient distance, PTV coverage, and doses to organs-at-risk. Additionally, patient-specific quality assurance and independent Monte Carlo 2nd checks were performed. A paper written about this study is currently under review. This project and fellowship allowed me to learn about LINAC systems, basic treatment planning, and assessment of plans. I had the opportunity to shadow Medical Physicists, which helped to deepen my understanding of physical principles and how they apply to radiation oncology. This fellowship also solidified my desire to pursue a PhD in Medical Physics. Additionally, I have been able to present this project to the Physics Department at my College, which has helped to improve my ability to effectively communicate science.



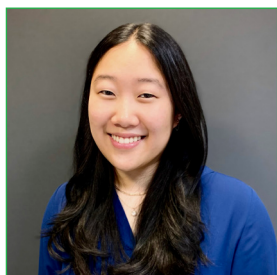
Taliah Lansing

College of Wooster
Senior, Physics and Mathematics

Mentor: Hao Zhang, PhD
Memorial Sloan Kettering Cancer Center
Department of Medical Physics

Next-generation nonstop gated CBCT imaging technique for respiratory gating radiotherapy

This project focused on analyzing dosimetric and efficiency outcomes from 1,000 patients receiving motion management during SBRT of the lung. AI analysis methods such as classification algorithms and oversampling techniques were utilized. By showing the benefits of utilizing the respiratory gating (RG) technique, we can emphasize the need for a nonstop-gated CBCT imaging technique. This would increase efficiency and allow physicians to prescribe RG more frequently. This research has developed into two journal articles (under peer review/ in progress) and a 100 page thesis. My participation in this project allowed me to have incredible experience in the clinical setting, both with patients and phantoms. Understanding the role of each person on the radiation therapy team is an integral part of providing safe and consistent care. This opportunity has solidified my desire to become a clinical medical physicist.



Nayoon Justina Lee

University of Pennsylvania
Junior, Physics

Mentor: Piotr Zygmanski, PhD
Harvard Medical School/Dana-Farber Cancer Institute/Brigham and Women's Hospital
Department of Radiation Oncology

Simulating Lung Tumor Motion via Charged Particle Current Sensing

The research I was involved in as an AAPM Summer Undergraduate Research Fellow was under the guidance of Professor Piotr Zygmanski at Brigham & Women's Hospital and Dana Farber Cancer Institute. I worked on the applicability of charged particle current sensing to tracking lung tumor motion and simulating X-rays using a moving charge cloud. This is important because lung tumors are notoriously difficult to treat due to their location in dynamic sites of the body. Thoracic motion is induced

from respiration introducing complexities to treatment planning. My project was performed full time between May and August and resulted in a poster presentation at the 2024 Fall Expo held at the University of Pennsylvania. In addition, this research project served as the basis for my nomination and later selection as a recipient of the Barry Goldwater Scholarship. This fellowship has enlightened me on the very interesting applications of physics to medicine and has affirmed my desire to pursue a research career in the radiation and oncological sciences.



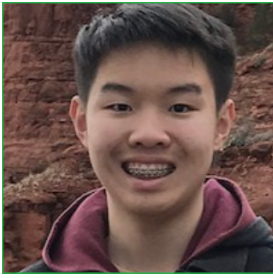
Bernadette Lesieur

Saint Michael's College
Senior, Physics

Mentor: Atchar Sudhyadhom, PhD
Harvard Medical School/Dana-Farber Cancer Institute/Brigham and Women's Hospital
Department of Radiation Oncology

Using Radiation Chemistry to Compare Radiated Versus Non-Radiated Tissue

This summer I worked with my mentor Dr. Atchar Sudhyadhom on a radiation chemistry project that worked towards understanding tumor conditions before, during, and after radiation treatment. This project is important because knowing exactly what occurs within the tumor during and after radiation can help medical physicists know how much radiation a tumor has received after treatment and decipher radiated versus non-radiated tissue on MR scans. This in turn will result in more accurate treatment plans in the future and the ability to check progress and results of radiation treatment. In this project, we analyzed the change in T1 relaxation values over time of phantoms via a dynamic scan on a ViewRay MRIdian MR-Linac. I performed this project by creating, scanning, irradiating, and analyzing phantoms made of water, gadolinium, and coumarin. This project accomplished a better understanding of the changes that occur within a phantom in regards to T1 value during and after radiation treatment. This fellowship taught me many aspects of medical physics regarding radiation chemistry, adaptive radiation treatment, MRI dynamics, and radiation interactions with tumors. This experience helped solidify my desire to pursue medical physics as a future career where I will have the opportunity to improve radiation treatment for oncology patients.



