Mounia Laassiri

PH.D. IN PHYSICS AND NUCLEAR INSTRUMENTATION

Brookhaven National Laboratory, Bldg 510a, P.O. Box 5000, Upton, NY 11973-5000, USA

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Languages: English (proficiency), French (Excellent), Finnish (fair), Arabic (native)

Current Positions

Postdoctoral Researcher, Brookhaven National Laboratory (BNL) — *Upton, NY, USA*

ATLAS Experiment and African School of Physics. — *May 2024 - Present*

Senior Research Associate, University of Johannesburg (UJ) — *Johannesburg, South Africa*

ATLAS upgrade, fiber optic sensors, and contributions to research and teaching in Africa. — *Oct. 2024 - Present*

Previous Positions

Reasearch Visitor, Helsinki Institute of Physics, University of Physics — *Helsinki, Finland*

POSEIDON - Position-sensitive detectors for nuclear fuel imaging — *Jun. 2023 - May 2024*

Postdoctoral Researcher, Helsinki Institute of Physics, University of Physics — *Helsinki, Finland*

POSEIDON - Position-sensitive detectors for nuclear fuel imaging — *Jun. 2022 - May 2023*

Member of Nexus Ubuntu Reactors, University of Johannesburg — *Johannesburg, South Africa*

Ubuntu Reactors- Modelling Nuclear Reactors with Geant4 — *Dec. 2019 - May 2022*

Research interests

- Assembly and testing of the ATLAS strip tracker upgrade (ITk)
- Fiber optic sensors
- Nuclear Instruments and Measurements
- Nuclear Safety, Security and Safeguards
- Nuclear Medicine & Medical Imaging
- Detector R&D; Simulations; Data analysis
- Reactor Studies and Simulations

Education

Ph.D. in Physics and Nuclear Instrumentation — *Mohammed V University, Morocco*

THESIS: NEUTRON SIGNALS NONNEGATIVE TENSOR BLIND SOURCE SEPARATION: APPLICATION TO n/γ DISCRIMINATION — *Nov. 2014 - Apr. 2019*

Specialized Master's Degree: Security of Computer Networks and Embedded Systems — *Mohammed V University, Morocco*

THESIS: DEVELOPMENT OF WAVELET BASED TOOLS FOR PROCESSING AND CHARACTERISING THE γ-RAY SPECTROMETRY — *Sep. 2011 - Nov. 2013*

Bachelor's Degree in Fundamental Physics — *Mohammed V University, Morocco*

THESIS: IONIZING RADIATION AND RADIOPROTECTION — *Sep. 2008 - Jun. 2011*

Work Experience

Brookhaven National Laboratory — *Upton, NY, USA*

POSTDOCTORAL RESEARCH— ATLAS ITK STRIPS PHASE II TRACKER UPGRADE — *May 2024 Present*

- Working on various tasks related to the ATLAS Phase II tracker upgrade, focusing on the strips barrel at Brookhaven National Laboratory.
- Developing interlock systems to ensure safe thermal cycling of silicon strip modules, enhancing operational safety and reliability.
- Involved in quality control (QC) for the ITk strips barrel modules, utilizing a coldjig setup for temperature control, data acquisition (DAQ), and hardware monitoring.
- Serving as US contact of the coldjig software.

University of Johannesburg
Johannesburg, South Africa

Senior Research Associate— ATLAS ITk
Oct. 2024 - Present

- ATLAS Experiment.
- Upgrade work on fibre optic sensors.
- Contributions to the discipline and teaching across the African continent.

Brookhaven National Laboratory
Upton, NY, USA

Research Visitor— ATLAS ITk
Dec. 2023 - May 2024

- Environmental Monitoring System of the ATLAS ITk Clean room.
- ITk strips module testing software, specifically coldjig software development for environmental monitoring

Brookhaven National Laboratory
Upton, NY, USA

Research Visitor— Evaluation of Position-Sensitive Virtual Frisch-Grid CZT Detectors
Jun. 2023 - Dec. 2023

- Fabricated and tested pixelated CZT detectors for gamma-ray detection.
- Investigated the use of CZT and germanium detectors for position-sensitive gamma-ray detection, contributing to advancements in 3D imaging technologies.
- Employed two-site event reconstruction to demonstrate the array's Compton imaging capability.

Helsinki Institute of Physics, University of Helsinki
Helsinki, Finland

Research Visitor— POSEIDON: Position-sensitive detectors for nuclear fuel imaging
Jun. 2023 - May 2024

- Provided expertise in nuclear fuel imaging, laying the groundwork for the continuation of the POSEIDON project.
- Acted as a consultant, advising on advanced simulation techniques and experimental validation strategies.
- Contributed to a research publication.

