

## ASHOK TIWARI, PhD

(ABR Board Eligible)

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Date: 12/28/2024

### EDUCATION

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- 12/2023 - **Medical Physics Residency**  
Department of Radiation Oncology  
Indiana University School of Medicine, Indianapolis, IN 46202
- 8/2022 - 5/2023 **Certificate in Medical Physics (CAMPEP)**  
Department of Radiation Oncology  
Wake Forest University School of Medicine, Winston-Salem, NC 27157
- 8/2017 - 5/2022 **PhD in Physics**  
Thesis: "*Monte Carlo Simulations and Phantom Measurements towards more Quantitative Dosimetry and Imaging in Nuclear Medicine*"  
Advisor: John Sunderland, PhD  
Department of Physics  
University of Iowa, Iowa City, IA 52242
- 8/2015 - 5/2017 **MS in Physics, Magna Cum Laude**  
Department of Physics  
University of South Dakota, Vermillion, SD 57069
- 9/2008 - 9/2012 **MSc in Physics**  
Central Department of Physics  
Tribhuvan University, Kathmandu, Nepal
- 8/2005 - 8/2008 **BSc in Physics**  
National Multiple College  
Tribhuvan University, Kathmandu, Nepal

### POST DOCTORAL TRAINING

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- 8/2022-11/2023 **Postdoctoral Research Associate**  
Advanced Computing for Health Sciences  
Computational Sciences and Engineering Division  
Oak Ridge National Laboratory, Oak Ridge, TN 37830  
Research: Monte Carlo for simulations for radionuclide dosimetry and radiobiology
- PET imaging extravasation dosimetry
  - Investigation of DNA damage from  $^{225}\text{Ac}$  radionuclide
- 7/2022 - 8/2022 **Postdoctoral Research Scholar**  
Department of Radiology  
University of Iowa City, Iowa City, IA 52242

### LICENSES & CERTIFICATIONS

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ABR Certificate in Therapeutic Medical Physics (Part I - Passed 8/2024)

ABR Certificate in Therapeutic Medical Physics (Part II - Approved)

### RESEARCH INTERESTS

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Radiation Physics, Treatment planning, Nuclear Medicine, Monte Carlo Simulations

## CLINICAL EXPERIENCE

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- **Treatment simulation with CT simulator**
  - Experience with Philips Big Bore & Siemens go.Open Pro CT simulators
  - Daily/Monthly QA of CT simulators, CTDI<sub>vol</sub> measurements
- **Treatment planning**
  - Six months of experience in photon and electron planning using *Eclipse v15.6*
  - IMRT/VMAT, SRS, SBRT, 3D & DCA planning for various anatomical sites
- **In-vivo dosimetry**
  - Calibration and absorbed dose measurements using TLDs, nanodots & Gafchromic films
  - Photons and Radiopharmaceutical dosimetry with Gafchromic EBT3 films
- **Oncology information system**
  - ARIA record and verify system
- **Clinical Quality Assurance (QA)**
  - IMRT/VMAT and SRS/SBRT patient-specific QAs
    - Phantom-based QA (ArcCHECK/MapCHECK phantoms)
    - Portal dosimetry with EPID - Varian
  - Initial, weekly, and End-of-Treatment chart checks
  - MU Calculation with RadCalc
  - Backup (and primary) POD roles
- **Machine quality assurance**
  - Daily/Monthly/Annual QA of Varian linacs (with QMP oversight)
  - Experience with Varian TrueBeam, TrueBeam Edge, and Varian iX Clinac
  - Daily/Monthly/Annual QA of Gamma Knife Perfexion system (with QMP oversight)
- **Special Procedures**
  - Total Skin Electron Therapy
  - Total Body Irradiation
  - Framed and frameless SRS
  - Gamma Knife and LDR & HDR Brachytherapy (in progress)
  - GammaTile Therapy (in progress)
- **Commissioning and acceptance testing**
  - Commissioning of Siemens go.Open Pro CT simulator
  - Commissioning of Varian VitalBeam linac (in progress)
  - VarianThink TB201 TrueBeam platform for physicist (33:30 hrs training)
- **Nuclear and Molecular imaging**
  - Experience with PET/CT: GE Discovery MI, Siemens Vision and Biograph mCT scanners
  - Phantom scan for research and PET/CT QA
- **Radioactive source handling and dose calibrator**
  - $^{90}\text{Y}$ ,  $^{177}\text{Lu}$  for absorbed dose measurements
  - $^{18}\text{F}$ ,  $^{89}\text{Zr}$ ,  $^{68}\text{Ga}$  for PET imaging