Joshua Pan

University of California, Berkeley
Junior, Nuclear Engineering,
Electrical Engineering, and
Computer Science

Mentor: Carri Glide-Hurst, PhD
University of Wisconsin, Madison
Department of Human Oncology

Standing Tall to Cancer: First experience with upright vertical CT for proton therapy

This past summer, I worked on various tasks involving the new Leo Cancer Care Upright CT. My primary project focused on generating synthetic upright images from supine images provided by the Leo Cancer Care team. Using deep learning AI models — specifically a nnU-Net — I trained multiple models with different hyperparameters to optimize DICE and SSIM scores, establishing a baseline for future supine-to-upright image translation projects. This work is important because upright CTs are not widely available for diagnostic and treatment planning. Converting supine images to upright ones enables better radiation therapy planning and prepares for proton treatment on upright machines. Additionally, I contributed to developing a model for segmenting cardiac substructures. Building on previous models, I implemented a cascade approach, segmenting structures from the easiest to the most complex. These experiences deepened my understanding of AI-driven medical imaging and its potential to enhance patient care. This fellowship has broadened my perspective on AI's role in healthcare, reinforcing my passion for innovation in medical imaging. I am incredibly grateful to Dr. Carri Glide-Hurst and her lab for their mentorship and support. This experience has been truly life-changing, shaping my future aspirations in the field.



Yurok Song

Emory University
Junior, Physics

Mentor: Lianli Liu, PhD
Stanford University
Department of Radiation
Oncology

Accelerate Diffusion-Weighted MRI with Extended b-values via Implicit Neural Representation Learning

Last summer, I spent ten weeks at Stanford University under the mentorship of Dr. Lianli Liu, funded by the AAPM Summer Undergraduate Fellowship. My project addressed

the clinical challenge of lengthy diffusion-weighted MRI (DWI) scans by combining a low-rank SVD prior with implicit neural representation learning to reconstruct high-quality DWI images from 10-fold under-sampled k-space data. I implemented a 16-layer MLP to learn a continuous spatial mapping, validated on brain datasets from ten subjects with nine b-values, and demonstrated improved PSNR and accurate ADC and diffusion kurtosis metrics compared to standard GRAPPA reconstructions. Throughout the fellowship, I gained hands-on experience in advanced MRI physics, Python-based algorithm development, and quantitative image analysis. This past summer's work culminated in my first oral presentation at the 2025 MRinRT Conference, where I shared our findings with experts in the field. I am grateful for the AAPM's support, which enabled me to deepen my research skills, forge lasting collaborations, and contribute to innovations in accelerated DWI.

Kaitlyn Atwood, Johns Hopkins University, Junior, Physics

Mentor: Evangelia Kaza, PhD

Harvard Medical School/Dana-Farber Cancer Institute/
Brigham and Women's Hospital
Department of Radiation Oncology

Zach Ehret, SUNY Geneseo, Junior, Physics

Mentor: Olga Marie Dona Lemus, PhD

University of Rochester, Department of Radiation
Oncology

Vivian Felso, Agnes Scott College, Senior, Physics

Mentor: Jun Zhou, PhD

Emory University School of Medicine, Department of
Radiation Oncology

Abigail Green, Bethel University, Junior, Applied Physics

Mentor: Daniel Gomez-Cardona, PhD

Gundersen Health System, Department of Medical Physics

Fahd Hatoum, Emory University, Junior, Engineering Physics

Mentor: Maryellen Giger, PhD, The University of Chicago,
Department of Radiology

Grace Nehring, Rhodes College, Junior, Physics and Math

Mentor: Samantha Lloyd, PhD, BC Cancer Department of
Medical Physics

Claire Tran, Georgia Institute of Technology, Junior,
Nuclear Engineering

Mentor: Shu (Stella) Xing, PhD, Memorial Sloan Kettering
Cancer Center, Department of Medical Physics

Diversity Recruitment through Education and Mentoring Program (DREAM)

is a ten-week (40-hours per week) summer program designed to increase the number of underrepresented groups in medical physics by creating new opportunities, outreach, and mentoring geared towards diversity recruitment of undergraduate students in the field of medical physics. Students participating in the program are placed into summer positions that are consistent with their interest. Selected for the program on a competitive basis, DREAM fellows receive a \$6,000 stipend from AAPM. Additional funding provided by the AAPM Northwest, Southeast, and Southwest Chapters.



