

# ASP short-term visits for research — Introduction



Summer 2019 BNL



January 23, 2024

Kétévi A. Assamagan

# ASP Alumni at BNL 2019-2023



## June-December 2019. From left:

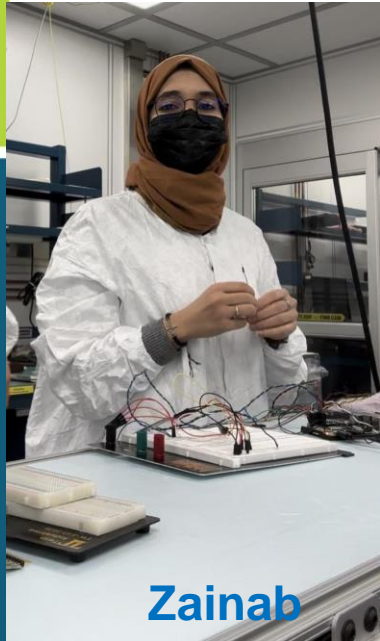
In front, Christelle Ekosso (Cameroon), Dr. Mounia Laassiri (Morocco); standing, Diallo Boye (Senegal), Dr. Somiealo Azote (Togo), Jesutofunmi Fajemisin (Nigeria), Hassnae El Jarrari (Morocco), Dr. Kétévi A. Assamagan, Raymond Yogo (Kenya), and Yves Kini (Burkina Faso). **Heba Sami Abdulrahman (Egypt), not in the figure, arrived in September 2019.**



## July 2022 – February 2023. From left:

Asmaa Aboulhorma (Morocco),  
Zainab Soumami (Morocco),  
Kétévi A. Assamagan,  
Antalia Rabarisoa (Madagascar),  
Xola Mapekula (South Africa),  
Kayode Dada (Nigeria),  
Rado Fanantenana (Madagascar)

# ASP Alumni short-term visits for research



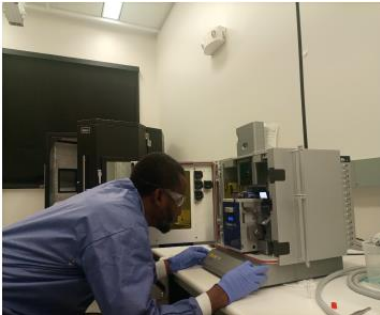
Zainab



Antalia

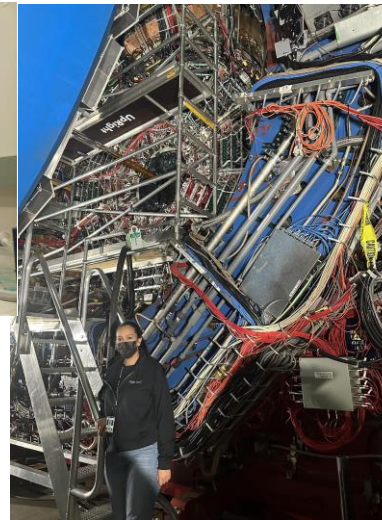


Rado



Kayode

Cohort of 2022-2023



Asmaa



Xola

Congratulations



August 2022 – February 2023.

From left:

Asmaa Aboulhorma (Morocco),  
Zainab Soumami (Morocco),  
Dr. Kétévi A. Assamagan,  
Antalia Rabarisoa (Madagascar),  
Xola Mapekula (South Africa),  
Dr. Kayode Dada (Nigeria),  
Rado Fanantenana (Madagascar)

# ASP Alumni at BNL 2023-2024

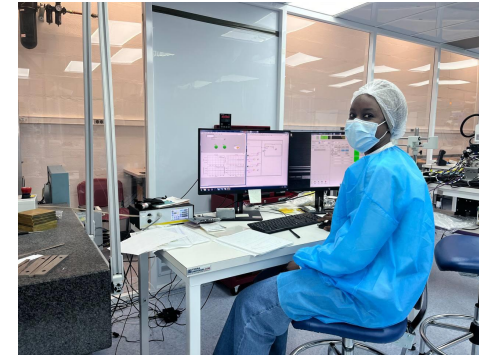
- 6 ASP alumni for the period of June 2023 - April 2024
  - From Kenya, Morocco, Senegal and Togo
  - 1 arrived on June 18, 2023
  - 4 arrived on July 31, 2023
  - 1 arrived on January 21, 2024
  - **Today, we will hear from 4 who will depart on January 28, 2024, after 6 months at BNL.**



