

Praneeth Kandlakunta, Ph.D.

Research Associate 2-Engineer

Nuclear Engineering Program, Department of Mechanical and Aerospace Engineering,

The Ohio State University

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Education:

Received Doctor of Philosophy degree in Nuclear Engineering from The Ohio State University in May 2014.
Dissertation: Gamma-rays Rejection in a Gadolinium based Semiconductor Neutron Detector

Received Master of Science degree in Nuclear Engineering from The Ohio State University in June 2012.
Thesis: A Proof-of-Principle Investigation for a Neutron-Gamma Discrimination Technique in a Semiconductor Neutron Detector

Received Bachelor of Engineering (Honors) degree in Electronics and Instrumentation Engineering from Birla Institute of Technology and Science-Pilani, India in December 2008.

Research and Professional Experience:

Research Associate 2-Engineer, Nuclear Engineering Program	2020 – Present
Research Associate 1-Engineer, Nuclear Engineering Program	2018 – 2020
Department of Mechanical and Aerospace Engineering The Ohio State University Columbus, OH 43210	

Responsibilities:

- ✦ Writing proposal applications to seek funding and helping with proposal preparation
- ✦ Supervising graduate and undergraduate students in research.
- ✦ Conducting research

Projects:

- Evaluation of a single crystal perovskite detector for X-ray sensitivity and gamma-ray response.
- Development of a fast-switching X-ray source based on a pulsed UV LED, photocathode, and electron multiplier.
 - **Principal Investigator** on this project.
 - Designed and constructed a high-vacuum system
 - Designed and constructed the X-ray tube geometry consisting of the LED, photocathode, electron multiplier and copper anode
 - Installed a remotely operable high voltage power supply for the anode
- Evaluation of X-ray sensitivity of thin-film perovskite devices.
- Evaluation of Li-doped perovskite sensor response to thermal neutrons
- Evaluation of solar photovoltaic device response to neutrons and gamma-rays, and study of gamma-radiation effects in solar cells.
- Evaluation of silicon carbide (SiC) detectors for monitoring trace amounts of uranium and plutonium using alpha spectroscopy.
- Evaluation of solar photovoltaic cells for detection of ionizing radiation

- Experimental study of solar cell response to X-rays, gamma-rays, and neutrons. Monte Carlo and finite element simulations of radiation interactions and charge transport.
- Built a pulsed X-ray testing apparatus to evaluate transient response of semiconductor sensors to X-rays.
- Built a pulsed laser testing apparatus to evaluate fast transient response of solar photovoltaic cells
- Characterization of SiC semiconductor devices and SiC detectors for charged particle detection. Evaluation of SiC detectors for fast and thermal neutron monitoring using reactor experiments and Monte Carlo simulations.
- Evaluation of new scintillator materials using photoluminescence and radioluminescence measurements.
- Evaluation of a SiC based nuclear voltaic device
- Evaluation of a self-powered neutron detector (SPND) for in-core neutron flux monitoring.
- Design and construction of a vacuum chamber apparatus for radiation measurements and sensor characterization study (Advised)

Postdoctoral Research Associate, Department of Radiation Oncology

2015 – 2018

Washington University in St. Louis – School of Medicine
St. Louis, MO 63110

- Design of a new X-ray transmission target for high power distributed X-ray sources – Monte Carlo simulations and Finite Element thermal modeling of a composite X-ray target for design optimization.
- Development of a multiple-pixel thermionic emission x-ray source – Construction of X-ray tube hardware and instrumentation including control electronics; finite element thermal modeling of X-ray target, anode and insulation; design, fabrication and characterization of oxide-coated cathodes.
- Development of a new detector array for proton dose verification in proton beam QA.
- Monte-Carlo simulations of a novel design of prompt gamma-ray detector for in-vivo proton range verification in proton beam therapy.
- Monte Carlo modeling and simulations of a LINAC treatment head for radiation therapy dose evaluation.
- Supervised undergraduate students on research projects

Nuclear Engineer

2013 – 2014

MP Machinery and Testing, LLC.
State College, Pennsylvania

- Performed neutron transport calculations and analysis using discrete ordinates transport codes for nuclear utility plants.