Careesa Billante

Grove City College
Junior, Physics

Mentor: Ashley Cetnar, PhD
Ohio State University Wexner Medical Center James
Cancer Hospital and Solove Research Institute
Department of Radiation Oncology

Accessibility for the Visually Impaired in Medical Physics

Accessibility is a topic of increasing importance in many fields, and medical physics is no exception. While the traditional educational pathway presents a plethora of challenges for the visually impaired, this does not necessarily mean that the field is entirely inaccessible. One of the goals of our project was to determine if the traditional pathway into medical physics is possible for someone with low or no vision. We created and disseminated a survey to graduate and residency program directors around the country, inquiring about the potential accessibility of their programs. Results from the survey showed a wide range of interpretations from educators in perceived ability of students with visual impairments completing graduate studies and residency education. Even so, we believe this will still inform the medical physics community of how it can better accommodate the visually impaired. In addition, we wanted to make a way to make diagnostic imaging more accessible to the blind, so we successfully designed and built a prototype to create tactile medical images. We 3D printed a matrix of pins which are coded to change height depending on the intensity of a pixel. This forms a topographical map of the image, which a blind person could use to 'feel' a diagnostic image. We hope that, if this were made on a larger scale, this could be a massive step in improving accessibility and instruction methods.



Alejandro Martinez

Georgia Institute of Technology
Senior, Physics

Mentor: Andrew Santoso, PhD
University of Colorado Anschutz Medical Campus
Department of Radiation Oncology

Custom Electron Radiotherapy Electronic Database

This past summer, I got to work with Dr. Andrew Santoso at the University of Colorado Anschutz Medical Campus. The project I worked on involved creating an electronic database for storing patients' custom electron therapy treatment plans. MATLAB was used to create the database by pulling patient-specific information from Varian's ARIA and Eclipse software. The database features over 100 unique patient electron therapy plans, as well as an interactive GUI with a comparison algorithm that compares plans within the database before obtaining relevant information such as the respective output factor of the closest geometrical match based on the dice coefficient. This project is important as it sought to improve the clinical workflow by standardizing the process for storing

and handling custom electron therapy plans. Aside from this clinically impactful project, I got to work closely with the faculty within the radiation oncology department and shadow many clinical procedures, including HDR, TBI, TSE, SBRT, and various types of QA. I also had the opportunity to travel to my first AAPM annual meeting and conference ever, where I got to meet and network with many individuals within the field. I am extremely grateful to have been given the opportunity to participate in a program such as this. Overall, my experience with the DREAM program was overwhelmingly positive and strongly influenced my desire to pursue a PhD and career in medical physics.



Bryanna Stalnaker

Virginia Commonwealth University
Senior, Biomedical Engineering

Mentor: Sarah Quirk, PhD
Harvard Medical School/Dana-Farber Cancer Institute/Brigham and Women's Hospital
Department of Radiation Oncology

Developing novel adaptive radiotherapy protocols for pediatric and adolescent patient cohorts

My project focused on conducting a literature review and creating a comprehensive adaptive workflow for a clinical trial in the adolescent and young adult (AYA) population. As of summer 2024, no clinical trials were conducted using CT adaptive radiotherapy in the AYA population—only the adult population. In the adult population, clinical trials have shown adaptive radiotherapy to be successful, thus adaptive radiotherapy could produce benefits for the AYA population as well, e.g. reproductive sparing. For the first few weeks of my project, I read and summarized papers related to CT adaptive radiotherapy and adaptive radiotherapy in pediatrics. In the subsequent weeks, I created an inclusion/exclusion list and sorted through multiple potential patients. I also familiarized myself with the ETHOS emulator, which is the simulator used to conduct the trial. At my fellowship's conclusion, I completed the framework for the clinical trial. I conducted a literature review, created an inclusion/exclusion criteria list, and determined the specific patients eligible for the trial. I also mastered the ability to simulate patient adaptive treatment plans using the ETHOS emulator and created an adaptive workflow for simulating treatment delivery. The fellowship has given me invaluable insight into the importance of CT adaptive radiotherapy, the method to conduct literature reviews, and why simulated treatment planning is so beneficial for medical physicists.