**Gloria Maithya (Kenya)**



**Fatima Bendebba (Morocco)**



**Aissata Ly (Senegal)**



**Augustin Sokpor (Togo)**

# ASP alumni countries of citizenship

2019 (9)

2022-2023 (6+)

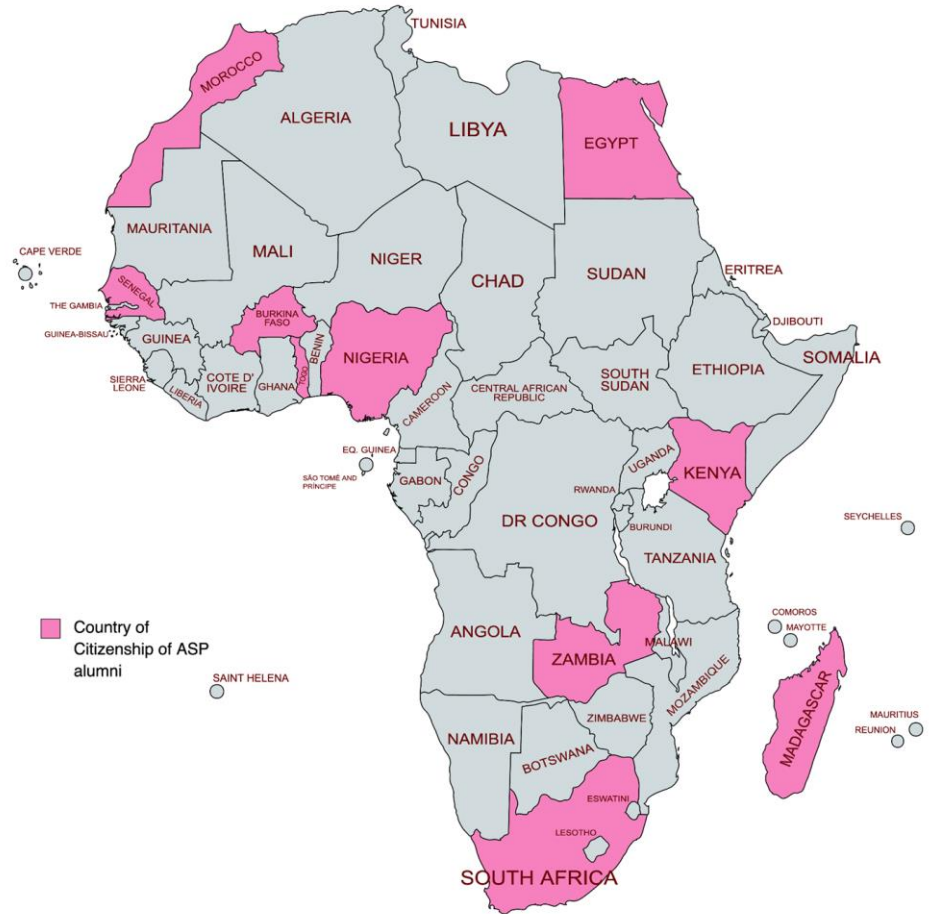
2023-2024 (6)

22 alumni

From 10 countries

## Areas of concentration:

Astrophysics & cosmology, nuclear physics, particle physics, light sources & materials characterization, nanoscience, nuclear instrumentation, radionuclide production & medical physics, particle accelerators, HEP computing.