Graduate Research Associate, Nuclear Engineering Program

2010 – 2013

Department of Mechanical and Aerospace Engineering
The Ohio State University
Columbus, OH 43210

- Proposed and validated a gamma-ray discrimination method for gadolinium based semiconductor neutron detector using Monte-Carlo simulations and experiments.
- Developed and characterized a lithium-6 scintillator glass based neutron beam monitor for the neutron beam facility at the OSU Research Reactor

- Designed and constructed a vacuum chamber based digital spectroscopy instrumentation system for radiation measurements and detector evaluation

Student Research Assistant, Nuclear Engineering Program

2010 – 2010

Department of Mechanical and Aerospace Engineering
The Ohio State University
Columbus, OH 43210

- Performed preliminary study and measurements for neutron noise analysis for core component vibration monitoring. Assisted in experiments and other research tasks.

Software Engineer

2008 – 2009

Invensys India Development Center,
Hyderabad, India.

- Responsible for conducting tests to detect issues in product application software – InTouch and ArchestrA

Project Trainee in Digital Electronic Design

2008 – 2008

Texas Instruments (India) Pvt. Ltd.
Bangalore, India.

- Performed power consumption analysis of a DDR memory system.
- Developed RTL design in Verilog HDL for an algorithm on reduction of external memory power in a high-definition video processing system. Verified the RTL design with Verilog test bench simulations and synthesized the design in Design Compiler to generate timing and area reports.

Honors

- **BEST IN PHYSICS Award** for abstract submitted to 2016 AAPM Annual Meeting
- **Excellence in Research Award** OSU Nuclear Engineering Program, 2013
- **Alpha Nu Sigma National Honor Society** Membership

Focused Research

- Nuclear Instrumentation and Radiation Detection Applications
- Monte Carlo Simulations and Modeling of Radiation Interaction with Materials
- WBG Semiconductor Radiation Sensors
- Pulsed X-ray Sources
- X-ray Imaging

Research Advisee (Co-Advising)

- Neil Taylor, Ph.D. (2021)
- Lei Pan, Ph.D. (2021)
- Jarod Remy, Graduate Student
- Wyatt Panaccione, Graduate Student
- Alexander Safranek, Graduate Student
- Daryl Giglio, Graduate Student
- Matt Bisbee, Graduate Student
- Christopher Heckert, Graduate Student

- Zuolong Zhu, Graduate student
- Andrew Maier, B.S. (2022)
- Zachary Dancoes, B.S. (2022)
- Nathan Smith, B.S. (2020)
- James Midkiff, Undergraduate Student

Courses

- Guest Lectures on Nuclear Radiation and Their Measurement – Monte Carlo Modeling and Simulations (graduate level)

Membership

- American Nuclear Society, 2010 to 2014 and 2018-Present
- IEEE, IEEE Nuclear and Plasma Sciences Society, 2012 to 2013, 2020 to Present
- American Association of Physicists in Medicine, 2015-2018

Contributions to ANS National Meetings

2019 Session Chair, " Radiation Detection and Imaging," American Nuclear Society (ANS) Winter Meeting Nov 12-17, 2019, Washington, DC, United States.

Journal Publications (total 20, of which 8 as first author):

1. **Kandlakunta P**, Van Zile M, Cao LR. "Silicon Solar Cells for Post-detonation Monitoring and Gamma-Radiation Effects." *Nuclear Science and Engineering* (Accepted, in production).
2. Dai X, Fei C, **Kandlakunta P**, Zhao L, Ni Z, Cao LR, Huang J. "Origin of the X-ray Induced Damage in Perovskite Solar Cells" *IEEE Transactions on Nuclear Science*. 2022 July 12. doi: 10.1109/TNS.2022.3190200.
3. Cao G, Larson N, Storms B, **Kandlakunta P**, Cao LR, Li S. "Gamma-ray spectra analyses of molten salts in spent nuclear fuels pyroprocessing facilities for mass measurement." *Journal of Radioanalytical and Nuclear Chemistry* **331**, 3085–3091 (2022).
4. Taylor NR, Ji M, Pan L, **Kandlakunta P**, Kravchenko I, Pooran J, Aytug T, Paranthaman MP, Cao LR. "Large area vertical Ga₂O₃ Schottky diodes for X-ray detection." *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*. 2021 Jul 18:165664.
5. Pan L, **Kandlakunta P**, Van Zile M, Dai X, Huang J, McClory JW, Cao LR. "Acquiring and Modeling of Si Solar-Cell Transient Response to Pulsed X-Ray." *IEEE Transactions on Nuclear Science*. 2021 Mar 18; 68(5):1152-60.
6. Holmes J, Brown J, Koeck FA, Johnson H, Benipal MK, **Kandlakunta P**, Zaniewski A, Alarcon R, Cao R, Goodnick SM, Nemanich RJ. "Performance of 5- μ m PIN diamond diodes as thermal neutron detectors." *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*. 2020 May 1;961:163601.
7. **Kandlakunta P**, Tan C, Smith N, Xue S, Taylor N, Downing RG, Hlinka V, Cao LR. "Silicon carbide detectors for high flux neutron monitoring at near-core locations." *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*. 2020 Feb 11;953:163110.
8. Pan L, Feng Y, **Kandlakunta P**, Huang J, Cao LR. "Performance of Perovskite CsPbBr₃ Single Crystal Detector for Gamma-Ray Detection." *IEEE Transactions on Nuclear Science*. 2020 Jan 7;67(2):443-9.