Hannah Williams

University of Chicago
Senior, Physics

Mentor: Jessica Fagerstrom, PhD
University of Washington
Department of Radiation Oncology

Creation and Evaluation of a Library of Prepared TBI Lung Blocks Using Volumetric Lung Dosimetry

I completed my 2024 DREAM Fellowship at the University of Washington Medical Center in Seattle, working with mentors Dr. Caroline Colbert and Dr. Jessica Fagerstrom. I conducted research on the design of lung shielding blocks used in total body irradiation (TBI). Lung blocks are typically designed and created custom for every patient, which is a major time and labor cost in the workflow of planning and delivery of treatment. I designed and proposed a new set of standardized lung blocks, where each patient would be fitted to their nearest size. A workflow using standardized blocks would likely improve the efficiency of TBI planning and delivery significantly, so I sought to test whether such a system could be viable without significantly impacting lung dose precision. I conducted 3D dosimetry tests in a simulated TBI treatment to measure differences in lung dose when using standardized vs. custom blocks. I found that a system of standardized lung blocks, with some tweaking, would likely be adequate in a clinic for maintaining precision of treatment dose. I was thankful to collaborate with several physicists, oncologists, and radiation therapists in this research, and I am excited to pursue this field for my career!

Benjamin Awad, California State University, Fresno, Junior, Physics | **Mentor:** Jordan Slagowski, PhD, University of Wisconsin Department of Human Oncology

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Rory Miller II, Wofford College, Sophomore, Physics and Mandarin Chinese | **Mentor:** Jiajian (Jason) Shen, PhD, Mayo Clinic, Department of Radiation Oncology

Medical Physics Journal Best Paper Awards

Farrington Daniels Award

(Funded by the endowed Farrington Daniels Fund)

This award is for an outstanding paper on radiation therapy dosimetry, planning, or delivery published in *Medical Physics* in 2023. Presented in 2024, the awardees were **Xiaoxuan Zhang, Alejandro Sisniega, Wojciech B. Zbijewski, Junghoon Lee, Craig K. Jones, Pengwei Wu, Runze Han, Ali Uneri, Prasad Vagdargi, Patrick A. Helm, Mark Luciano, William S. Anderson** and **Jeffrey H. Siewerdsen** for their paper entitled "Combining physics-based models with deep learning image synthesis and uncertainty in intraoperative cone-beam CT of the brain," *Med. Phys.*, 2023; 50: 2607–2624. <https://doi.org/10.1002/mp.16351>.

Moses and Sylvia Greenfield Award

(Funded by the endowed Moses and Sylvia Greenfield Fund)

This award is for an outstanding paper on imaging, published in *Medical Physics* in 2023. Presented in 2024, the awardees were **Yinsheng Li, Xin Tie, Ke Li, Ran Zhang, Zhihua Qi, Adam Budde, Thomas M. Grist** and **Guang-Hong Chen** for their paper entitled "A quality-checked and physics-constrained deep learning method to estimate material basis images from single-kV contrast-enhanced chest CT scans," *Med Phys.*, 2023; 50: 3368–3388. <https://doi.org/10.1002/mp.16352>.

Journal of Applied Clinical Medical Physics (JACMP) Best Paper Awards

(Funded by the endowed JACMP Editors' Fund)



Michael D. Mills Editor In Chief Award

This Award of Excellence is for an outstanding general medical physics article published in *JACMP* in 2023. Presented in 2024, the awardees were **Jacqueline Esthappan Zoberi, Jose Garcia-Ramirez, David Luechtefeld, Nichole M. Maughan, Maxwell Amurao, Reiko Oyama, Brian C. Baumann, Hiram A. Gay** and **Jeff M. Michalski** for their paper entitled "Logistical, technical, and radiation safety aspects of establishing a radiopharmaceutical therapy program: A case in Lutetium-177 prostate-specific membrane antigen (PSMA) therapy," *J Appl Clin Med Phys.*, 2023; 24:e13899. <https://doi.org/10.1002/acm2.13899>.

Ramirez, David Luechtefeld, Nichole M. Maughan, Maxwell Amurao, Reiko Oyama, Brian C. Baumann, Hiram A. Gay and **Jeff M. Michalski** for their paper entitled "Logistical, technical, and radiation safety aspects of establishing a radiopharmaceutical therapy program: A case in Lutetium-177 prostate-specific membrane antigen (PSMA) therapy," *J Appl Clin Med Phys.*, 2023; 24:e13899. <https://doi.org/10.1002/acm2.13899>.