## TEACHING EXPERIENCE

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- 6/2024 - 9/2024 **Medical Physics Teaching Assistant**  
 Department of Radiation Oncology  
 Indiana University, Indianapolis, IN  
 Course: *The Physics of Radiation Therapy by Faiz Khan (RAON 604/605)*  
 (Collaborated with medical physics faculties to teach radiation oncology residents)
- 8/2017 - 8/2018 **Physics Teaching Assistant**  
 Department of Physics

University of Iowa, Iowa City, IA

Course: *General physics lab*

3/2013 - 1/2015 **Physics Lecturer**

SS College, Bhaktapur, Nepal

Course: *Introductory Nuclear Physics, Heat and Thermodynamics, and Mechanics*

## **GRADUATE RESEARCH AND PROFESSIONAL EXPERIENCE**

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9/2021 - 7/2022 Programmer (Monte Carlo), SPECT Project

Department of Radiology

University of Washington, Seattle, WA

8/2018 - 5/2022 Graduate Research Assistant

Department of Physics and Radiology

University of Iowa, Iowa City, IA

8/2015 - 5/2017 Graduate Research Assistant

Department of Physics

University of South Dakota, Vermillion, SD

1/2012 - 5/2012 Radiographer

Sunshine Medical Center, Kathmandu, Nepal

## **HONORS, AWARDS AND SCHOLARSHIPS**

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- AAPM Ohio Valley Chapter Meeting 2024, 2<sup>nd</sup> best presentation (Cash Prize \$200)
- 11<sup>th</sup> Annual ORPA Research Symposium 2023 – People’s Choice Award
- Ballard and Seashore Dissertation Fellowship (\$10,500), Spring 2022, University of Iowa
- Research Assistantship, Department of Physics and Radiology, University of Iowa
- Teaching Assistantship, Department of Physics, University of Iowa
- Teaching Assistantship, Department of Physics, University of South Dakota
- Graduate Studentship, Central Department of Physics, Tribhuvan University, Nepal
- Scholarship from Ministry of Environment, Science and Technology (Cash NPR 25,000), Nepal
- Travel award (\$1000), Seoul National University “11<sup>th</sup> Edoardo Amaldi Conference on Gravitational Waves”, June 21-26 (2015), Gwangju, South Korea
- Travel award (\$800), Beihang University, International graduate summer school in Aeronautics and Astronautics, July 15-23 (2014), Beijing, China

## **COMPUTATION SKILLS**

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- High Performance Computing (HPC): research computing, big data handling
  - SLURM and SGE job schedulers
  - Bash scripting
- Operating systems: Linux, Windows, MacOS
- Programming and software skills
  - Monte Carlo Simulation: Geant4, GATE, TOPAS, TOPAS-nBio toolkits
  - ROOT data analysis framework
  - Programming: Python, MATLAB
  - Interactive computing: Jupyter Notebook (Pandas, Numpy, Matplotlib)
  - JavaScript Object Notation (JSON)
  - Qt widget toolkit
  - Image analysis tools: ITK-SNAP, ImageJ, Amide, 3D Slicer and DICOM
  - Image reconstruction software for PET imaging: STIR, CASToR

