

MING FANG

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EDUCATION

PhD Candidate <i>Nuclear, Plasma, and Radiological Engineering</i> University of Illinois at Urbana-Champaign (UIUC) <ul style="list-style-type: none">Cumulative GPA: 4.0 / 4.0	Jan 2020 – Present Urbana, USA
Master of Science <i>Nuclear, Plasma, and Radiological Engineering</i> University of Illinois at Urbana-Champaign (UIUC) <ul style="list-style-type: none">Cumulative GPA: 4.0 / 4.0	Aug 2018 – Dec 2019 Urbana, USA
Bachelor of Engineering <i>Nuclear Engineering and Technology</i> University of Science and Technology of China (USTC) <ul style="list-style-type: none">Cumulative GPA: 3.89 / 4.3	Sept 2014 – June 2018 Hefei, China

RESEARCH INTEREST

- Development of non-destructive assay methods of special material for the characterization of tri-structural isotropic particle (TRISO) fuel for pebble bed reactors.
- Development of single-volume scatter camera with SiPM scintillator readout.
- Radiation detector signal processing algorithms with a focus on accelerated Monte Carlo implementation and iterative linear inverse solver for image reconstruction.
- Application of advanced radiation detection techniques, such as positron lifetime spectroscopy.

RESEARCH EXPERIENCE

Multi-Mode Imaging for TRISO-fueled Pebble Identification UIUC <ul style="list-style-type: none">Designed a boron-coated straw-based neutron multiplicity counter to perform non-destruction assay of fuel pebbles.Implemented an accelerated Monte-Carlo algorithm to simulate X-ray images of a pebble generated by an industrial CT scanner.Developed image reconstruction, image segmentation, and fuel pebble identification algorithms.Contributed to the writing of the awarded Phase II STTR DOE grant.	Aug 2020 - Present Urbana, USA
Quantitative Image Reconstruction in Passive Gamma Emission Tomography UIUC <ul style="list-style-type: none">Developed a linear forward model to characterize the imaging system response.Implemented an accelerated Monte Carlo algorithm to perform scattering correction.Developed a full set of software to reconstruct cross-sectional images of inspected fuel assemblies, identify missing fuel pins, and estimate fuel pin activities.	Aug 2019 – Sept 2020 Urbana, USA
Active Interrogation Using a DD Neutron Generator UIUC <ul style="list-style-type: none">Implemented a shift-register algorithm 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.	May 2019 – May 2020 Urbana, USA
Positron Annihilation Lifetime Spectroscopy (PALS) UIUC <ul style="list-style-type: none">Developed and optimized a PALS experimental setup using organic scintillators and fast digitizers.Implemented an interpolation-based constant-fraction discrimination (CFD) timing algorithm to determine the pulse arrival time.	Jan 2019 – May 2019 Urbana, USA
General-Purpose Pulse-Processing Program UIUC	Sept 2018 – Present Urbana, USA

- Developed a fast and general-purpose pulse-processing program based on the CERN ROOT framework.

Implementation of Key Algorithms in Gamma Spectrum Analysis Software

Jul 2017 – Mar 2018

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. **Ming Fang** and Angela Di Fulvio. Boron coated straw-based neutron multiplicity counter for neutron interrogation of triso fueled pebbles (under review). *Annals of Nuclear Energy*, 2022
2. **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
3. **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
4. 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
5. 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
6. 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
7. 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

Proceedings at International Conferences

1. **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
2. **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
3. **Ming Fang**, Satwik Pani, 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
4. **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
5. **Ming Fang** and Angela Di Fulvio. Multi-Mode Imaging for TRISO-fueled Pebble Identification. *ANS Student Conference 2021*, April 2021
6. **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

7. **Ming Fang**, Daniele Della Latta, Yoann Altmann, Massimiliano Salvatori, and Angela Di Fulvio. Computational Methods for Pin Identification in Passive Gamma Emission Tomography. In *Proceedings of the INMM 61st Annual Meeting*, July 2020
8. **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
9. 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
10. Jon Balajthy, Melinda Sweany, Thomas Weber, James Burkart, Joel Christiansen, Angela Di Fulvio, **Ming Fang**, Jacob Fritchie, and Darlene Udoni. Characterization and optimization of silicon photomultipliers for high temperature applications. In *2022 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, 2022
11. 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
12. 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
13. Satwik Pani, **Ming Fang**, and Angela Di Fulvio. Pulse Shape Discrimination with Pulse Shaping through ASICs. ANS Student Conference 2021, April 2021
14. 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

PRESENTATIONS AT INTERNATIONAL CONFERENCES

1. 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
2. Boron coated straw-based neutron multiplicity counter for neutron interrogation of triso fueled pebbles (oral). Virtual Conference, July 2022. INMM 63rd Annual Meeting
3. Algorithms for TRISO Fuel Identification Based on X-ray CT (oral). Anaheim, CA, USA, June 2022. 2022 ANS Annual Meeting
4. Enabling psd-capability for a high-density channel imager (oral). Virtual Conference, December 2021. 2021 IEEE Nuclear Science Symposium and Medical Imaging Conference
5. Multi-mode imaging for triso-fueled pebble identification (oral). Virtual Conference, April 2021. ANS Student Conference 2021
6. 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
7. Computational methods for pin identification in passive gamma emission tomography (oral). Virtual Conference, July 2020. INMM 61st Annual Meeting
8. Positron annihilation lifetime spectroscopy using fast scintillators and digital electronics (poster). Manchester, UK, November 2019. 2019 IEEE Nuclear Science Symposium and Medical Imaging Conference

APPOINTMENTS

Graduate Research Assistant
Neutron Measurement Laboratory

Sept 2018 – Present
Urbana, USA

TEACHING AND MENTORING

Outreach Activities
UIUC

Mar 2020
Urbana, USA

- Coordinated lab tour for the Academic Redshirt in Science and Engineering (ARISE).

Mentor
UIUC

Sept 2018 – Present
Urbana, USA

- Jacob Fritchie, Undergraduate student.
- Satwik Pani, Undergraduate student.
- Muzammil Siddiqui, Undergraduate student.
- Noah Rebei, High school student, University Laboratory High School.

Undergraduate Teaching Assistant
USTC

Sept 2017 – Jan 2018
Hefei, China

- Course: Physics, Subject: Quantum Mechanics B.

SKILLS

Programming: C/C++, OpenMP/MPI, Python (NumPy, SciPy, Matplotlib), Bash, Java

Document Creation: \LaTeX , Markdown, Microsoft Office Suite

Software: MCNP, MATLAB, Mathematica, ROOT, Git, CMake/Make, SOLIDWORKS, OrCAD Capture and PCB Editor, Origin, Vivado

HONORS AND AWARDS

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

Outstanding Student Scholarship

May 2017

USTC

Institute of Modern Physics, Chinese Academy of Sciences Scholarship

Sept. 2017

USTC

Outstanding Student Scholarship

May 2016

USTC

Institute of Modern Physics, Chinese Academy of Sciences Scholarship

Sept. 2015

USTC

Outstanding Freshman Scholarship

Sept. 2014

USTC

PROFESSIONAL SOCIETIES

- Student member of Institute of Nuclear Materials Management
- Student member of American Nuclear Society