George Starkschall Award

This Award of Excellence is for an outstanding radiation oncology physics article published in the *JACMP* in 2023. Presented in 2024, the awardees were **John T. Stasko, William S. Ferris, David P. Adam, Wesley S. Culbertson** and **Sean P. Frigo** for the paper entitled "IMRT QA result prediction via MLC transmission decomposition," *J Appl Clin Med Phys.*, 2023; 24:e13990. <https://doi.org/10.1002/acm2.13990>.



Peter R. Almond Award

The Peter R. Almond Award of Excellence is for an outstanding radiation measurements article published in *JACMP* in 2023. Presented in 2024, the awardees were **Kevin Liu, Allison Palmiero, Nitish Chopra, Brett Velasquez,**

Ziyi Li, Sam Beddar and **Emil Schüller** for their paper entitled "Dual beam-current transformer design for monitoring and reporting of electron ultra-high dose rate (FLASH) beam parameters," *J Appl Clin Med Phys* 2023; 24:e13891. <https://doi.org/10.1002/acm2.13891>.

Edwin C. McCullough Award

The Edwin C. McCullough Award of Excellence is for an outstanding medical imaging physics article published in the *JACMP* in 2023. Presented in 2024, the awardees were **Samaneh Abbasi, Alireza Mehdizadeh, Hamid Reza Boveiri, Mohammad Amin Mosleh Shirazi, Reza Javidan, Raouf Khayami** and **Meysam Tavakoli**, for their paper entitled "Unsupervised deep learning registration model for multimodal brain images," *J Appl Clin Med Phys.*, 2023; 24:e14177 <https://doi.org/10.1002/acm2.14177>.



Jack Fowler Early-Career Investigator Award

(Funded by the Jack Fowler Award Fund)

This award was established in honor of Jack Fowler, PhD, Emeritus Professor of Human Oncology and Medical Physics,

University of Wisconsin. The award was presented to **Amrit Kaphle, PhD**, The University of Texas MD Anderson Cancer Center, Houston, TX, for the top scoring abstract submitted by Early-Career Investigators who entered the competition, entitled "Incorporation of Fractal-Based DNA Model into High Resolution TEM-Based Model of Gold Nanoparticle-Laden Tumor Cell for Monte Carlo Study of Gold Nanoparticle-Mediated Radiosensitization."



Jack Krohmer Early-Career Investigator Award

(Funded by the Krohmer Memorial Fund)

This award was established in honor of Jack Krohmer, PhD, a pioneer in the medical physics community. The award was

presented to **Xiaoyu Hu, PhD**, Johns Hopkins University, Baltimore, MD, for the best abstract submitted by Early-Career Investigators to the Scientific Program of the AAPM Annual Meeting, judged according to criteria of significance, innovation, and the potential for major scientific impact in an area of cutting-edge interest in medical physics. The abstract was entitled "Detectability of Ultra-Low Concentration Iodine Solutions By Photon-Counting CT."



Arthur Boyer Award for Innovation in Medical Physics Education

(Funded by the Boyer Innovation in Medical Physics Education Fund)

This award is given for the best presentation at an Education Council session concerning

innovative programs in medical physics education of physicists, physicians, ancillary personnel, and the public. Presentations can be concerned with scientific research, novel teaching strategies (team teaching or adult learning efforts), or novel educational materials (lectures, websites, or other innovations). This year's award went to **Kelly Kisling, PhD**, UC San Diego, for a presentation entitled, "Harmonizing Medical Physics Education in Nigeria through an Accredited Course: Experiences from a Pilot Program."

Carson/Zagzebski Distinguished Lecture On Medical Ultrasound

(Funded by the endowed Carson/Zagzebski Fund)

On Sunday, March 24 at the 2024 AAPM Spring Clinical Meeting, invited lecturer **Jonathan Rubin**, University of Michigan Medicine, delivered the lecture, "Assessing Blood Flow Rates in Ultrasound: Clinical Rationale and the Physicist's Role in Getting It Right."

The Anne and Donald Herbert Distinguished Lectureship in Modern Statistical Modeling

(Funded by the endowed Anne and Donald Herbert Fund)

On Tuesday, July 23 at the 2024 AAPM Annual Meeting & Exhibition, invited lecturer **Miguel Eckstein**, University of California Santa Barbara, delivered the lecture, "The Perception of Medical Images: Past, Present and Future."

