Ming Fang

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904 Stoughton Ct #3, Urbana, IL 61801, US

Education

PhD| ***Nuclear, Plasma, and Radiological Engineering*** Jan 2020 – Jan 2024
University of Illinois Urbana-Champaign (UIUC) Urbana, USA

- Cumulative GPA: 4.0 / 4.0

Master of Science | ***Nuclear, Plasma, and Radiological Engineering*** Aug 2018 – Dec 2019
University of Illinois Urbana-Champaign (UIUC) Urbana, USA

- Cumulative GPA: 4.0 / 4.0

Bachelor of Engineering | ***Nuclear Engineering and Technology*** Sept 2014 – June 2018
University of Science and Technology of China (USTC) Hefei, China

- Cumulative GPA: 3.89 / 4.3

Research Experience and Employment

Ex-core Microreactor Monitoring (EM2) for Autonomous Operation Jan 2024 - Present
Postdoctoral Research Associate, Advisor: Prof. Angela Di Fulvio, UIUC Urbana, USA

- Developed a non-destructive method of measuring in-core flux distribution using ex-core neutron detectors.

Multi-Mode Imaging for TRISO-fueled Pebble Identification Aug 2020 - Dec 2023
Graduate Research Assistant, Advisor: Prof. Angela Di Fulvio, UIUC Urbana, USA

- Developed SCALE/MCNP models of advanced nuclear reactors and performed criticality/burnup calculation.
- Designed a boron-coated straw-based neutron multiplicity counter to perform non-destructive assay of TRISO fuel.
- Developed image reconstruction, image segmentation, and fuel pebble identification algorithms in C++/python to enable single pebble identification in advanced nuclear reactors.
- Contributed to the writing of the awarded Phase II STTR DOE grant.

Quantitative Image Reconstruction in Passive Gamma Emission Tomography (PGET) Aug 2019 – Sept 2020
Graduate Research Assistant, Advisor: Prof. Angela Di Fulvio, Prof. Yoann Altmann, UIUC Urbana, USA

- Developed a linear forward model in C++ to characterize PGET system response to spent nuclear fuel assemblies in water pools.
- Implemented an accelerated Monte Carlo algorithm in C++ to perform gamma-ray down-scattering correction.
- Developed a full set of software in python to reconstruct cross-sectional images of spent fuel assemblies, identify missing fuel pins, and estimate fuel pin activities.

Active Interrogation Using a DD Neutron Generator May 2019 – May 2020
Graduate Research Assistant, Advisor: Prof. Angela Di Fulvio, UIUC Urbana, USA

- Implemented a shift-register algorithm in python to calculate the coincidence neutron count rate.
- Demonstrated the possibility of using a DD generator as a neutron active interrogation source based on the strong correlation between the time-dependent neutron count rate signature and uranium mass.

Positron Annihilation Lifetime Spectroscopy (PALS) Jan 2019 – May 2019
Graduate Research Assistant, Advisor: Prof. Angela Di Fulvio, UIUC Urbana, USA

- Developed and optimized a PALS experimental setup using organic scintillators and fast digitizers.
- Implemented an interpolation-based constant-fraction discrimination (CFD) timing algorithm in C++ to determine the pulse arrival time.

General-Purpose Pulse-Processing Program Sept 2018 – Present
Graduate Research Assistant, Advisor: Prof. Angela Di Fulvio, UIUC Urbana, USA

- Developed a fast and general-purpose pulse-processing program based on the CERN ROOT framework in C++.
- Pulse-processing capabilities include zero suppression, pile-up rejection, pulse shape discrimination (PSD), CFD timing, coincidence selection, energy calibration, etc.
- Visualization capabilities include waveform plot, pulse height distribution/pulse integral distribution plot, PSD plot, time-of-flight plot, etc.

Implementation of Key Algorithms in Gamma Spectrum Analysis Software July 2017 – Mar 2018
Undergraduate Research Assistant, Advisor: Dr. Jia Li, USTC Hefei, China

- Implemented pulse smoothing, peak finding and background subtraction algorithms in C++.
- Implemented energy calibration algorithm in C++.

PUBLICATIONS

Peer-Reviewed Journal Publications

1. John Leland, **Ming Fang**, Satwik Pani, Yuri Venturini, Marco Locatelli, and Angela Di Fulvio. Enabling pulse shape discrimination with commercial asics. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, page 169438, 2024

2. **Ming Fang** and Angela Di Fulvio. Rotation-invariant rapid triso-fueled pebble identification based on feature matching and point cloud registration. *Annals of Nuclear Energy*, 203:110527, 2024

3. Abdullah Abdulaziz, Jianxin Zhou, **Ming Fang**, Stephen McLaughlin, Yoann Altmann, and Angela Di Fulvio. A variational autoencoder for minimally-supervised pulse shape discrimination. *Annals of Nuclear Energy*, 204:110496, 2024