9. Taylor NR, Kuang W, Saeidijavash M, **Kandlakunta P**, Zhang Y, Cao LR. “Direct printing of metal contacts on 4H-SiC for radiation detection” *AIP Advances*. 2019 Sep 24;9(9):095041.
10. Xue S, Tan C, **Kandlakunta P**, Oksuz I, Hlinka V, Cao LR “Methods for improving the power conversion efficiency of nuclear-voltaic batteries” *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*. 2019 May 21;**927**:133-139.
11. Wang J, Chen L, Persson M, Rajbhandary PL, **Kandlakunta P**, Carini G, Fahrig R “Pulse pileup analysis for a double-sided silicon strip detector using variable pulse shapes” *IEEE Transactions on Nuclear Science*, vol. 66, no. 6, pp. 960-968, June 2019.
12. Taylor NR, Alnajjar N, Jarrell J, **Kandlakunta P**, Simpson M, Blue TE, Cao LR. “Isotopic concentration of uranium from alpha spectrum of electrodeposited source on 4H-SiC detector at 500° C” *Journal of Radioanalytical and Nuclear Chemistry*, 2019 May 15;320(2):441-9.
13. **Kandlakunta P**, Momin S, Sloop A, Zhang T, Khan R. “Characterizing a Geant4 Monte Carlo model of a multileaf collimator for a TrueBeam™ linear accelerator.” *Physica Medica*, 2019 Mar 1;59:1-2.
14. **Kandlakunta P**, Thomas A, Tan Y, Khan R, Zhang T. “Design and numerical simulations of W-diamond transmission target for distributed x-ray sources.” *Biomedical Physics & Engineering Express*. 2019 Jan 24;5(2):025030.
15. Yang S, Xu Z, Xue S, **Kandlakunta P**, Cao L, Huang J. “Organohalide Lead Perovskites: More Stable than Glass under Gamma-Ray Radiation.” *Advanced Materials*. 2018 Nov 28;1805547.
16. Chuirazzi WC, Oksuz I, **Kandlakunta P**, Massey TN, Brune CR, Cherepy NJ, Martinez HP, Cao L. “Evaluation of polyvinyl toluene scintillators for fast neutron imaging” *Journal of Radioanalytical and Nuclear Chemistry*. 2018 October; 318(1): 543-51.
17. **Kandlakunta P**, Pham R, Khan R, Zhang T. “Development of multi-pixel x-ray source using oxide-coated cathodes” *Physics in Medicine & Biology*, 2017 Jun 13;62(13):N320.
18. **Kandlakunta P**, Cao LR. “Neutron conversion efficiency and gamma interference with gadolinium” *Journal of Radioanalytical and Nuclear Chemistry*, 2014 Jun 1;300(3):953-61.
19. **Kandlakunta P**, Cao LR, Mulligan P. “Measurement of internal conversion electrons from Gd neutron capture.” *Nuclear Instruments and Methods in Physics Research Section A*, **705**, 36 (2013).
20. **Kandlakunta P**, Cao L. “Gamma-Ray Rejection, Or Detection, with Gadolinium as a Converter,” *Radiation Protection Dosimetry*, **151** (3), 2012, 586-590.

Patents:

1. Zhang T, **Kandlakunta P**, inventors; Washington University in St Louis WUSTL, assignee. “Multi-pixel x-ray source with tungsten-diamond transmission target.” *United States Patent US 11,289,301*. 2022 Mar 29.
2. Cao LR, **Kandlakunta P**, inventors; The Ohio State University. “A tritium sensor with tritium-hydrogen differentiation for reactors, fuel cycles, medicine, and nuclear applications.” *Patent Pending*.