John R. Cameron Early-Career Investigators Symposium Award

(Funded by the endowed John Cameron Fund)

The Early-Career Investigators Symposium is a competition in honor of University of Wisconsin Professor Emeritus John R. Cameron, PhD and John R. Cunningham, PhD, from Princess Margaret Hospital, and subsequently from the University of Alberta. The 10 highest scored abstracts submitted for the Symposium are selected for presentation, from which the top three presentations receive awards. 2024 winners were:



1st Place

Joseph Cozzi

University of Chicago
"Evaluation of Automatic Segmentations through Performance of Radiomic Features in the Classification of Thyroid Nodules on Ultrasound"



2nd Place

David Adam

Johns Hopkins University
"Development and Evaluation of Parameterizable Salivary Gland Model for Small-Scale Monte Carlo Radiopharmaceutical Therapy Dosimetry"



3rd Place

Rebecca Lim

The University of Texas MD Anderson Cancer Center
"Correlating Ventilation Change over Treatment with Toxicity and Dose in Proton- and Photon-Treated Lung Cancer Patients"

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Science Council Associates Mentorship Program (SCAMP)

has been established to recognize and cultivate outstanding researchers at an early stage in their careers with the goal of promoting a long-term commitment to science within AAPM. The program uses the process of "shadowing" to integrate the Associates into the scientific activities of the organization. Science Council Associates participate in the program for one year and are funded up to \$4,000 per Associate (to cover travel costs including flight, hotel, and meeting registration) to attend two consecutive AAPM Annual Meetings.

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AAPM Expanding Horizons

Travel Grants are awarded twice annually. As many as ten grants, each up to \$1,250, are given for the purpose of providing additional support for student and trainee travel to conferences that are not specifically geared toward medical physics. The travel grant is designed to provide an opportunity to broaden the scope of scientific meetings attended in order to introduce students and trainees to new topics which may be of relevance to medical physics research and which may subsequently be incorporated into future research in order to progress the field in new directions.

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- **Ngara Bird**
Duke University Health System
- **Shaojie Chang**
Mayo Clinic
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University of Chicago
- **Zakery Simpson**
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Round 2

- **Wesley Cunningham**
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- **Jun Hong**
The University of Texas MD Anderson Cancer Center
- **Zi Yang**
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Summer School Tuition Scholarships

are in the form of a full waiver of tuition fees for the entire AAPM 2024 Summer School. This award is available to applicants who are in the first five years of their careers in medical physics.

- **Yao Chen**
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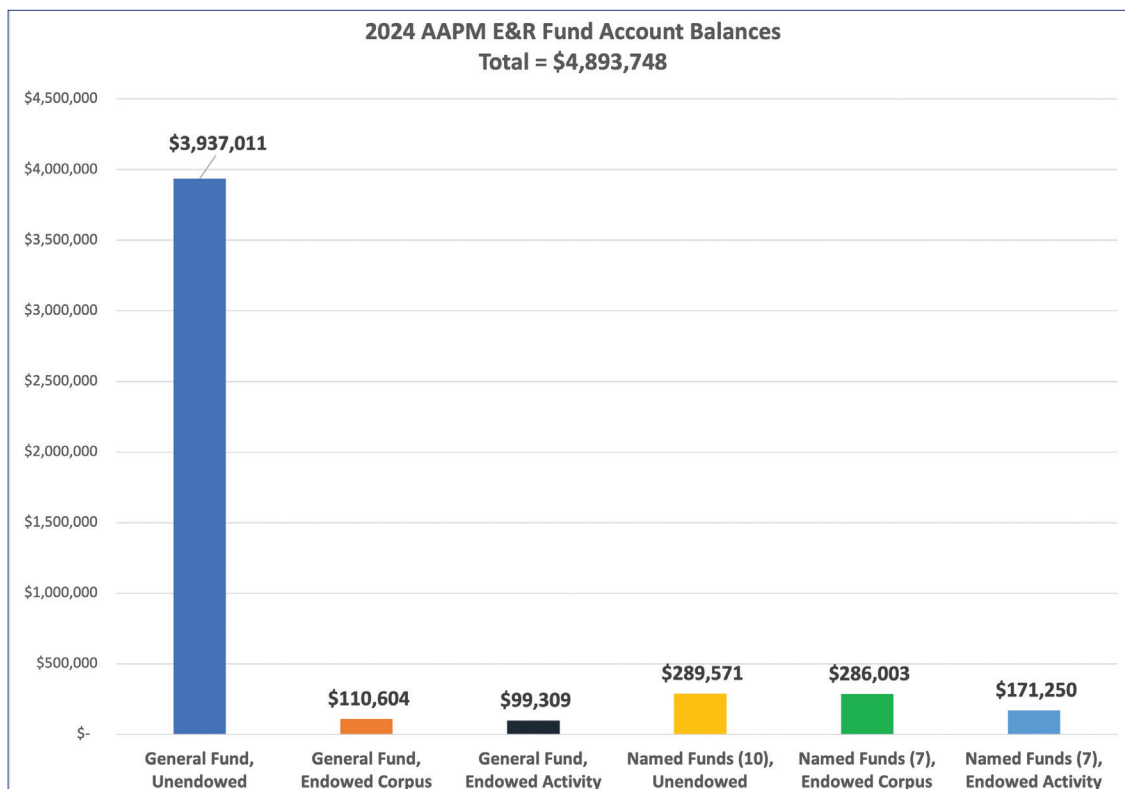
TeamBest® provides funding for 10 fellowships in the amount of \$500 each, to be used for travel, food and lodging expenses to attend the Annual Meeting. AAPM provides complimentary Annual Meeting registration for each recipient, including social functions.