- Github, DOCKER
- AutoCAD modeling

#### JOURNAL PUBLICATIONS (Most recent to earliest)

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12. **Tiwari A.**, Andriotty M., Agasthya G., Sunderland JJ., Osborne D., Kapadia A. Dosimetric and biological impact of activity extravasation of radiopharmaceuticals in PET imaging. *Med Phys.* 2024;1-13.
11. **Tiwari A.**, Merrick M., Graves S., and Sunderland JJ. Alpha dose point kernels and their potential application in labelling FAPI-radiotherapeutics. *Med Phys. (in review)*, 2024.
10. **Tiwari A.**, Merrick M., Graves S., and Sunderland JJ. Monte Carlo evaluation of hypothetical long axial field-of-view PET scanner using GE Discovery MI PET front-end architecture, *Med Phys.* 49:1139-1152, 2022.
9. Graves S., Martin M., **Tiwari A.**, Merrick M., and Sunderland JJ. SIR-Spheres® activity measurements reveal systematic miscalibration, *JNM*, 63 (8) 1131-1135, 2022; DOI: <https://doi.org/10.2967/jnumed.121.262650>.
8. Graves S., **Tiwari A.**, Merrick M. J., Hyer D., Flynn R., Kruzer A., Nelson A., Dewaraja Y., Miranda D., and Sunderland JJ. Accurate resampling of radial dose point kernels to a Cartesian matrix for voxelwise dose calculation, *Med Phys. (in review)*, 2023.
7. Merrick M. J., Rotsch D. A., **Tiwari A.**, Nolen J., Brossard T., Song J., Wadas T. J., Sunderland JJ., and Graves S. A. Half-Life of  $^{67}\text{Cu}$ , *J. Phys. Commun.* 5 085007, 2021.
6. **Tiwari A.**, Sunderland JJ., Graves S., Strand S., and Flynn R. Absorbed dose distributions from beta-decaying radionuclides: experimental validation of Monte Carlo tools for radiopharmaceutical dosimetry. *Med Phys.* 47(11):5779-5790, 2020.
5. Merrick M. J., Rotsch D. A., **Tiwari A.**, Nolen J., Brossard T., Song J., Wadas T. J., Sunderland J. J., and Graves S. A. Imaging and Dosimetric Characteristics of  $^{67}\text{Cu}$ . *Phys Med Biol* 66, 035002, 2021.
4. **Tiwari A.**, Graves S., and Sunderland J. The Impact of Tissue Type and Density on Dose Point Kernels for Patient-Specific Voxel-Wise Dosimetry: A Monte Carlo Investigation. *Radiat Res*, 193 (6): 531–542, 2020.
3. Zhang C., Mei D.-M., **Tiwari A.**, and Cushman P. Reply to “Comment of ‘Observation of annual modulation induced by  $\gamma$  rays from ( $\alpha$ ,  $\gamma$ ) reactions at the Soudan Underground Laboratory’”, *Phys Rev C* 101, 049802, 2020.
2. **Tiwari A.**, Zhang C., Mei D.-M., and Cushman P. Observation of annual modulation induced by  $\gamma$  rays from ( $\alpha$ ,  $\gamma$ ) reactions at the Soudan Underground Laboratory, *Phys Rev C*, Vol. 96, No. 4, 2017.
1. **Tiwari A.**, and Khanal U., Gravitational radiation from a particle in bound orbit around the black hole; relativistic correction, *J. Phys.: Conf. Ser.* 716, 012024, 2016.