4. **Ming Fang** and Angela Di Fulvio. Feasibility of neutron coincidence counting for spent triso fuel. *Annals of Nuclear Energy*, 193:110062, 2023

5. **Ming Fang**, Jeff Lacy, Athanasios Athanasiades, and Angela Di Fulvio. Boron coated straw-based neutron multiplicity counter for neutron interrogation of triso fueled pebbles. *Annals of Nuclear Energy*, 187:109794, 2023

6. **Ming Fang**, Yoann Altmann, Daniele Della Latta, Massimiliano Salvatori, and Angela Di Fulvio. Quantitative imaging and automated fuel pin identification for passive gamma emission tomography. *Scientific reports*, 11(1):1–11, 2021

7. Ahmed Karam Eldaly, **Ming Fang**, Angela Di Fulvio, Stephen McLaughlin, Mike E Davies, Yoann Altmann, and Yves Wiaux. Bayesian activity estimation and uncertainty quantification of spent nuclear fuel using passive gamma emission tomography. *Journal of Imaging*, 7(10):212, 2021

8. Zhihua Liu, **Ming Fang**, Jon George, Ling-Jian Meng, and Angela Di Fulvio. Neutron tomography of spent fuel casks. *Journal of Signal Processing Systems*, pages 1–11, 2021

9. Matthew Weiss, **Ming Fang**, Yoann Altmann, Marc G. Paff, and Angela Di Fulvio. Effect of natural gamma background radiation on portal monitor radioisotope unmixing. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, 2021

10. Noah Rebei, **Ming Fang**, and Angela Di Fulvio. Quantitative and three-dimensional assessment of holdup material. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, 984:164630, 2020

11. **Ming Fang**, Nathan Bartholomew, and Angela Di Fulvio. Positron annihilation lifetime spectroscopy using fast scintillators and digital electronics. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, 943:162507, 2019

Proceedings at International Conferences

1. **Ming Fang** and Angela Di Fulvio. Experimental methods for tagging and tracking triso-fueled pebbles in pebble-bed reactors. In *Proceedings of 2023 ANS Winter Conference and Expo*, November 2023

2. **Ming Fang** and Angela Di Fulvio. Demonstration of gamma ray insensitivity of boron coated straw-based neutron multiplicity counter. In *Proceedings of the INMM&ESARDA 2023 Joint Annual Meeting*, May 2023

3. Kholod Mahmoud, **Ming Fang**, Ashish Avachat, and Angela Di Fulvio. Positron annihilation lifetime spectroscopy and geant4 simulation of positronium (ps) lifetime in soft tissues. In *2023 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, 2023

4. **Ming Fang** and Angela Di Fulvio. Simulation of charge collection in a boron-coated straw detector for emerging fuel cycles. In *2022 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, 2022

5. Jacob Fritchie, **Ming Fang**, Jon Balajthy, Melinda Sweany, Thomas Weber, and Angela Di Fulvio. Comparison of sipm properties and their effect on organic-scintillator based detector performance. In *2022 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, 2022

6. **Ming Fang** and Angela Di Fulvio. Boron coated straw-based neutron multiplicity counter for neutron interrogation of triso fueled pebbles. In *Proceedings of the INMM 63rd Annual Meeting*, July 2022. **Overall best paper award**, second place

7. **Ming Fang** and Angela Di Fulvio. Algorithms for triso fuel identification based on x-ray ct. In *Transactions of the American Nuclear Society*, volume 126, pages 245–247, 2022

8. **Ming Fang**, Satwik Pani, and Angela Di Fulvio. Enabling psd-capability for a high-density channel imager. In *2021 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, pages 1–4, 2021

9. Zhihua Liu, **Ming Fang**, and Angela Di Fulvio. Feasibility of fast neutron imaging of spent nuclear fuel dry storage casks. In *Proceedings of the INMM-ESARDA Joint Annual Meeting*, August 2021

10. Matthew Weiss, **Ming Fang**, Yoann Altmann, Marc Paff, and Angela Di Fulvio. Unmixing algorithms for the identification of radionuclide signatures in the presence of natural background and shielded materials. In *Proceedings of the INMM-ESARDA Joint Annual Meeting*, August 2021

11. **Ming Fang** and Angela Di Fulvio. Multi-Mode Imaging for TRISO-fueled Pebble Identification. ANS Student Conference 2021, April 2021

12. Satwik Pani, **Ming Fang**, and Angela Di Fulvio. Pulse Shape Discrimination with Pulse Shaping through ASICs. ANS Student Conference 2021, April 2021

13. Zhihua Liu, **Ming Fang**, and Angela Di Fulvio. Fast Neutron Interrogation for Spent Nuclear Fuel Dry Storage Cask Monitoring. ANS Student Conference 2021, April 2021

14. **Ming Fang**, Yoann Altmann, Daniele Della Latta, Massimiliano Salvatori, and Angela Di Fulvio. Attenuation and scattering correction in passive gamma emission tomography reconstruction. In *2020 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, pages 1–4, 2020