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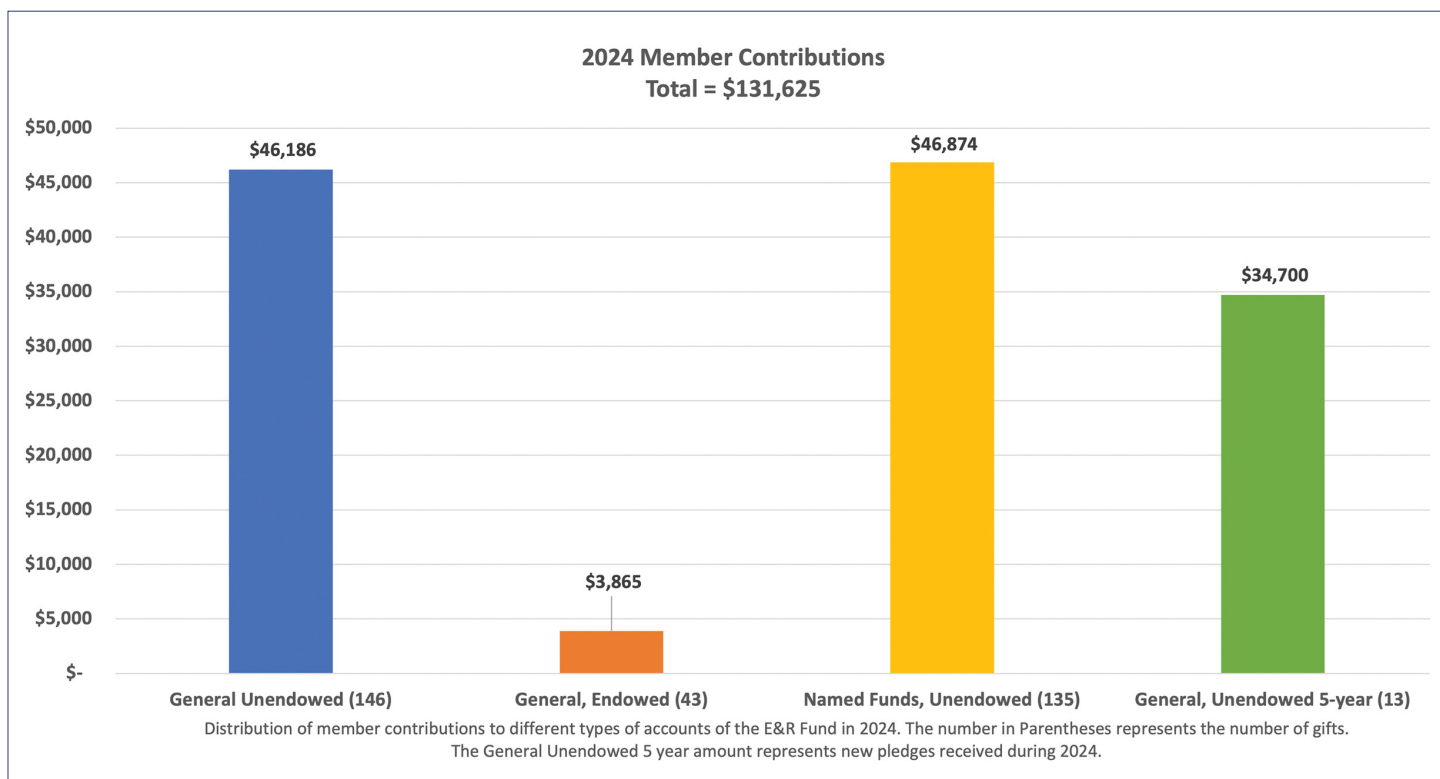