Book Chapter:

- Pan L, **Kandlakunta P**, Cao LR. “Inorganic Perovskite CsPbBr₃ Gamma-Ray Detector.” In *Advanced Materials for Radiation Detection 2022* (pp. 33-54). Springer, Cham.

Conference Proceedings and Extended Abstract

1. **Kandlakunta P**, Van Zile M, Cao LR. “Solar Photovoltaic Device Response to Gamma-ray Irradiation.” *2021 ANS Winter Meeting and Technology Expo*. Nov. 30–Dec. 3, 2021. Washington DC.
2. **Kandlakunta P**, Van Zile M, Pan L, McClory J, Huang J, Cao LR. “Radiation monitoring and radiation effects in solar photovoltaic panels.” *2021 IEEE SORMA West-Virtual Meeting* (Abstract and Oral Presentation).
3. Cao LR, Pan L, **Kandlakunta P**, Nie W. “Perovskite detectors for x-ray imaging and gamma spectroscopy: overview and current state-of-the-art.” In *Hard X-Ray, Gamma-Ray, and Neutron Detector Physics XXIII* 2021 Aug 4 (Vol. 11838, p. 118380B). International Society for Optics and Photonics.
4. **P. Kandlakunta**, X. Dai, J. Midkiff, M. Van Zile, L. Pan, J. Huang, J. McClory, L. R. Cao, “Solar Photovoltaic Devices as Radiation Sensors for Post-detonation Nuclear Forensics,” *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) Record*, Nov 2020.
5. Oksuz I, Van Zile M, Bisbee M, Kauffman A, Hatch J, **Kandlakunta P**, Cherepy NJ, Cao LR. "Characterization of a reactor-based fast neutron beam facility for fast neutron imaging." In *Hard X-Ray, Gamma-Ray, and Neutron Detector Physics XXII* 2020 Aug 20 (Vol. 11494, p. 114940T). International Society for Optics and Photonics.
6. **Kandlakunta Praneeth**, Chuting Tan, Nathan Smith, Sha Xue, Neil Taylor, R. Gregory Downing, Vasil Hlinka, and Lei R. Cao. "High Flux Neutron Detection Using Silicon Carbide from Near-core Locations." *Transactions of the American Nuclear Society* 121, no. 1 (2019): 427-430.
7. **Praneeth Kandlakunta**, Lei Cao, “Neutron-Gamma Separation in a Gadolinium based Semiconductor Neutron Detector.” *Transactions of the American Nuclear Society*, Reno, NV, USA (2014).
8. Lei Cao, **Praneeth Kandlakunta**, “Measure Internal Conversion Electron Spectrum of Gadolinium Neutron Capture Using Neutron Beam”, *Transactions of the American Nuclear Society*, Atlanta, GA, USA (2013).
9. **Praneeth Kandlakunta**, Padhraic Mulligan, Danyal Turkoglu, Lei Cao, “A Neutron Flux Monitor for a Reactor Neutron Beam Facility”, *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) Record*, Anaheim, CA, USA (2012).
10. **Praneeth Kandlakunta**, Danyal Turkoglu, Padhraic Mulligan, Lei Cao, “A Neutron Beam Monitor for a Neutron Depth Profiling Facility.” *Transactions of the American Nuclear Society*, Chicago, IL, USA (2012).
11. J. Ralston, **P. Kandlakunta**, L. Cao, “Electron Emission Following ^{157}Gd Neutron Capture.” *Transactions of the American Nuclear Society*, Chicago, IL, USA (2012).
12. **Praneeth Kandlakunta**, Lei Cao. “A Neutron Detector with Gamma Discrimination.” *Transactions of the American Nuclear Society*, Vol. 105, Washington, D.C., USA. (2011):335-336.
13. Padhraic L. Mulligan, Danyal J. Turkoglu, **Praneeth Kandlakunta**, Lei Cao. “Improving Neutron Depth Profiling at The Ohio State University Using Multiple Detectors.” *Transactions of the American Nuclear Society*, Vol. 104, Hollywood, FL, USA (2011): 227-229.
14. Jinghui Wang, **Praneeth Kandlakunta**, Thomas F. Kent, John Carlin, Daniel R. Hoy, Roberto C. Myers, Lei Cao. “A Gadolinium Doped Superlattice GaN Schottky Diode for Neutron Detection.” *Transactions of the American Nuclear Society*, Vol. 104, Hollywood, FL, USA (2011): 207-209.
15. D. Turkoglu, **P. Kandlakunta**, P. Mulligan, L. Cao, J. Zhang, B.T. Sang, R.G. Downing, “Development of a Neutron Depth Profiling Facility for Characterizing Advanced Reactor Materials,” *Transactions of the American Nuclear Society*, Vol. 103, Hollywood, FL, USA (2011).