Helsinki Institute of Physics, University of Helsinki
Helsinki, Finland

Postdoctoral Researcher— POSEIDON: Position-sensitive detectors for nuclear fuel imaging
Jun. 2022 - May 2023

- Studied the performance of a Passive Gamma Emission Tomography (PGET) device utilizing state-of-the-art 3D position-sensitive semiconductor gamma-ray detectors.
- Developed a Monte Carlo simulation framework using the Geant4 toolkit to simulate detector performance, validated through code-to-code verification and experimental data from the Helsinki Institute of Physics (HIP)/University of Helsinki and Uppsala University.
- Explored the potential of Compton imaging to trace the origin of gamma rays along spent nuclear fuel assemblies (SFAs), enhancing the precision of nuclear fuel imaging.

University of Johannesburg
Johannesburg, South Africa

Member of Nexus Ubuntu Reactors, University of Johannesburg
Dec. 2019 - May 2022

- Provided expertise in nuclear reactor simulation.
- Contributed to a research publication.

Brookhaven National Laboratory
Upton, NY, USA

Research Visitor— Liquid Argon Field Calibration System (LArFCS)
Oct. 2019 - Dec. 2019

- Developed a dedicated system to calibrate the field response functions for the wire-readout- based single-phase Liquid Argon Time Projection Chamber (LArTPC), enhancing TPC signal processing for automated event reconstruction.
- Constructed a LabVIEW-based DAQ program for LArFCS using commercial VME modules from CAEN, avoiding the complexity of the existing MicroBooNE NEVIS FPGA readout system.

Brookhaven National Laboratory
Upton, NY, USA

Research Visitor— Ubuntu Reactors: Geant4 modelling for Nuclear Energy
Jul. 2019 - Oct. 2019

- Developed a stochastic Monte Carlo (MC) simulation of a High Temperature Gas Cooled Reactor (HTGCR) using the Geant4 framework.
- Implemented basic neutronics, geometrical discretization, time slicing, and intra-slice persistence for studying spatial variations of physical parameters.
- Integrated thermal hydraulics via workflow scheduling and validated thermal macroscopic cross-section behavior, fission, burn, decay, and differential energy deposition processes.
- Conducted validation of Xenon effects on neutronics, criticality, and core behavior over multiple time steps.

Mohammed V University
Rabat, Morocco

Ph.D. Research— Software n/γ Discrimination Using Nonnegative Tensor Factorization (NTF) Algorithms
Nov. 2014 - Apr. 2019

- Applied Nonnegative Tensor Factorization (NTF) algorithms to extract independent components from signals recorded at the fission chamber preamplifier's output, achieving software-based n/γ discrimination.
- Simulated neutron flux in the TRIGA Mark II reactor using Monte Carlo methods with Geant4 and Garfield++ to model the fission process, energy deposition, and ionization in the fission chamber.
- Integrated Magboltz and Heed within Garfield++ for analysis of electron-ion drift lines and induced signals, providing a detailed simulation of stochastic events and detector response.
- Processed output signals using the NTFLab toolbox in MATLAB®.

Teaching and Mentoring

Teaching

Tutorial on Events Generation & Detector Simulation using Geant4— a simulation toolkit *Marrakesh, Morocco*

The 8th Biennial African School of Physics (ASP2024), Cadi Ayyad University *Jul. 7-21, 2024*

Tutorial on Events Generation & Detector Simulation using Geant4— a simulation toolkit *Port Elizabeth, South Africa*

The 7th Biennial African School of Physics (ASP2022), Nelson Mandela University (NMU) *Nov. 28- Dec. 9, 2022*

Instructor for Nuclear Physics Practical Work (Bachelor's Level) *Rabat, Morocco*

Faculty of Sciences, Mohammed V University *2015- 2016*

Mentoring

BNL: ATLAS ITk

Mentored and worked with various students based at BNL *Jan. 2024 - Present*

- Abdullah Sayed (PhD student, Brandeis University (US)): Mentoring in ITk strips module testing. Trained in testing procedures, troubleshooting, and documentation methods.
- Shuaiyan Kang (PostDoc, Duke University (US): Mentoring in ITk strips module testing. Trained in testing procedures, troubleshooting, and documentation methods.

