

Nathan Giha

giha@umich.edu • www.nathangiha.info • ORCID: 0000-0002-6826-4681

Research interests

Nuclear fission; Reaction reconstruction; Nuclear Structure; Instrumentation

Education

University of Michigan

2019 – 2024 (Expected)	PH.D. NUCLEAR ENGINEERING & RADIOLOGICAL SCIENCES Dissertation: Reconstructing angular momenta of fission fragments	4.0/4.0
2019 – 2022	M.S.E. NUCLEAR ENGINEERING & RADIOLOGICAL SCIENCES Highlighted coursework: Elementary particle physics; Electrodynamics & classical fields; Quantum mechanics	4.0/4.0
2015 – 2019	B.S.E. NUCLEAR ENGINEERING & RADIOLOGICAL SCIENCES, <i>Summa Cum Laude</i> Minor in Mathematics	3.9/4.0

Research experience

Sep 2019 – Present	Detection for Nuclear Nonproliferation Group Advisor: Professor Sara Pozzi (University of Michigan) <ul style="list-style-type: none">Analyzing experimental correlations between fission observables to discover how angular momentum is generated in nuclear fissionContributed to the construction and characterization of a twin Frisch-grid ionization chamber and experimental campaign correlating fission fragment properties with neutron and γ-ray emissionEquipped laboratory for scintillator manufacturing and characterized glass bars coupled to silicon photomultipliers for neutron imaging (IEEE-NSS Proc., NIM:A)
-----------------------	--

- May 2021 – **Argonne National Laboratory**
 Aug 2021 Mentors: Filip Kondev, Fredrik Tovesson (Physics Division)
- Constrained angular momenta of discrete levels of ^{146}Ce populated in β decay of ^{146}La by studying γ -ray cascades with Gammasphere
 - Found evidence of ground-state deformation in ^{146}La , flipping the spins of the ground and isomeric states in the present evaluation ([APS DNP](#)).
- May 2016 – **Detection for Nuclear Nonproliferation Group**
 Aug 2019 Mentors: William Steinberger, Angela Di Fulvio, Marc Ruch, Sara Pozzi (University of Michigan)
- Designed and assembled readout electronics ([IEEE-NSS Proc.](#)) for silicon photomultiplier arrays
 - Developed radiation imaging algorithms in Python and validated with Monte Carlo simulations
 - Characterized radiation imaging systems ([Scientific Reports](#), [NIM:A](#))
 - Contributed to experimental campaign at Idaho National Laboratory, imaging kg quantities of special nuclear material
- May 2018 – **Los Alamos National Laboratory**
 Aug 2018 Mentor: Marc Ruch (Safeguards Science & Technology Group)
- Developed an algorithm for analyzing time-correlated coincidence data for localizing correlated neutron sources
 - Simulated detection scenarios and tested algorithm on high-performance computing cluster
 - Presented findings orally ([LA-UR-18-27463](#)) and in an internal technical note

Awards and honors

- | | |
|------------|--|
| 2022 | First Place, Innovations in Nuclear Tech R&D (US DOE Office of Nuclear Energy) |
| 2020 | NSF Graduate Research Fellowship (National Science Foundation) |
| 2019 | Dean's Fellowship (UM College of Engineering) |
| 2019 | Best in Detection & Measurements, ANS Student Conference |
| 2018 | Michigan Competitive Scholarship (State of Michigan) |
| 2017, 2018 | Andrew A. Kucher Scholarship (NERS Department) |
| 2016, 2017 | Summer Research Fellowship (Consortium for Verification Technology) |
| 2016 | James D. Butt Scholarship (NERS Department) |