#### CONFERENCE PRESENTATIONS AND ABSTRACTS (Peer reviewed)

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22. **Tiwari A.**, Andriotty M., Agasthya G., Sunderland J., Osborne D., and Kapadia A. Assessment of impact of activity extravasation of radiopharmaceutical in PET imaging. *Journal of Nuclear Medicine*, 65 (supplement 2) 242321. SNMMI Annual Meeting (2024) – Poster presentation.
21. Campos D.D., **Tiwari A.**, Huang K.C., Ng S.K., and Yue Y. Decreasing Pitch Reduces 4DCT Motion Artifacts for Increased ITV Fidelity. AAPM 66<sup>th</sup> Annual Meeting (2024).
20. **Tiwari A.**, Huang C., Ng S.K., Rivera J., Campos D., Oderinde O., Njeh C., and Yue Y. Transitioning from OSLD to TLDs for In-Vivo Dosimetry in Total Skin Electron Therapy: A Clinical Perspective. AAPM 66<sup>th</sup> Annual Meeting (2024) – Poster presentation.
19. **Tiwari A.**, Gonzalez M., Davern S., Agasthya G., and Kapadia A. Validation of Monte Carlo simulations to assess DNA damage from  $^{225}\text{Ac}$  for radiopharmaceutical therapy. AAPM 66<sup>th</sup> Annual Meeting (2024) – Oral presentation.

18. **Tiwari A.**, Gonzalez M. T., Andriotty M., Agasthya G., and Kapadia A. Experimental validation of Monte Carlo simulations for quantifying DNA damage in breast cancer cells exposed to  $^{225}\text{Ac}$ . 17<sup>th</sup> ICRR Meeting (2023) – Poster presentation.
17. **Tiwari A.**, Andriotty M., Agasthya G., Osborne D., and Kapadia A. Absorbed doses from accidental extravasation of radiotracers in PET imaging. AAPM 65<sup>th</sup> Annual Meeting (2023) – Oral presentation.
16. **Tiwari A.**, Andriotty M., Inman P., Agasthya G., and Kapadia A. Estimation of DNA damage from radionuclide irradiation in a single cell. SEAAPM Scientific Meeting, Feb 2-4, (2023) – Oral presentation.
15. **Tiwari A.**, Graves S., Merrick MJ., and Sunderland J. Evaluation of therapeutic alpha emitters for their potential to be used in FAPI compounds. *Journal of Nuclear Medicine*, 63 (supplement 2) 2815. SNMMI Annual Meeting (2022) – Poster presentation.
14. Merrick M., Dunnwald L., **Tiwari A.**, Sunderland J., and Graves S. Longitudinal PET/CT Imaging of  $^{64}\text{Cu}$  for Radiopharmaceutical Therapy Dosimetry. AAPM 63<sup>rd</sup> Annual Meeting (2021).
13. Sunderland J. and **Tiwari A.** A Comprehensive PET-CT scanner characterization performance assessment paradigm and database. *Journal of Nuclear Medicine*, 62 (supplement 1) 1398. SNMMI Annual meeting (2021).
12. Graves S., Merrick M., **Tiwari A.**, and Sunderland J. Evaluation of a scalable qSPECT calibration method for radiopharmaceutical dosimetry. *Journal of Nuclear Medicine*, 62 (supplement 1) 143. SNMMI Annual meeting (2021).
11. **Tiwari A.**, Merrick M. J., Graves S. A., and Sunderland J. Monte Carlo simulation of 4-ring Discovery MI PET/CT scanner and its extended axial field-of-view to 2 m. *Journal of Nuclear Medicine*, 62 (supplement 1) 1150. SNMMI Annual Meeting (2021) – Oral presentation.
10. **Tiwari A.**, Graves S., Strand S. and Sunderland J. Experimental validation of Monte Carlo-generated beta absorbed doses for 3D voxelwise dosimetry. *Journal of Nuclear Medicine*, 61 (supplement 1) 533. SNMMI Annual Meeting (2020) – Oral presentation.
9. Graves S., **Tiwari A.**, Kruzer A., Nelson A., Mirando D., Dewaraja Y., and Sunderland J. Monte Carlo validation of convolution-based voxelwise dosimetry. *Journal of Nuclear Medicine*, 61 (supplement 1) 1019. SNMMI Annual Meeting (2020).
8. Graves S., **Tiwari A.**, and Sunderland J. Collapsed-cone convolution superposition for improved accuracy of voxelwise dosimetry. *Journal of Nuclear Medicine*, 61 (supplement 1) 535. SNMMI Annual Meeting (2020).
7. Merrick M. J., Rotsch D., **Tiwari A.**, Nolen J., Brossard T., Song J., Wadas T. J., Sunderland J. J., Graves S. A. Production, SPECT Imaging, and Initial Evaluation of  $^{67}\text{Cu}$  for Theranostic Applications. AAPM Annual Meeting (2020).
6. **Tiwari A.**, Graves S., Sunderland J. Measurements of dose point kernels using GATE Monte Carlo toolkit for personalized convolution dosimetry. *Journal of Nuclear Medicine*, 60 (supplement 1), 274-274. SNMMI Annual Meeting (2019) – Oral presentation.
5. Graves S., **Tiwari A.**, Hyer D., Flynn R., Buatti J., Sunderland J. Impact of Kernel Truncation On  $^{177}\text{Lu}$ -DOTATATE and  $^{131}\text{I}$ -MIBG Voxelwise Dosimetry. *Medical Physics* 46 (6), E316-E316. AAPM Annual Meeting (2019).
4. Graves S., **Tiwari A.**, Menda Y., Madsen M., Sunderland J. Toward best practice voxel-wise  $^{177}\text{Lu}$  dosimetry: kernel generation, scanner characterization, and convolution-based dose calculation. *Journal of Nuclear Medicine*, 60 (supplement 1), 119. SNMMI Annual Meeting (2019).
3. **Tiwari A.**, Zhang C. and Mei D. M. The study of the correlation between (alpha, gamma) induced events with respect to Radon annual modulation. APS Meeting, Washington DC (2017) – Oral presentation.
2. **Tiwari A.**, Zhang C., and Mei D. M. (alpha, gamma) reaction induced background events for rare event experiments. APS Division of Nuclear Physics Meeting, Vancouver, Canada (2016) – Oral presentation.