ASP Mentorship:

Mentored and worked with ASP Alumni remotly *Jan. 2025 - Present*

- Khadija Charef (PhD student, HASSAN II University): Mentorship in Geant4 Simulation and Career Development, providing guidance on simulation techniques, research methodologies, and professional growth in the field.

Contribution to conferences, schools, and workshops

Oral Communications

- M. laassiri et al., *Performance of 8×8×32 mm^3 position-sensitive CdZnTe detector array for nuclear imaging*, The National Society of Black Physicists Conference (NSBP2023), Knoxville, Tennessee, November 10, 2023
- M. laassiri et al., *3D Position-Sensitive Semiconductor Detectors for Nuclear Fuel Imaging*, The 3rd African Conference on Fundamental and Applied Physics (ACP2023), Nelson Mandela University, George Campus, South Africa, September 27, 2023
- M. laassiri et al., *Monte Carlo study of a 3D Position-Sensitive Semiconductor gamma-ray Detectors for Nuclear Fuel Imaging*, *Seminar* at the Uppsala University, January 20, 2023
- M. laassiri et al., *Ubuntu reactors– Modelling Nuclear Reactors w/ Geant4*, The second African Conference of Fundamental and Applied Physics (ACP2021), March 07, 2022
- M. laassiri et al., *ASP Online Seminars: Neutron/Gamma Identifications in Nuclear Reactors*, Online lecture, April 27, 2021
- M. laassiri et al., *Neutron Signals Nonnegative Tensor Blind Source Separation: Application to neutron/gamma discrimination*, NSBP2019, The National Society of Black Physicists Conference, Providence, Rhode Island November 16, 2019
- M. laassiri, E-M. Hamzaoui and R. Cherkaoui El Moursli, *Application of Nonnegative Tensor Factorization Algorithm for Neutron-Gamma Discrimination*, NPW2017, The XXIV Nuclear Physics Workshop, Kazimierz Dolny, September 21, 2017
- M. laassiri & al., *Emergency planning and response*, Joint ICTP-IAEA School on Nuclear Energy Management (NEM), the Abdus Salam International Center for Theoretical Physics (ICTP) Trieste, Italy, November 13, 2015

Poster Communications

- P. Dendooven et al., *Position-sensitive semiconductor detectors for nuclear fuel imaging*, iWoRiD2023 "24th International Workshop On Radiation Imaging Detectors" at Oslo Science Park, June 25-29, 2023
- M. laassiri et al., *Fission Chamber's Identification and Characterization Using Nonnegative Tensor Factorization Algorithms*, EFMMIN5 "The fifth edition of the Franco-Moroccan School of Measurement and Instrumentation Nuclear" at Mohammed V University-2018, October 9, 2018
- M. laassiri et al., *Neutron-Gamma Discrimination Based on Nonnegative Tensor Factorization Methods*, Spring2017, The 12th International Spring Seminar on Nuclear Physics "Current Problems and Prospects for Nuclear Structure" at Ischia, Italy-2017, May 18, 2017
- H. Arahmane et al., *Neutron-gamma discrimination using non-negative matrix factorization blind sources separation algorithms* ND2016, "International Conference on Nuclear Data and Technology Bruges" at Bruges Belgium-2016, September 13, 2016
- M. laassiri et al., *A Monte Carlo simulation of the fission chamber neutron-gamma discrimination using the NTF* ASP2016, "African School of Physics" at the University of Rwanda-2016, August 18, 2016
- M. laassiri et al., *A Preliminary Study on Fission Chamber Simulation for Neutron Gamma Discrimination using Geant4 and NTF*, EFMMIN4 "The fourth edition of the Franco-Moroccan School of Measurement and Instrumentation Nuclear" at Aix Marseille University-2016, July 20, 2016

Seminars and Colloquia

- M. laassiri et al., *3x3 array module of 8x8x32 mm^3 position-sensitive virtual Frisch-grid CdZnTe detectors for imaging and spectroscopy of cosmic gamma-rays*, BNL, Instrumentation Division, Mar. 19, 2024
- M. laassiri et al., *Monte Carlo study of a 3D Position-Sensitive Semiconductor gamma-ray Detectors for Nuclear Fuel Imaging*, University of Illinois Urbana-Champaign Champaign, Department of Nuclear, Plasma, and Radiological Engineering, Jul. 27, 2023
- M. laassiri et al., *Monte Carlo study of a 3D Position-Sensitive Semiconductor gamma-ray Detectors for Nuclear Fuel Imaging*, BNL, Instrumentation Division, Mar. 22, 2023
- M. laassiri et al., *Monte Carlo (MC) modelling of a nuclear reactor core using the Geant4 framework*, Nuclear Reactors ***Seminar***, Brookhaven National Laboratory (BNL), Nuclear Science and Technology Department, Bldg. 817, De. 18, 2019