Created with mapchart.net

# Acknowledgements

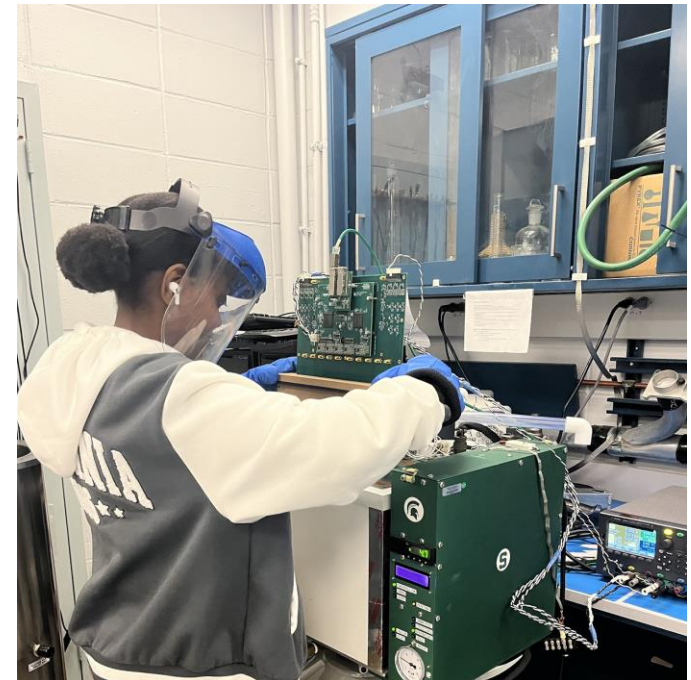
- **DOE Office of Science**
- **BNL DEI Office, NPP Diversity Council**
- **US-ATLAS**
- **Departments that hosted African students**
  - Physics Department, Collider Accelerator Department, Center for Functional Nanomaterials, NSLS-II, Advanced Technology Research Office
- **Groups / Departments & advisors that hosted students**
  - Electronic Detector Group, Omega Group, Medical Isotope Research and Production, CFN Soft and Bio Nanomaterials, Physics Theory Group, Astro & Cosmology Group, ATLAS Software & Computing, Instrumentation Division, ATF, all the Advisors & mentors
- **Administration**
  - Linda Feierabend, Eileen Morello, Tracy Trent, Menzel Smith-Jones, Grace Webster, Suzanne Junk, Sara Capp, Ivette Cruz, Linda Nevelino, Office of International Services
- **Folks who went beyond for quality of life at BNL**
  - Mary Bishai, Scott Snyder, Christian Weber, Robert Pisarski

# DUNE Cold Electronics Front End Chip Quality Control Testing and Data Analysis



**Gloria Katunge Maithya**

**The University of Nairobi -  
Kenya**



01/23/2024

Brookhaven National Laboratory

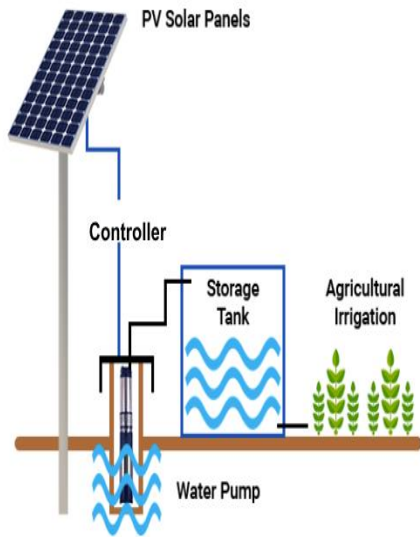


# Academic path

- **Sept 2016 – Sept 2020:** Bachelor's degree in Physics - University of Nairobi.
- **Sept 2020– Sept 2023:** Master's degree in Physics –University of Nairobi.
- **July 2023** - Became a licensed Solar Technician-Class 3 –EPRA, Kenya.



## \*Aug-Sept-2023:Solar Water Pumping Project\*



## Goals:





# ASP Attended:

- **Nov 2022- Dec 2022:** Participation in the ASP Summer School program at Nelson Mandela University in South Africa

Gloria 😊

Dr. Ketevi

Featured in the ASP magazine



## 100 years of physics — the past, the present and the future

2022 was the centenary of the International Union of Pure and Applied Physics, of which SA is one of the 13 founding members and which now has 60 member countries. These celebrations came at a critical time, as the UN Educational, Scientific and Cultural Organisation (Unesco) has highlighted that the basic sciences are being neglected worldwide. This has led to a state of serious vulnerability in disciplines such as physics, mathematics and statistics, all of which are key to innovation, development and the future world of work.