Journal articles

1. **N. Giha**, S. Marin, J. A. Baker, I. E. Hernandez, K. J. Kelly, M. Devlin, J. M. O'Donnell, R. Vogt, J. Randrup, P. Talou, A. E. Lovell, I. Stetcu, O. Serot, O. Litaize, A. Chebboubi, S. D. Clarke, and S. A. Pozzi. "Correlations Between γ -Ray Multiplicity and Compound Nucleus Excitation Energy in $^{239}\text{Pu}(n, f)$ ". *Phys. Rev. Lett.* (Submitted July 2022). URL: <https://arxiv.org/abs/2207.02743>
2. W. M. Steinberger, **N. Giha**, R. Lopez, J. C. Nicholson, S. D. Clarke, and S. A. Pozzi. "Passive gamma-ray imaging of special nuclear materials using a handheld dual particle imager". *IEEE Transactions on Nuclear Science* (Submitted July 2021)
3. W. M. Steinberger, **N. Giha**, P. Marleau, S. D. Clarke, and S. A. Pozzi. "Source isolation and identification using the handheld dual particle imager". *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* (Submitted June 2021)
4. **N. Giha**, W. M. Steinberger, L. Q. Nguyen, J. S. Carlson, P. L. Feng, S. D. Clarke, and S. A. Pozzi. "Organic glass scintillator bars with dual-ended readout". *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* 1014 (2021), p. 165676. ISSN: 0168-9002. DOI: [10.1016/j.nima.2021.165676](https://doi.org/10.1016/j.nima.2021.165676)
5. W. M. Steinberger, **N. Giha**, M. Y. Hua, S. D. Clarke, and S. A. Pozzi. "Anisotropic neutron response of trans-stilbene and impact on a handheld dual particle imager". *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* 1003 (2021), p. 165266. ISSN: 0168-9002. DOI: [10.1016/j.nima.2021.165266](https://doi.org/10.1016/j.nima.2021.165266)
6. W. M. Steinberger, M. L. Ruch, **N. Giha**, A. Di Fulvio, P. Marleau, S. D. Clarke, and S. A. Pozzi. "Imaging Special Nuclear Material using a Handheld Dual Particle Imager". *Scientific Reports* 10.1 (2020), p. 1855. DOI: [10.1038/s41598-020-58857-z](https://doi.org/10.1038/s41598-020-58857-z)

Conference proceedings

1. **N. Giha**, W. M. Steinberger, S. D. Clarke, S. A. Pozzi, L. Q. Nguyen, J. S. Carlson, and P. L. Feng. "Melt-Cast Organic Glass Scintillators for a Handheld Dual Particle Imager". *2020 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. 2020, pp. 1–5. DOI: [10.1109/NSS/MIC42677.2020.9507862](https://doi.org/10.1109/NSS/MIC42677.2020.9507862)

2. W. M. Steinberger, **N. Giha**, P. Marleau, S. D. Clarke, and S. A. Pozzi. "Optimizing the Position of Inorganic Scintillators in a Handheld Dual Particle Imager". *2020 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. 2020, pp. 1–5. DOI: [10.1109/NSS/MIC42677.2020.9508098](https://doi.org/10.1109/NSS/MIC42677.2020.9508098)
3. W. M. Steinberger, **N. Giha**, M. Bondin, S. D. Clarke, and S. A. Pozzi. "Neutron Imaging and Spectroscopy of Plutonium Using a Handheld Dual Particle Imager". *2019 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. 2019, pp. 1–3. DOI: [10.1109/NSS/MIC42101.2019.9059619](https://doi.org/10.1109/NSS/MIC42101.2019.9059619)
4. **N. Giha**, M. L. Ruch, A. Di Fulvio, W. M. Steinberger, and S. A. Pozzi. "Readout Electronics of a Handheld Dual Particle Imager". *2017 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. 2017, pp. 1–3. DOI: [10.1109/NSSMIC.2017.8532622](https://doi.org/10.1109/NSSMIC.2017.8532622)
5. A. Di Fulvio, K. A. Beyer, T. H. Shin, **N. Giha**, S. D. Clarke, and S. A. Pozzi. "SiPM readout of stilbene crystals for safeguards applications". *2017 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. 2017, pp. 1–3. DOI: [10.1109/NSSMIC.2017.8532859](https://doi.org/10.1109/NSSMIC.2017.8532859)

Invited talks

- | | |
|----------|--|
| Jul 2021 | Neutrons & Gammas from Fission
<i>2021 MTV Nuclear Engineering Summer School (244 students)</i> |
| May 2020 | Gamma-Ray Detection
<i>2020 MTV Nuclear Engineering Summer School (224 students)</i> |