Publication

- S. Saariokari et al., *Nuclear fuel imaging using position-sensitive detectors.*, JINST, 2025, https://iopscience.iop.org/article/10.1088/1748-0221/20/03/C03012
- A. E. Bolotnikov et al., *3x3 array module of 8×8×32 mm^3 position-sensitive virtual Frisch-grid CdZnTe detectors for imaging and spectroscopy of cosmic gamma-rays.*, NIMA, 2024, NIMA, 10.1016/j.nima.2024.169328
- V. Rathor et al., *First experimental demonstration of the use of a novel planar segmented HPGe detector for gamma emission tomography of mockup fuel rods.*, Nuclear Technology, 2023, Nuclear Technology, doi.org/10.1080/00295450.2023.2236882
- P. Dendooven et al., *Passive methods for spent fuel characterisation at the Finnish geological repository.*, Italian Physical Society, 10.1393/ncc/i2023-23047-4
- A.C. Cilliers, S.H. Connell, J. Conradie, M.N.H. Cook, M. laassiri, B.G. Maqabuka, R. Mudau, P. Naidoo and D. Nicholls, *Towards a Monte Carlo simulation of a pebble bed type high temperature gas cooled reactor using Geant4*, Annals of Nuclear Energy (2021), ANE-108868
- M. laassiri, E-M. Hamzaoui and R. Cherkaoui El Moursli, *Validation of the neutron and gamma fields in the Moroccan TRIGA Mark II reactor using Nonnegative Tensor Factorization approach: Comparison of performances of the Geant4/Garfield++ and pyFC interfaces*, Acta Phys. Pol. B Proc. Suppl., vol. 11 (2018), p. 73, APhysPolBSupp.11.73
- M. laassiri, E-M. Hamzaoui and R. Cherkaoui El Moursli, *Nonnegative Tensor Factorization Approach Applied to Fission Chamber's Output Signals Blind Source Separation*, J. Phys. Conf. Ser., vol. 966 (2018), p. 012063, IOP Conf. Series: Journal of Physics
- M. laassiri, E-M. Hamzaoui and R. Cherkaoui El Moursli, *Application of Nonnegative Tensor Factorization for neutron-gamma discrimination of Monte Carlo simulated fission chamber's output signals*, Results Phys., vol. 7 (2017), p. 1422-1426, rinp-2017

Memberships

2022- Present	**Member of,** American Physical Society
2022- Present	**Member of,** BNL, Early Career Resource Group (ECRG)
2021- Present	**Member of,** Women in Nuclear Morocco
2021- Present	**Member of,** Women in Nuclear Global (WIN Global) association
2020- Present	**Member of,** African Association of Physics Students
2019- Present	**Member of,** National Society of Black Physicists (NSBP)
2014- 2019	**Member of,** Science Team of Matter and Radiation (ESMaR), Mohammed V University

Computer skills

- **Computer Skills** LaTeX(and Overleaf), Office Suite
- **Programming Language** C/C ++, Java/JEE, Mathematica, Maple, Matlab, Python XML
- **Software** LabVIEW, Hybrid burnin and module thermal cycling (coldjig), ITk Strips DAQ (ITSDAQ)
- **OS** Windows (XP, 200X, Vista, 10), Linux (Ubuntu, Debian, Scientific linux)
- **Particle Transport Simulation** Geant4, Garfield++, MCNP5
- **Data Analysis** ROOT, Matlab, IDL
- **Blind Source Separation Algorithms** ICALab, NMFLab, NTFLab

Outreach and Extracurricular

I believe scientific fields should be accessible to young people, regardless of their background. Through my involvement in initiatives like ASP, ASFAP, APN, ArPS, and FIP, I am committed to mentoring the next generation of African and Arab physicists while contributing to physics education and research for Africa's development.

Organisations I have collaborated with

Jan. 2025 - Present	**Member-at-Large,** American Physical Society (APS) Forum on International Physics (FIP)
Oct. 2024 - Present	**Trustee of the Friends of the ASP (FASP),** African School on Fundamental Physics and Applications (ASP)
Sep. 2024 - Present	**Member of the Governing Council (GC),** Arab Physical Society (ArPS)
Mar. 2023 - Present	**Senior editor,** African Physics Newsletter (APN), American Physical Society
Jan. 2023 - Present	**Member of the International Organizing Committee (IOC) and Board of Trustees (BoT) of the Friends,** African School on Fundamental Physics and Applications (ASP)
Apr. 2020 - Present	**Co-convener,** Young Physicists Forum (YPF) at the African Strategy for Fundamental and Applied Physics (ASFAP)

Scientific and societal contributions

Oganisation of conferences, workshops ...

