2023 Spring Student-Faculty Medical Physics Meeting

Location: HAMP 1113
Date: February 8th, 2023
Time: 5:00-6:30 pm
Medical Physics Students and Faculty
Medical Physics Club of Purdue
(formerly Medical Physics Journal Club)

“MPCP”
2022-2023 Leadership

Mahsa Servati  
Co-President

Brian Bozymski  
Co-President

Humberto Monsivais  
Treasurer
From MPJC to PMPC

Constitution submitted to be registered and approved as *official Purdue student organization* – Approved on January 31st!

**Benefits**

- University recognition
- Eligibility for funding
- Official purdue.edu email address
Events: “Journal Club” Meetings

- Brief volunteer report on a recent MP-related publication
  - Group-wide discussion, including MP faculty

- ABR question review
Events: Meet Medical Physicists

- Host (virtually or in-person) a professional physicist
  - Purdue Alumni, Residents, Researchers, Clinical, Industry…
- Opportunity to…
  - Hear their journey
  - Learn about their day-to-day
  - **Network!**
- Always open to your suggestions
Events: Socials and Specials

- Student hangouts and socials
- Get to know your peers outside class

FOOD-
Awards ($$$)

➢ ONE $200 award for MP-related travel
➢ TWO $50 awards for annual AAPM membership dues

How?

_Earn points for PMPC participation, presentations, etc._

- Awarded to students with most points at end of academic year
- Point collection detail via email
Spring 2023 Events
(Tentative → Check your emails!)

February 15th
– Journal Club #1: Humberto Monsivais presenting “Synthetic MRI for Clinical Neuroimaging”.

February 22nd
– Meet a MP with Mychaela Coyne, PhD, MS, Therapy MP at IU School of Medicine (tentative)

March 6th or 8th
– SPECIAL EVENT “AAPM Non-Clinical Careers in MP with Dr. Alison Roth”

March 22nd
– Journal Club #2

April 5th
– Meet a “” - TBD

April 19th
– Social Event: TBD

https://purdue.ca1.qualtrics.com/jfe/form/SV_6iq6kDP0a9PZ4Ls
Outline

• Are you new to Medical Physics?
• New Faculty
• Clinical Internships
• CAMPEP – new Requirements
• New courses or workshops?
• ABR Exam Part I
• Annual AAPM Conference
• Research opportunities for students (examples)
What is Medical Physics?

• Defined as an applied branch of physics concerned with the application of the concepts and methods of physics to the diagnosis and treatment of human disease.

• Responsible for the technical foundations of radiology, radiation oncology, and nuclear medicine.

• Incorporates both theoretical and experimental methods, but inherently an applied discipline.

https://w3.aapm.org/media/index.php
Medical Physics - subspecialties

Certification in one of three subspecialties:

- **Therapeutic Medical Physics**
  - Radiation Therapy/Oncology

- **Diagnostic Medical Physics**
  - All imaging modalities (X-rays, CT, MRI, Ultrasound, PET, SPECT)

- **Nuclear Medical Physics**
  - Nuclear Medicine (PET, SPECT): imaging, safety, administration of radionuclides

  ...development of therapeutic techniques (e.g., prostate implants, stereotactic radiosurgery), collaborate with radiation oncologists **to design treatment plans, and monitor equipment and procedures** to ensure that cancer patients receive the prescribed dose of radiation to the correct location.

  ...the effectiveness of radiological imaging procedures by assuring radiation safety and helping to develop improved imaging techniques...
What does a Medical Physicist do:

- Radiation Therapy Equipment – calibration, commissioning
- Planning of patient procedures
- Management of special procedures: e.g. Stereotactic Radiosurgery
- Dose Calculation
- Radiation Treatment Planning

Therapeutic Medical Physics
What does a Medical Physicist do:

- CT
- X-ray
- MRI
- Ultrasound
- PET
- SPECT

Diagnostic Medical Physics
Medical Physicist Role

• Medical physicists are concerned with three areas of activity: clinical service and consultation, research and development, and teaching. On the average their time is distributed equally among these three areas.

• A Qualified Medical Physicist is an individual who is competent to independently provide clinical professional services in one or more of the subfields of medical physics.

• Therapeutic Medical Physics
• Diagnostic Medical Physics
• Nuclear Medical Physics
• Medical Health Physics
• Magnetic Resonance Imaging Physics
How to become a Medical Physicist

- Graduate study (MS or PhD) within a CAMPEP-accredited Medical Physics program and subsequent completion of a CAMPEP-accredited residency program (https://www.campep.org/campeplstgrad.asp)

- However, there are many opportunities in academia, industry, and government!