Also known as the fundamental sciences, the basic sciences include physics, biological sciences, chemistry, mathematics, statistics, computer science and geological sciences. The reason for the basic sciences not receiving anything near sufficient support in terms of funding, is because it is difficult to convince governments and funding agencies to pro-

Only now are gravitational waves being detected, as Einstein predicted in 1916. Inventions like GPS would not work without Einstein's theories of relativity.

Over the past 100 years, basic scientists have achieved fundamental advances, such as quantum mechanics, nuclear fission and fusion, the X-ray, the theory of evolution, and the internet/world wide web — a by-product of particle physics research at CERN (the European Organisation for Nuclear Research).

The basic sciences include physics, biological sciences, chemistry, mathematics, statistics, computer science and geological sciences



ASP 2022: A gathering of Africa's top physics students at ASP 2022 at Nelson Mandela University. Photo: @NelsonMandelaU

## Science students are inspired to solve Africa's problems

**Gillian Mkhize**  
Senior students invited to participate at the 2022 edition of the African School of Fundamental Physics and Applications (ASP 2022) went home inspired and enriched through their encounters with other bright sparks from all over Africa.

**South Africa: Amogelang Moeing**  
Amogelang Moeing, 21, is studying astrophysics for her master's degree at the University of Johannesburg. "Science shapes our world and tells a story of where we come from, where we are right now, and where we are going. The school has been very intense but so exciting at the same time, and I have learnt new concepts that align with my current project. I have also had the opportunity to make new friends from across Africa and I hope to collaborate with most of them on projects. The future looks exciting!"

**Togo: Augustin Sogpor**  
Augustin Sogpor, 25, who holds an MSc in Physics from Université de Lomé, sees physics as key for developing the continent. "This has helped me to understand atomic and nuclear physics. It opened my mind and

**Students featured:** SAMUEL WORUBI, CHENGA MUNGUNGA, GLORIA KATUNGE, FATIMA BENDERBA, DIMARFATO MANISO, AMOGELANG MOEING, AUGUSTIN SOGPOR, ARNOLD MUTIBUKI

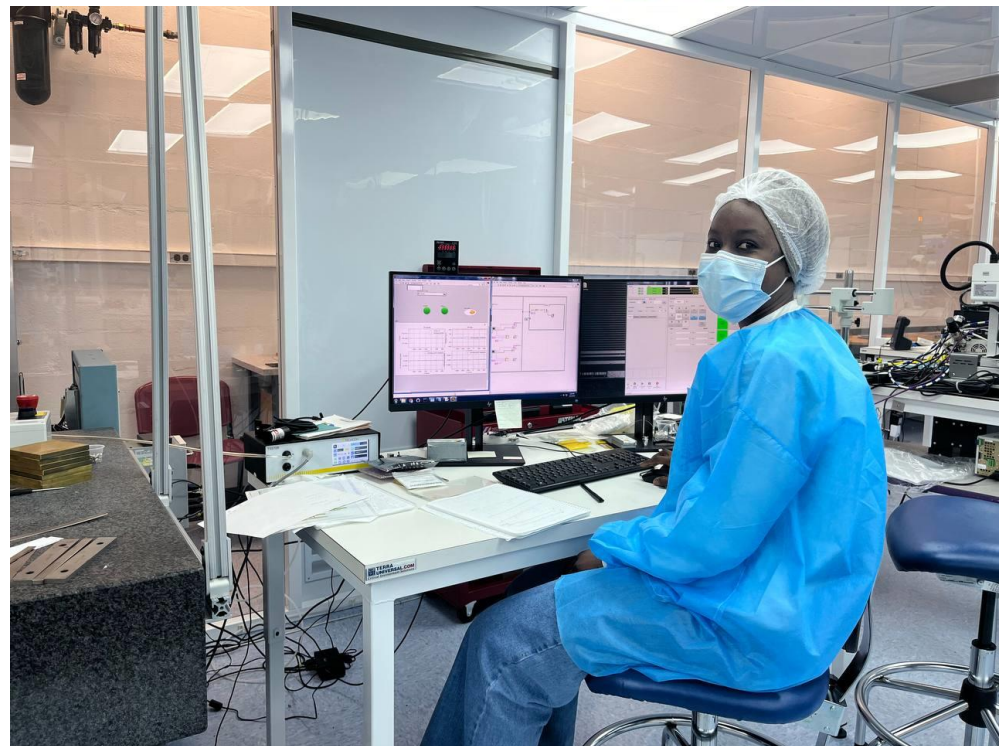
- **1<sup>st</sup> Aug 2023 – 28<sup>th</sup> Jan 2024:** Intern at BNL working with the Electronic Detector Group and Cold Electronic Group.