1. **Tiwari A.** and Khanal U. Gravitational radiation from a particle in bound orbit around black hole; relativistic correction. 11<sup>th</sup> Edorado Amaldi Conference on Gravitational Waves, Gwangju, South Korea (2015) – Oral presentation.

#### INVITED AND RECENT TALKS

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5. **Tiwari A.** DNA Damage estimations from  $^{225}\text{Ac}$  for Radiopharmaceutical Therapy: Experiment vs Monte Carlo study. AAPM POWV-ORVC Joint Fall chapter meeting, Columbus OH, Sep 14 (2024).
4. **Tiwari A.**, Merrick MJ., Graves S., and Sunderland J. Dose point kernels and their potential application in labeling FAPI-compounds. ARIA Workshop on “Evolving Targeted Therapies for Cancer”, Oak Ridge National Laboratory, Nov 2-3, (2022). <https://aria-workshop.ornl.gov/speakers/ashok-tiwari/>
3. **Tiwari A.** and Sunderland J. Simulations of therapeutic alpha-emitting radionuclides in various tissues. OpenGATE Virtual Meeting, Nov 18, (2021).
2. **Tiwari A.** and Sunderland J. GATE simulation of Discovery MI PET scanner and its extended version. GATE Scientific Meeting, Virtual Edition, May 10 (2021).
1. **Tiwari A.** Dosimetry of therapeutic beta emitters using GATE Monte Carlo simulation and its experimental validation for radiopharmaceutical therapy. GATE Technical Meeting, Virtual Edition, Sep 10 (2020).

#### PROFESSIONAL MEMBERSHIPS

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- *Associate Member* - American Association of Physicist in Medicine - AAPM (2019 - 2024)
- *Associate Member* - Society of Nuclear Medicine and Molecular Imaging - SNMMI (2023 - 2024)

#### JOURNAL REVIEWER

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- Medical Physics

#### LEADERSHIP ROLES

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- Vice President, Nepalese Student Association, University of Iowa (2017 - 2020)