16. D. Turkoglu, J. Strah, **P. Kandlakunta**, L. Cao. "Development of an External Neutron Beam Facility at The Ohio State University." *Transactions of the American Nuclear Society*, Vol.102, Las Vegas, NV, USA (2010).
17. Tan, Y., P. Kandlakunta, R. Liu, S. Zhou, T. Zhao, and T. Zhang. "Transmission W-Diamond X-Ray Target for High Brightness Microfocus X-Ray Sources." In *MEDICAL PHYSICS*, vol. 46, no. 6, pp. E301-E301. 111 RIVER ST, HOBOKEN 07030-5774, NJ USA: WILEY, 2019.
18. Zhang, T., **P. Kandlakunta**, X. Chen, Y. Tang, and A. Thomas. "X-Ray Field Imaging with a Linear Scan X-Ray Source and Linear Detector Array." In *MEDICAL PHYSICS*, vol. 45, no. 6, pp. E536- E537. 111 RIVER ST, HOBOKEN 07030-5774, NJ USA: WILEY, 2018.
19. **Kandlakunta, P.**, Y. Tang, A. Thomas, and T. Zhang. "A W-Diamond Transmission Target for Multi- Pixel X-Ray Sources with a Stationary Anode." In *MEDICAL PHYSICS*, vol. 45, no. 6, pp. E370- E370. 111 RIVER ST, HOBOKEN 07030-5774, NJ USA: WILEY, 2018.
20. Khan, Rao, **Praneeth Kandlakunta**, and Tiezhi Zhang. "Use of tessellated geometry for improved linac design and modeling in Monte Carlo simulations: poster Reception-19." *Medical Physics*, 44, no. 8 (2017): 4378.
21. Rao, W., R. Pham, **P. Kandlakunta**, M. Anastasio, and T. Zhang. "Development and Evaluation of Iterative CT Image Reconstruction in Cylindrical Image Coordinate: su-f-201-02." *Medical Physics*, 44, no. 6 (2017): 2758-2759.
22. **Kandlakunta, P.**, T. Zhang, S. Mutic, and R. Khan. "A Comprehensive Geant4 Monte Carlo Model of Multileaf Collimator for Varian Truebeam Linac: su-i-gpd-t-351." *Medical Physics*, 44, no. 6 (2017): 2909.
23. **Kandlakunta, P.**, R. Pham, W. Rao, R. Khan, and T. Zhang. "Thermal Analysis of a Stationary Target of X-ray Sources Operating in Pulse Mode: su-k-702-02." *Medical Physics*, 44, no. 6 (2017): 3017.
24. Pham, R., W. Rao, **P. Kandlakunta**, M. Anastasio, and T. Zhang. "Joint Image Domain Motion-estimation and Motion-compensation for 4d Cone Beam Computed Tomography Image Reconstruction: th-ab-601-07." *Medical Physics*, 44, no. 6 (2017): 3284.
25. **Kandlakunta, P.**, R. Pham, and T. Zhang. "TH-CD-207B-01: BEST IN PHYSICS (IMAGING): Development of High Brightness Multiple-Pixel X-Ray Source Using Oxide Coated Cathodes." *Medical physics*, 43, no. 6Part46 (2016): 3888-3889.
26. Pham, R. , Sun, B. , Zhao, T. , Li, H. , Yang, D. , Grantham, K. , Goddu, S. , Santanam, L. , Bradley, J. , Mutic, S. , **Kandlakunta, P.** and Zhang, T. (2016), SU-F-J-194: Development of Dose-Based Image Guided Proton Therapy Workflow. *Medical Physics*, 43: 3452-3453.

Synergistic Activities

Proposal Reviewer:

U.S. Department of Energy Phase I&II Release 1&2 SBIR/STTR Proposals

U.S. Department of Energy NEUP Consolidated Innovative Nuclear Research Proposals

Journal Reviewer:

IEEE Transactions on Nuclear Science

Nuclear Instruments and Methods in Physics Research A

Medical Physics

Journal of Applied Physics

Journal of Physics: D Applied Physics

Nuclear Engineering and Technology

Journal of Radioanalytical and Nuclear Chemistry