# ITK stave assembly at BNL



Aissata Ly

Institute of Applied  
Nuclear  
Technology-Cheikh  
Anta Diop university  
of Dakar  
Senegal



January 23, 2024

Brookhaven National Laboratory



# outline

- Academic path
- Motivation of ATLAS upgrade
- ITK stave assembly for barrel
- Quality control features to be added to LabView assembly program
- Summary
- Prospects and acknowledgements

# Academic path



First year of high school waiting for my first daughter

- Bachelor in physics and Chemistry Science of Substance from 2017 to 2021
- Master in nuclear and atomic physics started at 2021



First year of master, taking courses with my second daughter

# African school of fundamental physics and applications (ASP) 2024

I had a good result in physics field such as the Advanced Quantum Mechanics, Atomic and Nuclear physics.

This is reason why I was selected by our director to participate in this internship program and to participate for the ASP in 2024.

**THE EIGHTH BIENNIAL AFRICAN SCHOOL OF FUNDAMENTAL PHYSICS AND APPLICATIONS (ASP2024)**

Co-organized by Cadi Ayyad University and Mohammed V University  
at Faculty of Science Semlalia, Marrakesh, Morocco  
April 15<sup>th</sup>-19<sup>th</sup> and July 7<sup>th</sup>-21<sup>st</sup>, 2024

**ASP MISSION**  
To increase capacity development in fundamental physics and related applications in Africa. The ASP has evolved to be much more than a school. It is a program of actions with directed ethos toward physics as an engine for development in Africa

**SCIENTIFIC PROGRAM**

**TOPICS**

- Nuclear & Particle Physics
- Medical and Radiation Physics
- Applied and Industrial Physics
- Theoretical and Computational Physics
- Space Physics, Astrophysics & Cosmology
- Physics for Sustainable Development
- Condensed and Materials Physics Biophysics
- Capacity Development and Retention Discussion
- Physics Education, Outreach and Communication

**ACTIVITIES**

- Outreach for Secondary Schools April 15<sup>th</sup>-19<sup>th</sup>, and July 15<sup>th</sup>-19<sup>th</sup>, 2024
- Physics lectures, tutorials and hands-on experimentation for students, July 7<sup>th</sup>-21<sup>st</sup>, 2024
- Workshop for High School Teachers, July 8-12, 2024
- ASP Forum, July 13<sup>th</sup>, 2024

**INTERNATIONAL ORGANIZING COMMITTEE (IOC)**  
B. Acharya (ICTP and King's College London), K. Assamagan (BNL), C. Darve (ESS), F. Ferroni (INFN), M. Laassiri (HIP)

**INTERNATIONAL ADVISORY COMMITTEE (IAC)**  
N. Blackburn (BNL), M. Campanelli (UCL), D. Charlton (University of Birmingham), S. Connel (University of Johannesburg), A. Dabrowski (CERN), T. Ekelof (Uppsala University), J. Ellis (King's College London), L. Elouadhihi (TJNAF), E. G. Ferrero (USC), H. Gao (BNL), J. Govaerts (UCL), J. Gray (ASP), B. Heinemann (DESY), H. Holtkamp (SLAC), J. Huston (MSU), O. Ka (UCAD), Y. K. Kim (Chicago), D. Kobor (UASZ), S. C. Lee (Accademia Sinica), B. Masara (SAIP), H. Montgomery (TJNAF), S. Muanza (CNRS-IN2P3), R. Nemutudi (Themba LABS), M. Nxumalo (NRF), F. Quevedo (University of Cambridge), L. Rivkin (PSI & EPFL), L. Sarafini (INFN), H. Severini (Oklahoma), P. Skands (Monash), E. Tsesmelis (CERN), L. Vaccavant (CNRS-IN2P3), Z. Vilakazi (Witwatersrand), H. B. White Jr. (Fermilab), J. Yu (UTA)