Conference presentations

1. Correlations Between γ -Ray Multiplicity and Compound Nucleus Excitation Energy in $^{239}\text{Pu}(n, f)$
University Program Review 2022 (Jun 2022)
2. Correlations between γ -ray multiplicity and incident neutron energy in $^{239}\text{Pu}(n, f)$
2022 MTV Workshop (Mar 2022)
3. Decay properties of low- and high-spin beta-decaying isomers in ^{146}La
2021 Fall Meeting of the APS Division of Nuclear Physics (Oct 2021)
4. Excitation energy dependence of fission neutron and γ -ray emission from $^{239}\text{Pu}(n, f)$
University Program Review 2021 (Sep 2021)
5. Exploring novel wavelength shifters in organic glass scintillators
2021 MTV Workshop (Mar 2021)

6. Melt-Cast Organic Glass Scintillators for a Handheld Dual Particle Imager
2020 IEEE Nuclear Science Symposium and Medical Imaging Conference (Nov 2020)
7. A Palm-Sized Adaptive Neutron Scatter Camera
MTV Virtual Student Research Symposium (Jun 2020)
8. Melt-Cast Organic Glass
2020 MTV Workshop (Mar 2020)
9. Development of a Neutron Scatter Camera using SiPMs Coupled to Stilbene
2019 American Nuclear Society Student Conference (Apr 2019)
10. Readout Electronics of a Handheld Dual Particle Imager
2018 CVT Workshop (Oct 2018)
11. Resolving the Position of Fission Sources in a ^3He Well Counter using List-Mode Analysis
Los Alamos National Laboratory Student Symposium (Aug 2018)
12. SiPM Readout of Stilbene Crystals for a Fast-Neutron Multiplicity Counter
2018 American Nuclear Society Student Conference (Aug 2018)
13. Readout Electronics of SiPMs Coupled to Stilbene in a Fast-Neutron Multiplicity Counter
2017 CVT Workshop (Nov 2017)
14. Readout Electronics of a Handheld Dual Particle Imager
2017 IEEE Nuclear Science Symposium and Medical Imaging Conference (Oct 2017)
15. Prototype Printed Circuit Board for Readout of a Handheld Dual Particle Imager
2016 Consortium for Verification Technology Workshop (Oct 2016)

Mentorship and teaching

Jan 2022 – Present	Isabel Hernandez (undergraduate) Project: Simulating γ -ray cascades from highly-excited nuclei
Jan 2021 – Present	James Baker Jr. (undergraduate) Project: Multiplicity correlations in fast neutron-induced fission
Jan 2020 – Mar 2020	Emma Cho (undergraduate) Project: Casting and characterizing organic glass scintillators
Fall 2018	Instructional Assistant, NERS 211: Introduction to Nuclear Engineering & Radiological Sciences (University of Michigan) Delivered lessons, graded assignments, and held office hours for a course on basic principles of nuclear physics and engineering. This course was intended for upper-level engineering majors outside the department (47 students).

Outreach

- Summer 2022 **University of New Mexico/U. Michigan Undergraduate Research Experience**
Hosted visiting undergraduate students from the University of New Mexico. Coached the students on graduate school and fellowship applications.
- Summer 2019 **Consortium for Verification Technology Outreach Program**
Hosted laboratory tours for high school students belonging to groups that are historically underrepresented in STEM. Taught basics of radiation interactions with matter and detector physics.
- Summer 2019 **Xplore Engineering Outreach Program**
Introduced University of Michigan alumni and their 4th - 7th grade children to radiation detection through laboratory tours and demonstrations.

Leadership

- 2020 – Present **Detection for Nuclear Nonproliferation Group**
Fellowships & Scholarships Lead
- 2019 – 2021 **UM Student Chapter, IEEE Nuclear & Plasma Sciences Society**
President 2020-21
Vice President 2019-20
- 2018 – 2021 **UM Student Chapter, Institute for Nuclear Materials Management**
President 2020-21
Vice President 2019-20
Communications Chair 2018-19

Technical skills

Programming languages

Proficient in: Python, C++, Mathematica

Familiar with: C#, MATLAB

Software

ROOT, RadWare, MCNP, Geant4, ~~LaTeX~~ LaTeX, Git, CAEN FPGA, CadSoft EAGLE (PCB design & layout), SolidWorks (CAD), SRIM

Hardware

Machining, soldering, detector construction

Languages

English (fluent), French (basic), Korean (basic), Spanish (basic)

Professional membership

2021 – Present	American Physical Society
2019 – Present	IEEE Nuclear & Plasma Sciences Society
2017 – Present	Institute for Nuclear Materials Management
2016 – 2022	American Nuclear Society

Last updated on July 8, 2022