Sep. 14-20, 2025	**The 4th African Conference on Fundamental and Applied Physics,** ACP2025	*UL, Togo*
Jul. 7-21, 2024	**The 8th Biennial African School of Fundamental Physics and Applications,** ASP2024	*UCA, Morocco*
Sep. 25-29, 2023	**The 3rd African Conference on Fundamental and Applied Physics,** ACP2023	*NMU, South Africa*
Jun. 8, 15, 22, 19, 2022	**ASFAP,** YPF Physics Working Group Introductions Series	*Virtual event*
Jan. 26, 202	**ASFAP,** Young African Physicists' Workshop—Challenges and opportunities	*Virtual event*

Science outreach

Sep. 29, 2023	**Early Career African Physicists,** ASK An ASP (Alumni)	*NMU, South Africa*
Sep. 25, 2023	**Early Career Panel Discussion,** Beauty of Physics	*NMU, South Africa*

Publication

- M. Laassiri et al., ***ASFAP Working Group Summary of Societal Engagements***, arXiv:2205.11362, physics.soc-ph, arXiv:2205.11362
- B. Mulilo, M. Laassiri and D. Boye, ***Young Physicists Forum and the Importance for Education and Capacity Development for Africa***, physics.soc-ph, arXiv:2206.15171
- M. Laassiri, ***I didn't know a physicist could look like you!***, hipblog:april 2023

Examples of invited talks:

- M. Laassiri et al., ***The African School of Physics***, EuPRAXIA_PP Annual Meeting 2024, Elba, Italy, Sep. 27, 2024, ASP:Training and young researcher education
- M. Laassiri et al., ***An overview of the African School of Physics***, The 3^{rd} African Conference on Fundamental and Applied Physics (ACP2023), Nelson Mandela University, George Campus, South Africa, Sep. 27, 2023, The African School of Physics, 2023
- M. Laassiri et al., ***The African School of Fundamental Physics and Applications (ASP)***, Workshop on Exploring Collaboration with MSIs in Nuclear and Particle Physics, Brookhaven National Laboratory, Upton, New York, Jul. 19, 2023, The African School of Physics at BNL, 2023
- M. Laassiri, ***Young African in Nuclear Physics***, WDTS-RENEW BNL/Fermi Lab Exchange Summer School, Brookhaven National Laboratory, Upton, New York, Jul. 21, 2023,
- M. Laassiri, ***Young African in Nuclear Physics***, APS Virtual March Meeting 2023. Open SESAME: Waves of Success and Recognition Connecting Women Scientists Beyond Skepticism-Beyond Borders, Mar. 21, 2023, Young African in Nuclear Physics, 2023
- M. Laassiri, ***The Perspectives of the Young Physicists Forum of the African Strategy for Fundamental and Applied Physics (ASFAP)***, APS March Meeting 2023. Session Q50: International Perspective for Young Physicists from Particle to Materials, Mar. 8, 2023, The Perspectives of YPF, 2023
- M. Laassiri et al., ***The African School of Physics***, The 7^{th} edition of the biennial African School of Fundamental Physics and Applications (ASP2022), Dec. 3, 2022, The African School of Physics, 2022
- M. Laassiri et al., ***ASFAP Working Group Summary of Societal Engagements***, The 2^{nd} African Conference of Fundamental and Applied Physics (ACP2021), Mar. 11, 2022, ASFAP WG Summary of Societal Engagements, 2022
- M. Laassiri et al., ***Pan-African Physics Roadmap Definition— Societal Engagements***, Joint Conference: African Light Source, Pan African Conference on Crystallography, and African Physical Society, Nov. 16, 2021, ASFAP— Societal Engagements, 2021
- M. Laassiri et al., ***African Young Physicists Forum***, The 6^{th} Biennial African School of Physics (ASP2021), Jul. 23, 2021 African YPF, 2021
- M. Laassiri et al., ***The African School of Fundamental Physics and Applications (ASP)***, DPF2019, The American Physical Society Division of Particles & Fields (DPF) Meeting, Boston, Jul. 30, 2019 ASP at DPF2019, 2019