**LOCAL ORGANIZING COMMITTEE (LOC)**  
A. Adachour (UCA), A. Arhrib (UAE), A. Belhaj (UM5), D. Benchekraou (UH2C), Z. Benkhaldoun (UCA), A. Boskri (UCA), M. Daoud (UIT), L. B. Drissi (UM5), M. Goughri (UIT), Y. Hassouni (UM5), A. Hoummada (AH2ST), F. Jabiri (UCA), T. Khalifa (UCA), Y. Khoulati (UH2C), A. Lahbas (UM5), M. Ouchrit (UM5), R. Sebini (UM5)

**CHAIRS**  
Mohamed Chabab (UCA)  
Farida Fassi (UM5)

<https://www.african-school-of-physics.org/asp2024/>



Thanks for your attention



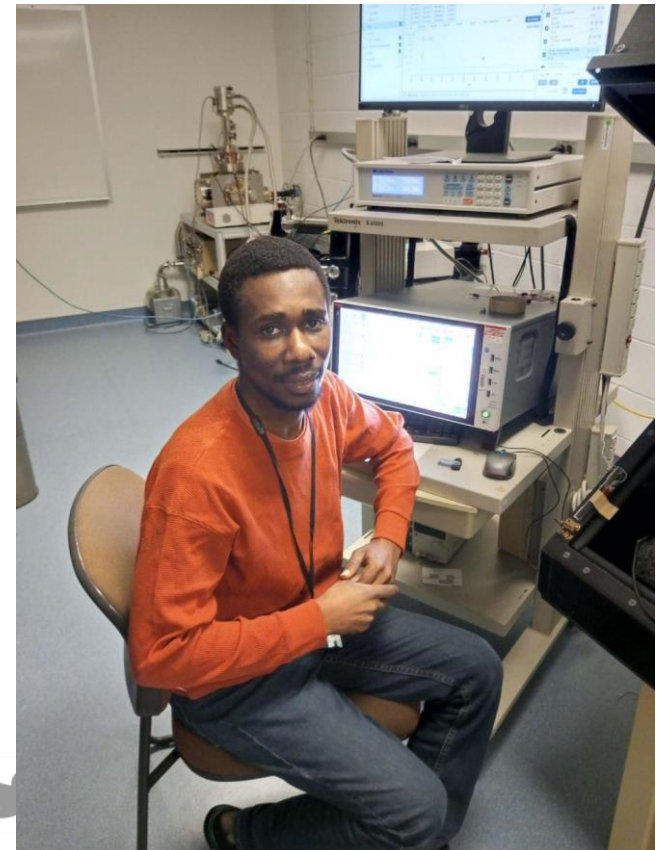
# DEVELOPMENT OF EQUIPMENT AND SETUP AIMED AT TESTING NOVEL AC-LGAD SILICON DETECTOR

**Komlan Augustin Sokpor**

**University of Lomé, Togo**

**January 23, 2024**

**Brookhaven National Laboratory**



# Outline

- Short synopsis of my academic path
- The African School of Physics (ASP) that I attended
- My arrival at BNL and my departure
- My work at BNL
- Summary
- Prospects and acknowledgements