15. **Ming Fang**, Daniele Della Latta, Yoann Altmann, Massimiliano Salvatori, and Angela Di Fulvio. Computational Methods for Pin Identification in Passive Gamma Emmission Tomography. In *Proceedings of the INMM 61st Annual Meeting*, July 2020

16. **Ming Fang**, Nathan Bartholomew, and Angela Di Fulvio. Timing performance of organic scintillators for positron annihilation lifetime spectroscopy. In *2019 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, pages 1–5. IEEE

Presentations at International Conferences

1. An online bayesian algorithm for tracking radiation sources with the compton imager (oral). Atlanta, GA, USA, May 2024. SIAM Conference on Imaging Science

2. Demonstration of gamma ray insensitivity of boron coated straw-based neutron multiplicity counter (oral). Vienna, Austria, May 2023. INMM&ESARDA 2023 Joint Annual Meeting

3. Boron-coated straw-based neutron multiplicity counter for emerging fuel cycles (oral). Milano, Italy, November 2022. 2022 IEEE Nuclear Science Symposium, Medical Imaging Conference and Room Temperature Semiconductor Detector Conference

4. Boron coated straw-based neutron multiplicity counter for neutron interrogation of triso fueled pebbles (oral). Virtual Conference, July 2022. INMM 63rd Annual Meeting

5. Algorithms for TRISO Fuel Identification Based on X-ray CT (oral). Anaheim, CA, USA, June 2022. 2022 ANS Annual Meeting

6. Enabling psd-capability for a high-density channel imager (oral). Virtual Conference, December 2021. 2021 IEEE Nuclear Science Symposium and Medical Imaging Conference

7. Multi-mode imaging for triso-fueled pebble identification (oral). Virtual Conference, April 2021. ANS Student Conference 2021

8. Comparison of image reconstruction methods for simulated passive gamma emission tomography (oral). Virtual Conference, November 2020. 2020 IEEE Nuclear Science Symposium and Medical Imaging Conference

9. Computational methods for pin identification in passive gamma emmission tomography (oral). Virtual Conference, July 2020. INMM 61st Annual Meeting

10. Positron annihilation lifetime spectroscopy using fast scintillators and digital electronics (poster). Manchester, UK, November 2019. 2019 IEEE Nuclear Science Symposium and Medical Imaging Conference

Teaching and Mentoring

Instructor Jan. 2024 - May 2024
UIUC Urbana, USA
- Course: NPRE 451 NPRE Laboratory, Spring 2024. Co-teach with Prof. Di Fulvio.

Graduate Teaching Assistant Sept. 2023 – Dec. 2023
UIUC Urbana, USA
- Course: NPRE452 Advanced Radiological Laboratory, Fall 2023

Seminars
UIUC Urbana, USA
- Course: NPRE451 NPRE Laboratory, Fall 2022
- Course: NPRE452 Advanced Radiological Laboratory, Spring 2022, Fall 2022

Outreach Activities Mar 2020
UIUC Urbana, USA
- Coordinated lab tour for the Academic Redshirt in Science and Engineering (ARISE).

Mentor Sept 2018 – Present
UIUC Urbana, USA
- John Leland, Master student.
- Jacob Fritchie, Master student.
- Satwik Pani, Undergraduate student.
- Muzammil Siddiqui, Undergraduate student.
- Noah Rebei, High School Summer Research Program, University Laboratory High School.

Undergraduate Teaching Assistant Sept 2017 – Jan 2018
USTC Hefei, China
- Course: Quantum Mechanics B, Fall 2017.

Skills

Programming: C/C++, OpenMP/MPI, Python (NumPy, SciPy, Matplotlib), Bash, Java
Document Creation: LaTeX, Markdown, Microsoft Office Suite
Software: MCNP, SCALE, MATLAB, Mathematica, ROOT, Git, CMake/Make, SOLIDWORKS, OrCAD Capture and PCB Editor, Origin, Vivado
Training: Radioactive Material Safety Training, Neutron Generator Operation Training

Honors and Awards

IEEE NPSS Glenn F. Knoll Graduate Educational Grant April 2024
IEEE Nuclear and Plasma Sciences Society (NPSS)

J.D. Williams Student Paper Award, Second Place July 2022
Institute of Nuclear Materials Management 63rd Annual Meeting

ACDIS Summer 2022 Fellowship May 2022
The Program in Arms Control & Domestic and International Security (ACDIS), UIUC

Fellow of Exotic Beam Summer School June 2019
Oak Ridge National Laboratory

Outstanding Teaching Assistant Mar 2018
USTC

Professional Societies

- Student member of Institute of Electrical and Electronics Engineers (IEEE)
- Student member of IEEE Nuclear and Plasma Sciences Society
- Secretary, Institute of Nuclear Materials Management UIUC Student Chapter
- Student member of Institute of Nuclear Materials Management
- Student member of American Nuclear Society