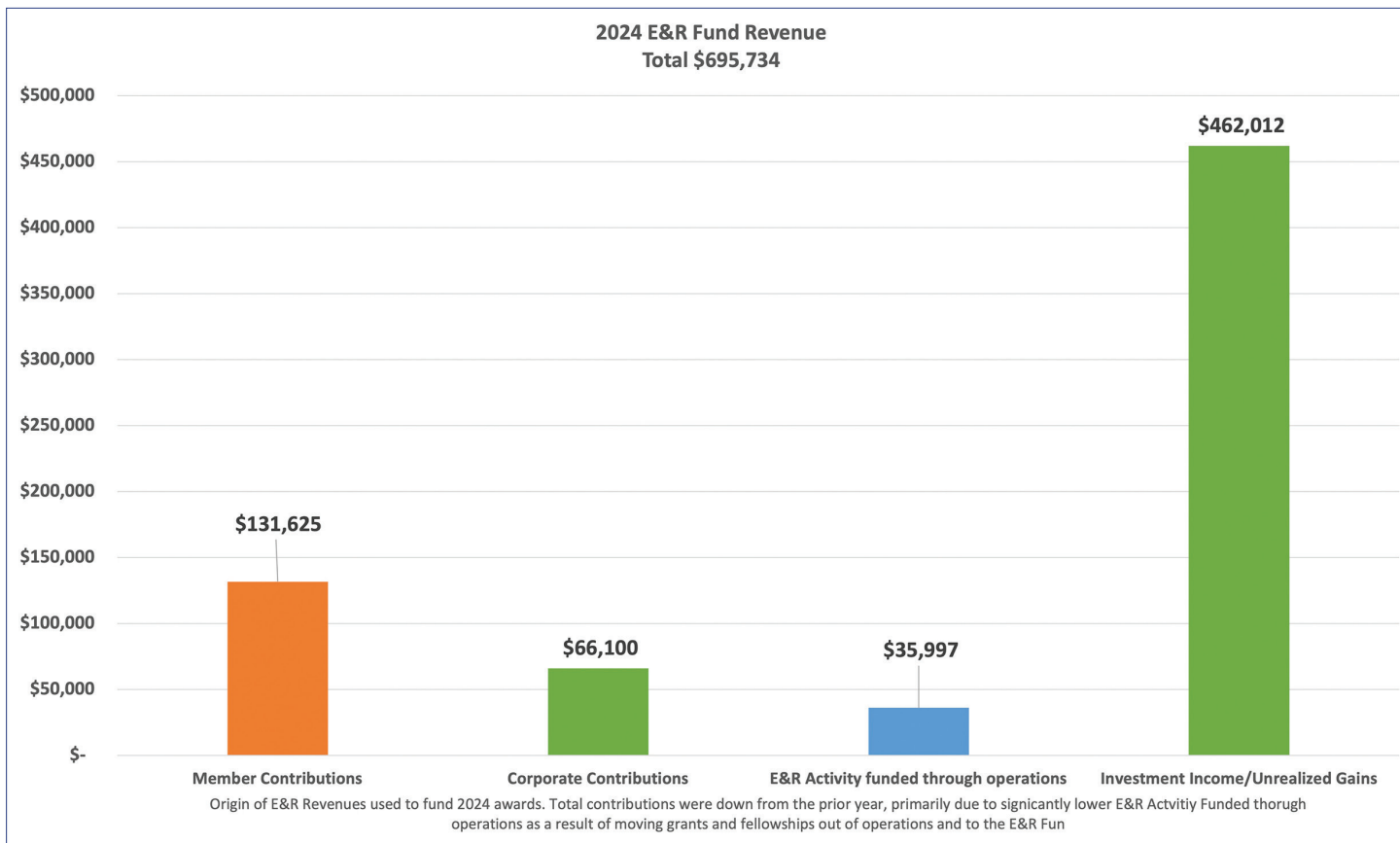


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