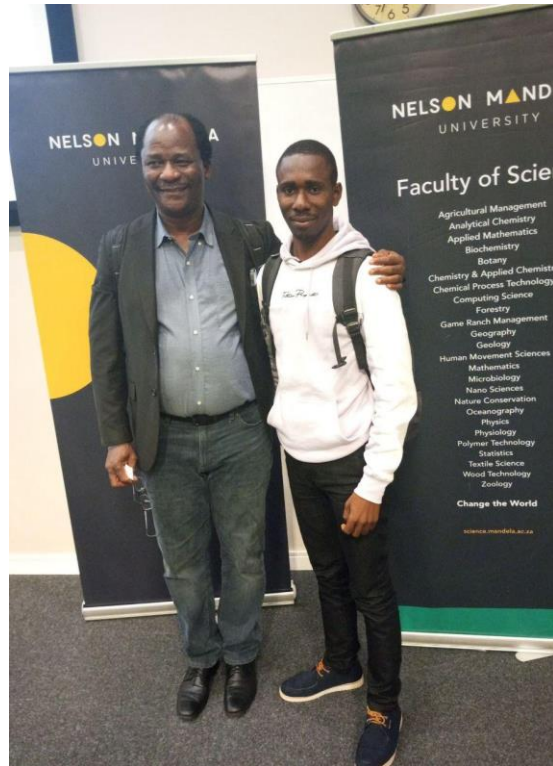


# Academic path

- ❖ 2015-2020: Bachelor's degree in Physics at the University of Lomé
- ❖ 2020-2022: Research Master in Materials Physics at the University of Lomé
- ❖ From 4 to July 14, 2022: introduction to the IAEA and safeguards course in Austria
- ❖ From November 27 to December 9, 2022 Attended the 7th edition of the African School of Physics (ASP2022), in Nelson Mandela University (South Africa)
- ❖ From July 31, 2023 until January 28, 2024 Internship in the Department of Physics at Brookhaven National Laboratory (Internship in progress)
- ❖ From 10 to 20 October 2023 Excellence in Detector and Instrumentation Technologies (EDIT School) at Brookhaven National Laboratory

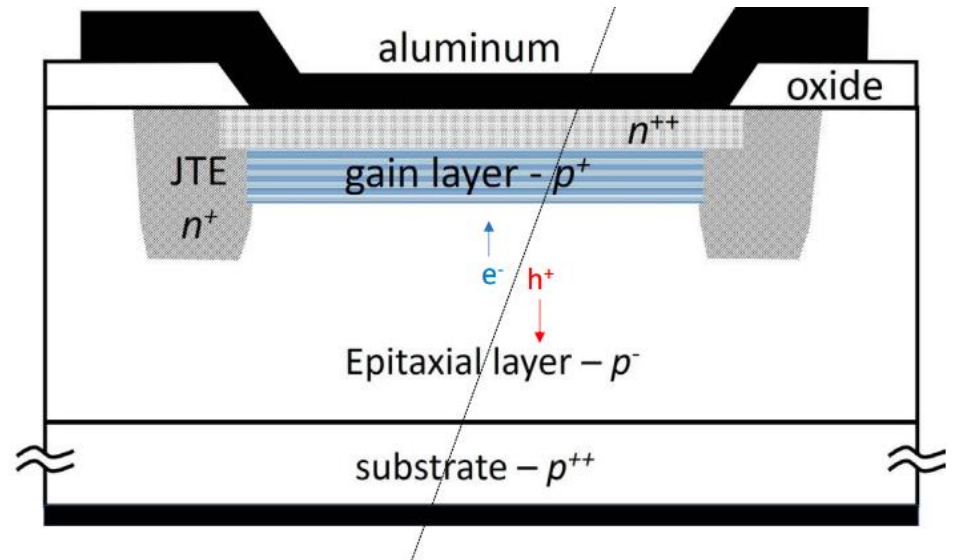
# ASP program I attended

I participated in ASP2022, the 7<sup>th</sup> edition which took place at Nelson Mandela University. Being interested in research in High Energy Physics, I benefited from internship at BNL with the aim of acquiring knowledge and practical experience in Particle Physics.



# Low-Gain Avalanche Diodes based Silicon Detector

LGAD are class of silicon sensors developed for the fast detection of minimum ionization particle. Built on thin silicon substrates and featuring an internal moderate gain, they provide fast signals, for excellent timing, performance, which are therefore useful to distinguish the different tracks. We distinguish several families of LGAD, namely: capacitively coupled LGADs (AC-LGAD), deep-junction LGADs (DJ-LGAD) and trench-isolated LGADs (TI-LGADs).



# Probing the Higgs self-coupling with $HH \rightarrow b\bar{b}l\bar{l} + MET$ final states at the LHC and beyond



**Fatima Bendebba** (Hassan II University of Casablanca)

**Advisors** : Dr. Elizabeth Brost (BNL),

Dr. Abraham Tishelman-Charny (BNL)