Common backgrounds:

- Physics
- Nuclear Engineering
- Biomedical Engineering
- Radiological Sciences
- Biology*

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**CAMPEP Accredited Graduate Programs in Medical Physics**

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<tr>
<th>Institution</th>
<th>Initial Accreditation</th>
<th>Expiration</th>
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<td>Brown University</td>
<td>2011</td>
<td>2023</td>
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<tr>
<td>Columbia University</td>
<td>2014</td>
<td>2019</td>
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<td>Cleveland State University</td>
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<td>Wayne State University</td>
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https://medicalphysics.med.wayne.edu/faq-students
New Faculty

Dr. Seyi Oderindine
- **Assistant Professor in Medical Physics, Purdue University**
- **Adjunct Faculty IU School of Medicine, Department of Radiation Oncology**

Research interests
- Molecular imaging in Radiation Oncology
- Motion Management in Radiotherapy – Tumor tracking
- Monte Carlo simulation in Radiation Oncology dosimetry
- Machine Learning/Artificial Intelligence in Radiation Oncology

Dr. Mychaela Coyne (Radiation Oncology, IUSM)
- **Assistant Clinical Professor in Radiation Oncology (IUSM)**

Research interests
- Updating SRS/SBRT procedures (workflow, immobilization, tolerance tables, and Special Physics Consults)
- New methods in electron therapy treatment utilizing 3D scanners and 3D printers
Clinical Internships

Summer, 2023
HSCI 690 (3CR) – Radiation Therapy (RT) Physics Clinical Competencies I
Dr. Oderinde

Slots (4-5)
• Joseph Speth

Fall, 2023
HSCI 690 (3CR) – Radiation Therapy Physics Clinical Competencies II
Dr. Oderinde

Fall, 2023
HSCI 672 – MRI QA Intern
Dr. Dydak

Spring, 2023
HSCI 674 – Diagnostic Imaging Physics Intern
Dr. Stantz
CAMPEP - New Requirements, New Course

**HSCI 590 (2CR) Human Sectional Anatomy**

- Dr. Uzay Emir Plan
- Started in the Fall, 2022

**Muscles**

### Anterior Thoracic
- Pectoralis major
- Pectoralis minor
- Subclavius

### Lateral Thoracic
- Serratus anterior

### Posterior Thoracic
- **(Layer 1) Trapezius**
- **(Layer 2) Levator scapulae**
- **(Layer 2) Rhomboideus major**
- **(Layer 3) Rhomboideus minor**
- **(Layer 3) Serratus posterior superior**
- **(Layer 3) Serratus posterior inferior**
- **Splenius capitis**
- **Splenius colli**

### Thorax
- Intercostal muscles
- External
- Internal
- Diaphragm

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For movement of scapula
- Origin: spinous process T6-T11; iliac crest
- Inset: Intertubercular groove humerus

Can you see it on the sagittal view?
New Courses or Workshops

Is there a topic or material you would like to see presented?

<Discussion>
ABR Exam, Part 1  https://www.theabr.org/medical-physics/calendar

2023

Feb, 1 – March, 30  Application  (for Qualifying Exam, Part 1)

May  Registration  (for Qualifying Exam, Part 1)

August 2  Qualifying Exam, Part 1  (REMOTE)

Requirements:  https://www.theabr.org/medical-physics/initial-certification/part-1-exam/requirements-application

Dates/Locations:  https://www.theabr.org/medical-physics/initial-certification/certification-requirements/dates-locations-fees
AAPM Annual Conference

• Annual AAPM Conference
  • July 23 – 27 – Houston Texas
  • Deadline Date: Tuesday, February 28, 2023 8:00 PM Eastern (5:00 PM Pacific)
  • Great opportunity to present your research
  • Lots of professional development workshops
  • Networking with people from industry, residency, and academia
  • Purdue Alumni night!
Faculty Research Projects

Get INVOLVED in RESEARCH

Undergraduates
1. Evan Pogue, Sodium Cartilage Imaging (Emir)
2. William Mahoney, Neurochemical Profiles and PFAS exposure (Emir)
3. Lydia Dowden, Submillimeter Functional MRI (Emir)
4. Austin Tredley (RHS) – DCE-CT in cancer and MC in radiotherapy (Stantz)
5. Vennessa Ferrel (EE) – Image reconstruction in Thermoacoustics (Stantz)
6. Madelyn Menke (RHS) – MC in neutron production (Stantz)
7. Raishma Anwar (BME) – AI in Image processing (Stantz)
8. Meglan O’Mera (CS) – AI in Image processing (Stantz)
9. Nicole Stepp (preMed) – Performing qPCR assays in radiobiology (Stantz)
10. Lucas Bottini (preMed) – Performing ELISA assays in radiobiology (Stantz)
11. Camryn Clapper (preMed) - Tumor cell culture (Scarpelli)
12. Changkanjana, Kaufar Snow (preMed) – Tumor cell culture and radiobiology (Scarpelli)
13. Carson Mann (RHS) – PET and MRI image analysis (Scarpelli)
14. Sidney Schwartz (RHS) – Tumor cell culture and radiobiology (Scarpelli)
15. Talia Thornton (Public Health and PolSci) - Tumor cell culture and radiobiology (Scarpelli)
16. Hannah Abdon (BHS) (He)
17. Boxi Gong (BHS) (He)
18. Shreya Joshy (BIO) (He)
19. Julia Flowers (BHS) (He)
20. Lindsay Brncick (BHS) (He)
21. Kambell Trapp (BHS) (He)
22. Hyunsup Han (RHS) (He)
23. Sai Geethanjali Koduru (BHS) (He)
Conclusion

Last comment(s): Volunteers to help tour potential applicants.

Questions?

Meet with each other and Faculty!