Ming Fang

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Education

PhD Student | *Nuclear, Plasma, and Radiological Engineering* — Jan 2020 – Present
University of Illinois at 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 at 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 Interest

- Development of non-destructive assay methods of special material for the characterization of tri-structural isotropic particle (TRISO) fuel for pebble bed reactors and use of advanced techniques, such as positron lifetime spectroscopy, and 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.

Research Experience

Multi-Mode Imaging for TRISO-fueled Pebble Identification — Aug 2020 - Present
UIUC — Urbana, USA
- Designed a 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.

Quantitative Image Reconstruction in Passive Gamma Emission Tomography — Aug 2019 – Sept 2020
UIUC — Urbana, USA
- 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.

Active Interrogation Using a DD Neutron Generator — May 2019 – May 2020
UIUC — Urbana, USA
- 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.

Positron Annihilation Lifetime Spectroscopy (PALS) — Jan 2019 – May 2019
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 to determine the pulse arrival time.

General-Purpose Pulse-Processing Program — Sept 2018 – Present
UIUC — 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**, Muzammil Siddiqui, Zhihua Liu, and Angela Di Fulvio. Estimation of ^{235}u mass in depleted uranium samples through active interrogation i. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment (Submitted)*

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*

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. 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

5. 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**, 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)*, Yokohama, Japan, December 2021. IEEE

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

3. **Ming Fang**, Yoann Altmann, Daniele Della Latta, Massimiliano Salvatori, and Angela Di Fulvio. Attenuation and Scattering Correction in Passive Gamma Emission Tomography Reconstruction. Boston, MA, USA, December 2020. 2020 IEEE NSS-MIC

4. **Ming Fang**, Daniele Della Latta, Yoann Altmann, Massimiliano Salvatori, and Angela Di Fulvio. Computational Methods for Pin Identification in Passive Gamma Emmission Tomography. Baltimore, Maryland, USA, July 2020. INMM 61st Annual Meeting

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

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

3. 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

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

5. 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 Sept 2018 – Present
Neutron Measurement Laboratory Urbana, USA

TEACHING AND MENTORING

Outreach Activities Mar 2020
UIUC Urbana, USA

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

Mentor Sept 2018 – Aug 2020
UIUC Urbana, USA

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

Undergraduate Teaching Assistant Sept 2017 – Jan 2018
USTC Hefei, China

- Course: Physics, Subject: Quantum Mechanics B.

SKILLS

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

Fellow of Exotic Beam Summer School Jun 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