**Host** : Dr. Kétévi Assamagan (BNL)



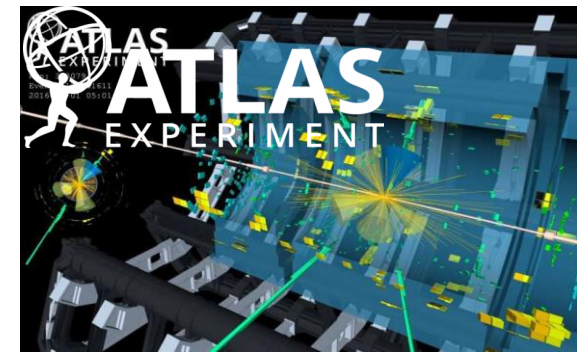
January 23, 2024

Brookhaven National Laboratory



# About me and my Academic Journey in Brief

- Fatima Bendebba
- From Casablanca - Morocco
- **2017:** Got my B.S. in Nuclear Physics at **Hassan II University of Casablanca** (3 years)
- **2019:** Got my master's degree in Computing and Scientific Instrumentation in High Energy Physics at **Hassan II University of Casablanca** (2 years)
- **2020:** Started my PhD at the same institute working in collaboration with the ATLAS experiment of CERN (still ongoing):
  - ATLAS **H**igh **G**ranularity **T**iming **D**etector (**HGTD**) Project on which I did my QT
  - Working on **Higgs pair production**



# My experience as an ASP2022 Alumni



- **2022:** Selected to attend the 7th edition of the African School of Physics, ASP2022, in Gqeberha, South Africa
- Great and memorable experience, both academically and socially
- ASP2022 was a very successful edition thanks to the community organizers and lecturers that gave amazing lectures and accompanied us throughout the journey
- Thanks to this wonderful program, I got the chance to be here today with you at BNL 🙏



# My experience at BNL

- Started my journey at **BNL** in **July 31**
- Working on Higgs boson production by focusing on the bbl final state with guidance from **Dr. Elizabeth Brost** and **Dr. Abraham Tishelman-Charny**
- Acquired knowledge about the ATLAS Inner Tracker (ITk) and participated in module testing with guidance from **Emily Duden**



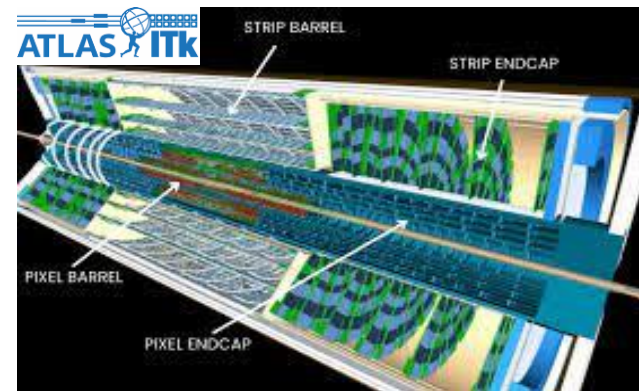
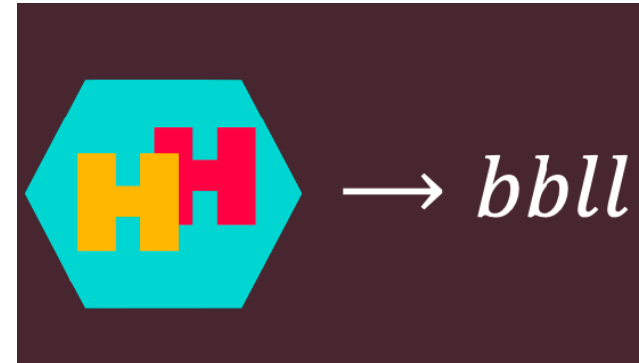
- Engaged with the vibrant scientific community at the lab, fostering connections with colleagues, and had the opportunity to visit various experiments within the facility



- Got the opportunity to attend the the Excellence in Detector and Instrumentation Technologies (**EDIT**) school at BNL where I had the chance to learn about silicon detectors and interact with researchers from diverse backgrounds

# Outline (My work at BNL)

- The analysis overview
  - $HH \rightarrow b\bar{b}l\bar{l} + \text{MET}$  : Results with full Run 2 data
- $HH \rightarrow b\bar{b}l\bar{l} + \text{MET}$  : Ongoing R&D for Run 3 data
- HL-LHC and ATLAS Inner Tracker (ITk)
  - Motivation
  - ITk Module Testing at BNL
- Summary





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Thank you شكرا

**Merci**